

**The *Immediate Postnatal Women's Assessment (ImPoWA)* tool: self-care
for the postnatal period**

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requirements of
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by
Dr Teesta Dey**

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Abstract

Background: The second half of the Sustainable Development Goals era is upon us. However, progress in reducing maternal mortality, particularly in sub-Saharan Africa, is insufficient to meet the 2030 deadline. The highest morbidity and mortality for mothers occurs in the immediate postnatal period. Despite its worth, immediate postnatal care (iPNC) is far from universal. Although median coverage in sub-Saharan Africa is 71%, gaping inequities still exist both between and within countries. Emerging evidence recognises that capacitating mothers to be active agents in protecting their health provides an innovative and equitable strategy to strengthen coverage, usage and quality of key reproductive services. To the researcher's knowledge, self-care strategies focusing on providing key information to mothers and their birth companions to actively and repeatedly participate in their iPNC monitoring has not been researched before. This study aims to develop and evaluate the Immediate Postnatal Women's Assessment (ImPoWA) tool with which Ugandan mothers can monitor their own health.

Methods: A sequential mixed methods approach was undertaken that adopted local community engagement at every phase. The sequential approach allowing iterative adjustment during rounds of development and evaluation. Coverage, time trends and determinants of immediate postnatal care (iPNC) were analysed from three Ugandan DHS surveys representing 12,872 mothers and explored through twelve stakeholder interviews to identify gaps and solutions. A systematic literature review and Delphi method with 113 global experts was used to develop the content of the ImPoWA tool. Thirty interviews with Ugandan mothers, birth companions and health-workers were conducted to refine the tool and elicit implementation factors. Finally, the tool was tested with 60 Ugandan mothers and birth companions.

Results: Coverage of iPNC in Ugandan health facilities was 65.0% (95% CI 63.2-66.7%); improved health literacy and active involvement of mothers in their care were identified as key solutions. Forty-four iPNC guidelines were identified, containing 351 critical symptoms. Global expert consensus was achieved on 19 symptoms. Qualitative interviews provided contextualised data to refine the ImPoWA tool to include 16 symptoms and highlighted the need for mixed-modal approaches (words, pictures and audio) to aid with health literacy and

the value for the tool in empowerment. Testing of the tool showed that 12/16 symptoms were fully understood, and use of all three tool modalities significantly improved understanding. Ninety-eight percent of participants found the tool suitably assessed their health and 93% of participants found the approach and tool acceptable.

Conclusions: ImPoWA, an evidence-based, context-specific self-assessment tool has been developed to improve community iPNC health literacy through mother and birth information empowerment. The study has highlighted that an integrated multi-format approach including use of the human voice is the most effective approach. This study provides a roadmap for meaningfully engaging community members in tool development whilst the tool provides an opportunity to improve equitable coverage and quality of iPNC in all settings.

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List of Abbreviations

Abbreviation	Description
ANC	Antenatal Care
DHS	Demographic Health Surveys
GDP	Gross Domestic Product
HIV	Human Immunodeficiency Virus
ImPoWA	Immediate Postnatal Women's Assessment tool
iPNC	Immediate Postnatal Care
LMIC	Low- and Middle-Income Countries
MDG	Millennium Development Goal
MMR	Maternal Mortality Ratio
MRRH	Mbale Regional Referral Hospital
NPC	Non-Physician Clinician
ODA	Overseas Development Aid
PNC	Postnatal Care
RCOG	Royal College of Obstetrics and Gynaecology
PET	Preeclampsia Toxaemia
PPH	Postpartum Haemorrhage
SDG	Sustainable Development Global Goals
UK	United Kingdom
WHO	World Health Organization

Chapter 1- Introduction and background

Purpose of this chapter

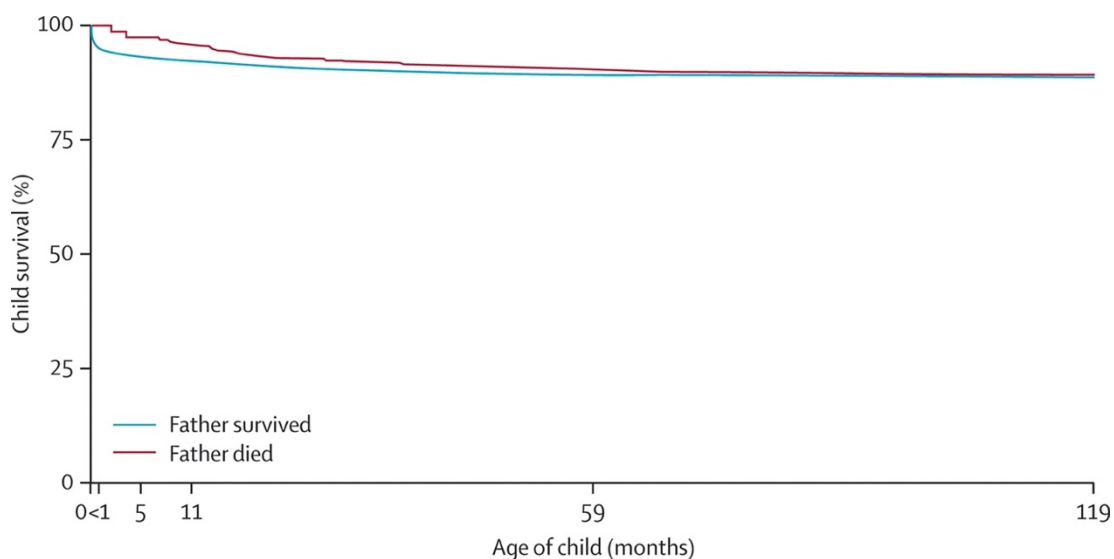
This chapter introduces the current epidemiological status of global maternal health. It presents Uganda as a setting of interest due to its high maternal mortality and morbidity and discusses how the Ugandan healthcare system is arranged. The chapter describes why the postnatal period and specifically immediate postnatal period is crucial for maternal survival. It outlines the content of immediate postnatal care (iPNC) globally and specifically in Uganda. Global and Ugandan coverage of iPNC are also presented. It reviews the potential barriers to coverage and utilisation of care in Uganda detailed in the literature from both the demand and supply side as well as existing opportunities to address these barriers.

The priority of international maternal health

“We are born of love; love is our mother”- Rumi

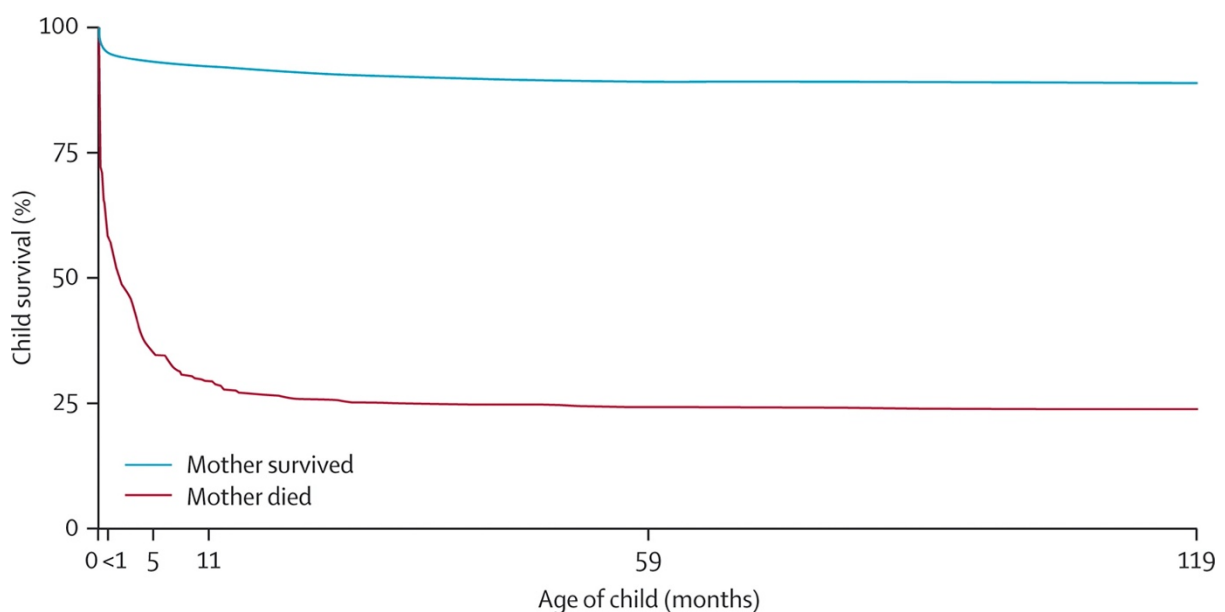
No truer statement could be made - yet the value of mothers transcends beyond poetry as being critical to the health and wellbeing of our communities. Globally mothers are the primary caregivers at home and their absence uniquely affects the health and survival of their children, particularly in communities where no other carers can step in.¹ When examining parental death in Bangladesh, Ronsman et al conducted a child survival analysis from birth up to 10 years depending on the survival status of parent.¹ Paternal death had no impact on child survival (Figure 1).

Figure 1: Kaplan-Meier survival curve from birth according to survival status of father¹



However, when looking at the impact of a maternal death, the disparity in child survival between a mother that survived versus a mother that died was significant (Figure 2). The cumulative probability of survival up to 10 years of age was 24% in children whose mothers died before the child's tenth birthday, compared with 89% for children whose mothers stayed alive. Although the greatest impact of maternal survival was noted in the first six months of life, the impact on child survival continues throughout childhood. As such, the health and wellbeing of mothers is of critical importance not only for them but for their communities too.

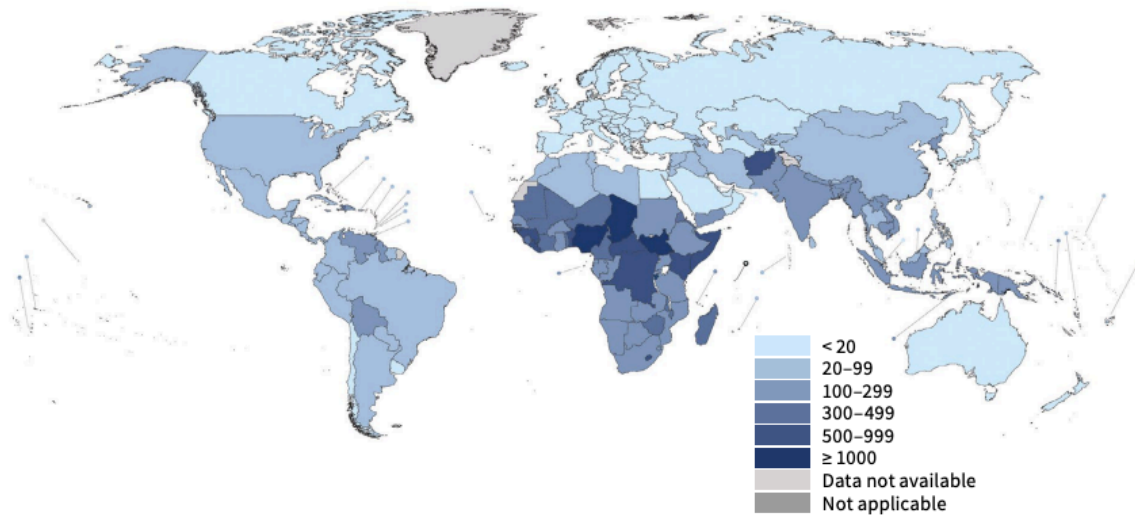
Figure 2: Kaplan-Meier survival curve from birth according to survival status of mother¹



The Millennium Development Goal (MDG) era, between 2000-2015, had a profound impact on raising the profile of maternal health to mobilise domestic and external funders for health, scale up existing proven useful interventions and to invigorate researchers to develop and implement novel effective strategies.^{2,3} Globally, since 2000, considerable progress has been made with global maternal mortality ratio (MMR) declining globally by 34.3% to be 223/100,000 in 2020.⁴ Although encouraging, progress is not even nor equal and far from complete. In low resource settings, the maternal mortality rate is almost 70% higher than the estimated global MMR.⁴ Additionally, most countries failing to reach these goals are in sub-Saharan Africa (See Figure 3) which in 2020 was the only region with a very high MMR at 545

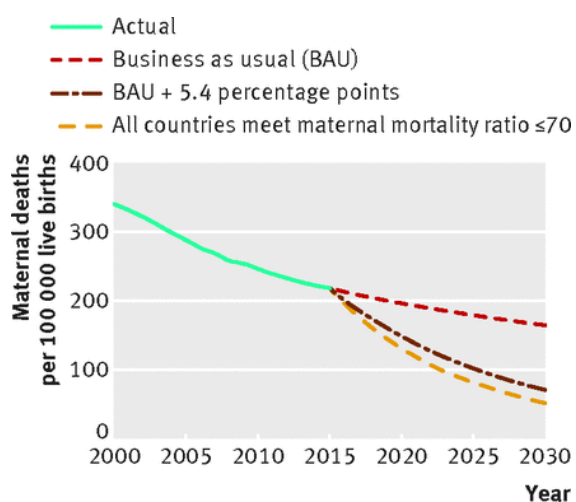
maternal deaths per 100,00 and has a lifetime risk of maternal death for every 1 in 40 mothers.⁴⁻⁶

Figure 3: Maternal mortality ratio (MMR, maternal deaths per 100 000 live births), 2020⁴



Without accelerated action, the current progress towards the Sustainable Development Global Goals (SDG) of 70 maternal deaths per 100,000 live births by 2030 (Figure 4).⁷ This lack of progress is leaving 1.6 million maternal lives at stake, 65% of which live in sub-Saharan Africa.⁹

Figure 4: Modelled scenarios for global trajectory for maternal mortality ratio to 2030⁷



Considering this, there is an urgent need for a sustained and equitable focus on maternal health to continue at an international, government and organisational level to rectify the unfinished agenda for maternal health.

Maternal Mortality in Uganda

In Uganda, over the past three decades, maternal mortality rates have encouragingly declined by 30%.⁸ Strong political will, donor funding and a rise in non-profit facilities have been highlighted as key contributors to resource mobilisation and maternal health prioritisation.^{9,10}

However, its progress in reducing MMR has been slower and insufficient to achieve the reduction required to meet SDG-3.⁴ As such, the MMR in 2020 remains high at 284/100,000.⁴ In response, the Ugandan government have pledged an additional 1.94% of Gross Domestic Product (GDP) towards health spending with an additional \$24,797,489 for maternal and new-born health services by 2030.¹¹ As such in 2017, the Ugandan Ministry of Health have implemented a five year Uganda Reproductive Maternal and Child Health Services Improvement Project.¹² In view of the high level political will on maternal health in Uganda and conducive landscape, there is great opportunity for truly meaningful improvement in maternal health.

Healthcare arrangements in Uganda

In the early 1990's Uganda implemented a widescale public sector reform in line with the World Bank's Structural Adjustment program.¹³ This resulted in a widescale downsizing and decentralising of health services in an effort to reach every citizen and provide basic health (Figure 5). The government has aimed for public health services to be free to allowing more women to access care.¹⁴

At present, healthcare in Uganda is largely divided into national and district-based levels and almost half of facilities (45.16%) are government owned according to the Ugandan Ministry of Health.¹⁵ The lowest level (health centre I) consists of Village Health Teams (VHTs). These are village volunteers that facilitate health promotion and education, simple preventative and curative service delivery, community participation, and empowerment.¹³

The district levels include health centre II and III. Health centre II is the first level of interaction between the formal health sector and communities. It is an outpatient and community outreach service provided by a nurse intending to serve 5000 people.¹³ The health centre III is managed by a clinical officer aiming to serve 10,000 people with community based services including in-patient, simple diagnostic and maternal health services.¹³

The next levels are general hospitals, which provide services such as emergency obstetric care, surgeries and blood transfusions.¹³ They are also for research and training. The regional referrals provide a higher level with more specialized clinical services and also involve teaching and research.

The national referral hospitals are the most comprehensive as they provide the highest level of specialist services in addition to all the other clinical services.¹³ The referral system is from the lowest to the highest level of care in the service delivery system.

Figure 5: Overview of the Health System in Uganda¹³

Health Facility	Roles
Regional and National Referral hospitals	Provide comprehensive specialist services, conduct research and training of health workers. Provide all other services as district level hospital. Target population two million people.
District (General) Hospitals	Provide curative, preventive, maternity, outpatient and inpatient services. Provide blood transfusion, medical imaging and laboratory services. Provide in service training, support community based programs through consultation and research. Target population 500,000 people
Health Centre IV (HCIV)	Provide curative, preventive, maternity, outpatient and inpatient services. Supervise, coordinate and plan for health centre levels III and II. Target population 100,000 people.
Health centre III (HCIII)	Provide basic preventive, promotive and curative care as well as basic obstetric care. Support supervision of community and health centre level II. Target population 20,000 people.
Health centre II (HCII)	Provide outpatient care including antenatal care, preventive care and link with the community and village health teams. Target population 5000 people

The importance of the postnatal period and immediate postnatal period

Starting immediately after birth of baby and up to 42 days following childbirth, the postnatal period divides into three distinct phases; immediate (the first 24 hours following birth irrespective to the time of placental delivery), early (Day 2 -Day 7) and late (Day 8- Day 42).¹⁶ This definition is as per the WHO Technical consultation on postpartum and postnatal care.¹⁶ The postnatal period and in particular the immediate postnatal period, is a critical time-period in childbirth where maternal mortality and morbidity is the highest, particularly in sub Saharan Africa.¹⁷⁻¹⁹ Most maternal mortality occurs within the first 24 hours and therefore focus on the immediate postnatal period is important.^{16,18} As such labour, birth and the immediate postpartum period have been labelled of critical importance to reduce maternal mortality.²⁰ In sub-Saharan Africa the most important causes of deaths among mothers are due to haemorrhage (24.5%), hypertensive diseases of pregnancy (16%), sepsis (10.3%), and indirect causes (28.6%) such as postnatal depression, Human Immunodeficiency Virus (HIV) and malaria.¹⁷ All of these causes commonly occur in the postnatal period, for example 43.8%

of maternal sepsis cases occur postpartum.²¹ Furthermore, in sub-Saharan Africa two thirds of the obstetric haemorrhage cases occur in the postnatal period.²² The vast majority of cases of maternal morbidity and mortality is treatable and preventable but requires quick recognition and good-quality care.^{23,24} As such *The Global Strategy for Women's, Children's and Adolescents' Health 2016–2030* has stressed the importance of postnatal care for mothers in ending preventable deaths and ensuring overall maternal health and wellbeing.²⁵ Explicit focus has been placed by the World Health Organisation (WHO) on global strategies including those in the postnatal period, to reduce rates of maternal mortality.²⁶

The content of postnatal care globally

Postnatal care is provided to both mother and baby following birth of baby and is recommended to continue regularly for six weeks.²⁷ Immediate postnatal care is provided by trained health workers for mothers and newborns in the first 24 hours following birth of baby.²⁷ The WHO currently recommends a package of routine maternal postnatal care interventions.^{27,28} This package of critical elements enables health providers to measure the mothers vital signs, assess and address any physical symptoms that the mother is experiencing which may indicate severe conditions, assess uterine contraction, vaginal tears/discharge or caesarean incision sites, assess the mothers ability to urinate and defecate, and conduct any other assessments based on existing comorbidities.²⁷ It is a holistic package of observations, diagnoses, treatments, and nutritional, physical and mental support components which are essential to be provided to every woman postnatally to support her and her newborn. Its elements can be provided by a range of health professionals and allied health personnel in cooperation within a functioning system on various levels, including in health facilities, on an outpatient level, and in the community.

Conducting this care is important as through these assessments, detection of complications and initiation of treatment can be commenced, if needed. Additionally, it provides an opportunity for health workers to provide advice and counselling on breastfeeding and newborn care. For facility-based births, the WHO have advised that mothers should be observed and cared for in the facility that they give birth in, for at least 24 hours following birth in order for mothers and their babies to receive quality iPNC.²⁷ For home births, the first postnatal assessment should occur within 24 hours of birth. Thereafter, all mothers and

newborns should receive at least three additional postnatal assessments on day three, between day seven- fourteen, and between week two and week six following birth of baby.²⁷

The content of postnatal care in Uganda

The 2016 Ugandan Clinical guidelines produced by the Ugandan Ministry of health are the most up-to-date guidance provided for healthcare workers providing maternal care in Uganda and were informed by the 2016 WHO postnatal care guidelines.²⁹ They recommend that following birth all mothers, regardless of location of birth, should at least be assessed within six hours of birth of baby. If the mothers give birth in a health facility she must also be assessed prior to discharge.

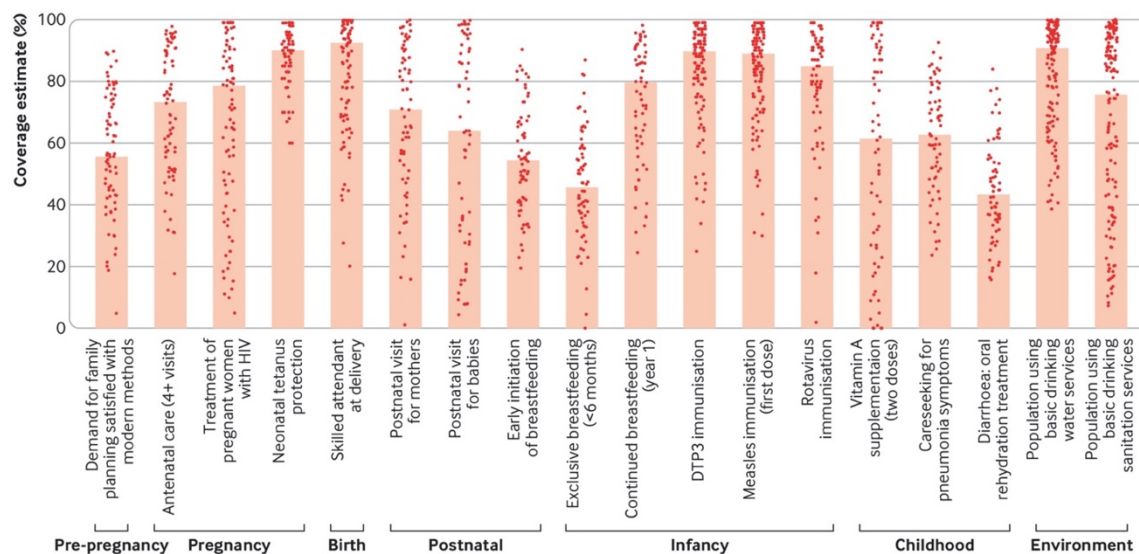
If the mother has birthed in a health facility the mother should be monitored every 15 minutes for two hours following birth of baby, then at three hours and four hours, then every four hours until discharge. During these assessments, healthcare workers are expected to take vital observations and monitor for danger signs including excess PV bleeding, difficulty in breathing and severe headache. They must also palpate the uterus to assess contractility.

Two further routine follow up visits occur for all mothers at six days and six months following birth. During this time counselling on breastfeeding, nutrition, iron and folic acid supplementation, avoidance of harmful substances including alcohol and tobacco, self-care and good hygiene practices, pelvic floor exercises, adequate malaria prevention, HIV testing and general support can be provided to the mother. Additionally, the mother should be assessed for high-risk postnatal conditions including hypertension, anaemia, vaginal bleeding and discharge, uterine infection and HIV.

Global coverage of postnatal care

Despite its worth, care given in the postnatal period is often neglected within the obstetric continuum with focus and resources generally placed on antepartum and intrapartum care.^{30,31} The Countdown to 2030 report showed postnatal services to have the lowest median national coverage of interventions on the continuum of maternal healthcare.^{2,25} A further analysis in 2020 of Countdown Data identified postnatal care and components of postnatal care including breastfeeding, as being amongst the lowest covered services in the reproductive continuum (Figure 6).³²

Figure 6: Median national coverage for selected interventions for mothers' and child health³²



Utilisation of postnatal care varies hugely across low- and middle-income countries (LMIC's) with socioeconomic status and rural geographic setting often forming barriers to mothers accessing care.³³

Collateral damage from the pandemic has compounded coverage of postnatal care services further with the number of PNC contacts reduced by an average of 59% at the height of the pandemic, in 77 countries surveyed.³⁴ As of July 2022, sustained disruptions to PNC continue, with only 55% of countries delivering essential PNC services at a pre-pandemic level.³⁵ Key detrimental factors impacting coverage of services include fear and reduced access to services through lockdowns and travel restrictions.³² Quality of care has deteriorated further due to under-staffing of existing services, rapidly changing guidelines with unclear or inconsistent communication and indeed over-stretching of vital resources.^{32,36} Additionally, the indirect impacts of the pandemic through social isolation, reduced birth companion participation in birth and separation of suspected or confirmed Covid-19 mothers from their new-borns is likely to have ongoing detrimental effects to perinatal mental health with ongoing potential implications to the health and wellbeing of newborns too.³⁷ Moreover, reduction in delivery of postnatal health services by midwives and health visitors during the pandemic increases the risks of mothers and babies falling through the cracks with insufficient care being provided

and critical complications being missed.³⁸ Mothers and babies from impoverished, rural, fragile and marginalised settings appear most vulnerable.³⁷

Postnatal care coverage in Uganda

Immediate postnatal care utilization has the lowest coverage across the continuum of maternal care in Uganda.^{8,30} Immediate postnatal care coverage is only nine percent in home births.³⁹ However, care is still not universal in facilities and the most recent estimates indicate that the provision of iPNC occurs in less than 50% of facility births in Uganda making it the fifth worst performing country out of the 33 sub-Saharan African countries examined.⁴⁰

Barriers to the provision and coverage of postnatal care in Uganda

Provision and coverage of postnatal care can be impeded at both the demand and supply side of care. Based on existing literature, key identified barriers of the demand side for mothers seeking postnatal care in Uganda include:

Cultural barriers

Studies have identified that in Uganda, mothers will seek postnatal care from a health facility as a last resort unless it is deemed truly necessary or required.⁴¹ Instead mothers will often first seek help from trusted traditional birth companions in community who are culturally acceptable to the mothers and able to provide both traditional medicines and social support too.^{42,43} They would only then seek medical care if their signs and symptoms persist and are severe. The significance of cultural practices is tremendous and includes restrictions from eating certain foods, superstitious beliefs and adopting traditional practices for clinical care.^{44,45} Some of the practices specific to the postnatal period include the handling of the umbilical cord and drinking herbal mixes to aid with uterine contraction.^{44,45} Mothers will have often consulted the same traditional birth companions for their antepartum and intrapartum care and thereby have established rapport, familiarity and trust. Additionally, the way a woman manages the period following birth, has wider impacts on her position in household and community.⁴¹ Mothers who seek medical care or assistance in birth are often seen as cowardly and lazy and not respected regardless of the circumstance.⁴¹ Mothers are therefore less likely to report their signs or symptoms to anyone.⁴¹ Finally, attending health facilities for postnatal care would result in some mothers, needing to leave their children un-

attended at home and can prevent them from continuing much needed chores at home.^{44,45} This has been reported as a potent barrier to accessing postnatal care.^{44,45}

Lack of awareness

Studies have demonstrated that mothers are often unaware of the need for postnatal care and assessments following birth and as such are reluctant to seek formal care if the mother does not experience any symptoms or illness.^{46,47} Antenatal visits provide a critical opportunity for mothers to receive education and counselling about the importance of postnatal care.⁴⁸ As such, in Uganda, mothers who received four or more antenatal care visits were 1.2 times more likely to receive immediate postnatal care than those with fewer visits.³⁹ This finding highlights lack of awareness as a potent factor preventing mothers from accessing care.

Additionally, following birth, mothers are expected to suffer certain symptoms including bleeding and pain.⁴¹ However they remain ill-informed regarding the severity and impact that these symptoms pose to their health. As such they will often only seek care when truly critical.

Lack of empowerment

A striking and critical feature in health provision inequity is the powerlessness mothers feel to make decisions regarding their own health care including birth.⁴³ In rural Uganda mothers who contributed to decision processes on their personal healthcare, and how to raise money for healthcare of them and their family members were 20% more likely to attend postnatal healthcare within six months of birth of baby than mothers who were not actively part of these decisions.⁴⁹ The traditional roles in Uganda of men being the breadwinners and heads of households and mothers the homemakers prevails and the financial inequity often drives mothers to adopt a secondary decision making role.^{43,45} As such mothers may require permission from male companions or family members before either seeking care or accepting advice regarding care within a facility.⁴² If the relevant family members are not available this can lead to delays and pose significant health risks, especially in obstetric emergencies. Mothers often rely on companions to provide the financial security needed which can lead to lack of autonomy on how finances are spent and therefore whether they access postnatal care or not.

Financial constraints

Financial constraints pose a particular problem for impoverished mothers. Some facilities are able to provide free care and medications however this is limited and in 2011, 72% of government health units had monthly stock outs of medicine and supplies.⁵⁰ If health facilities do not provide free health care for mothers, costs or the fear of costs can force mothers to neglect using vital services when they need them the most.⁴³ Additionally, even where no formal user costs are charged, there can be an expectation to purchase additional items including medicines and other consumables of soap and blankets which are necessary for care.⁴³ Both mothers and relatives acting as companions in facilities experience a loss of income because of being away from their place of work, so-called opportunity costs.

A maternal health voucher program was instilled in Uganda in 2008 in order to reduce the financial burden on Ugandan families.⁵¹ Initially, there was limited engagement by public facilities due to operational issues with delivery of the program, misalignment with the government mandate to provide health for all and the challenges for ongoing monitoring and surveillance of the program.⁵¹ However in recent years, the scheme has become more comprehensively adopted in public facilities to ensure maternal care reaches those most impoverished.

Distance to facilities and Transport Constraints

The distance between homes and facilities has been recognized as a factor contributing to adverse outcomes.^{52,53} Longer distances are cited by mothers as a reason for not seeking adequate postnatal care for themselves which contributes to delays to care and poorer outcomes.⁴⁷ Therefore, given the speed at which obstetric emergencies can occur, mothers living in rural communities at a distance from health care facilities often face the greatest risk particularly in cases of post-partum haemorrhage and pre-eclampsia.⁵²

Even if a woman decides to make the journey, difficulties with transport can impede the journey further. Specialized suitable transport vehicles such as ambulances may not be available or costly. If mothers do not own their own transport, they will have to rely on the availability of public transport systems.⁴³ These public transport systems are often intermittent and may not be available especially at night. Additionally, these transport routes may not be direct and require multiple journey changes resulting in further delays to receiving

care. In Northern Uganda the use of transport vouchers had a significant impact in utilization of care with an increase postnatal care service coverage by 49.2%.⁵⁴

Fear of abuse and poor reputation of facilities

Consistently in Uganda mothers report a lack of usage of postnatal care due to fear of abuse or discrimination by staff. These fears can have been generated through past personal experiences or through stories being shared by other mothers in the community.^{42,47} Examples of disrespectful care include being shamed, turned away and denied care or having their ailments disregarded. For others mistreatment was reported as being rudely spoken to or yelled at, being criticized with apparent lack of empathy or at times being physically abused.^{43,47} In particular, mothers who were deemed poorest or who had birthed at home were most vulnerable to being deprioritised by health workers for medical attention or treatment.^{42,47,53} Coupled with lack of resources, poor staff attitudes or absenteeism, experiences of disrespectful care have resulted in a poor reputation of health care facilities and ongoing reduced utilisation of services.⁴¹

In addition, barriers have been reported from the supply side too. The examples are as follows:

Insufficient staffing and poor skill mix

A full workforce is critical to the resilience of any health system however in many low resource countries, critical shortages of health workers persist and the human resources for health are neglected.⁵⁵ Across sub-Saharan Africa, the likelihood that a facility has at least one competent staff present that can provide care for mothers, newborns and children that meets minimum quality standards is only 14%.⁵⁶ In Uganda for the 2019/20 fiscal year, the health worker population ratio in the public sector is 1.92 per 1,000, falling below the WHO recommendation target of 2.28 health workers per 1,000 population.⁵⁷ Furthermore, only 73% of approved healthcare worker positions in the public sector have been filled by trained health professionals in Uganda which the ministry of health acknowledged were insufficient to address key priorities of reducing maternal and perinatal deaths. Additionally, a recent analysis of health system priorities in Uganda identified lack of human resources as a key cross-cutting barrier to deliver optimal maternal care.⁵⁸

Other than an overall reduced number of staff, there is also an uneven distribution of health care workers across settings. One study found that a total of 75% of doctors work in urban areas whilst only 15% of doctors work in rural areas where 86% of the Ugandan population live.⁵⁹ This often results in an inappropriate skill mix with relatively inexperienced or low cadre workers working unsupported and without supervision.⁵⁹

Additionally, the health system has failed to attract new workers and retain existing workers through not providing a conducive work environment, a lack of financial incentives or social amenities including staff housing which is especially essential in remote areas where alternatives are limited.⁵⁹ Health workers have considered their present salary insufficient for the work done, qualifications achieved and length of service.⁶⁰ Additionally, lack of mentorship, appraisal and career progression has resulted in considerable levels of demotivation in their work.⁶⁰ This has led to the Ugandan health sector staffing situation falling well below the established norms.

Lack of skills and training

A need for evidence based maternal health clinical training was highlighted by clinicians in Uganda.⁵⁸ Such training is critical to capacity strengthen health workers with both the knowledge and skills to deliver effective care, particularly when obstetric emergencies arise. Without this training, studies have highlighted it can impede quality care from being provided.^{61,62} In fact, a study in 2015 found none of the health facilities examined were able to provide the seven functions required of a basic emergency care facility.⁶³ Initial training can be poor and there is a need for revision of pre-service curricula needs to incorporate training that provides a basic understanding of how to deliver a structured response in recognition and management of emergency situations.^{64,65} Additionally, there is little uptake of additional training and re-appraisal of skills to remain up to date, especially with more experienced staff.^{60,66} Even if training was provided, healthcare workers report there would be little incentive for them to undertake training as it would require additional effort and time to acquire new competencies and improve existing competencies without any career progression opportunity or increase in salary.⁵⁹ Postnatally, this results in an often inappropriate management of conditions and birth complications. Efforts are in place to ensure regular re-license e.g. for midwives, employers now require and check re-licence every

three years.⁶⁷ There is also development of graduate midwifery education programmes to run in facilities.⁶²

Lack of available infrastructure

In 2022, the WHO and UNICEF published a Global baseline study of water, sanitation and hygiene (WASH) in Health Care facilities.⁶⁸ Findings demonstrated that since 2000 there was a continued lack of basic infrastructure for adequate sanitation in many facilities with half of health care facilities worldwide lack basic hygiene services.⁶⁸ Additionally, a 2011 study across five sub-Saharan African countries (Ghana, Kenya, Rwanda, Tanzania and Uganda) found that only half of hospitals had the ability to provide 24-hour emergency care and a minority of hospitals had unexpired drugs and current inventories, or the ability to manage infection control or safely dispose of hazardous waste.⁶⁹ Uganda is recovering from a 20 year civil war and humanitarian crisis that damaged health infrastructure considerably and has required considerable efforts to rebuild and repair.^{45,70}

Health facilities require basic infrastructure to enable the delivery of high-quality postnatal care. Electricity is necessary to provide adequate lighting for clinical care and maintenance of the cold chain needed for storage of life-saving postnatal medications including oxytocin which is important in the management of postpartum hemorrhage. Clean clinical spaces that have enough beds and are private and provide comfort are also essential for clinical examinations and management.⁴⁴ Clean running water is also critical which unfortunately was not present in over 50% of birthing facilities in Uganda and sub-Saharan Africa.⁷¹ Insufficient infrastructure not only prevents health professionals from providing high quality and safe care, but it has been noted as a deterrent to mothers seeking care too.⁴⁴

Additionally, facilities require the access to resources, drugs equipment and supplies which are key to provision of care.⁵⁸ Lack of stock is a common occurrence often due to misalignment of stock to numbers served. In Uganda the quantity of supplies at district health centers is determined centrally and often managers are unable to request more even if need dictates.⁶⁰

Strategies and opportunities to improve coverage of immediate postnatal care

It is clear that change is needed to enable equity in coverage of postnatal care. Three key strategies and opportunities have been identified to improve coverage of iPNC.

Increased health facility-based births

It is widely acknowledged that increasing the proportion of mothers who give birth with a skilled birth companions is an important means to reducing MMR in low resource settings through reduction of unsafe obstetric practice.⁷² As such, this approach has been heavily promoted in published literature and implemented through international initiatives and safe motherhood programmes particularly in low resource settings.⁷³⁻⁷⁵ The hope is that this will help increase coverage of care during birth and the ongoing postpartum period.⁷⁶ Births in health facilities can ensure that mother and baby are attended to by a skilled personnel during labour and at birth. Additionally, it provides an opportunity for mothers to be assessed following birth of baby and link mothers to the referral system in case of any complications.

In Uganda, over the past two decades there has been a 97% increase in numbers of facility-based births from 37% in 2000 to 73% in 2016.⁸

However, the reality is that in many low resource settings where bed space is limited, often mothers choose to leave before this time-period. Additionally, with resources being stretched, health departments are also in need of early discharge to allow space for new births and this can often mean >75% of patients do not receive the adequate health assessments they require.^{40,77} Thus, mothers in these settings are often not accessing the crucial postnatal assessment and care that they require in a period of time when they are often most vulnerable to life-threatening complications of birth such as post-partum haemorrhage (PPH), pre-eclampsia and sepsis. Should complications arise at home, in order to receive adequate treatment, mothers must ensure they return to a health care facility promptly without delay which can be difficult and costly to do. The disparity is markedly seen in those in LMIC's coming from poorer socioeconomic backgrounds where many are not able or are less empowered to seek the care they need.³³ This is especially concerning as it is in low resource and poorer settings where maternal morbidity and mortality is the highest.^{22,78}

Task-shifting to allied healthcare workers

Task-shifting has been described by the WHO as “a process of delegation whereby tasks are moved, where appropriate, to less-specialised health workers”.^{79,80} It involves utilizing and training available lay staff to provide a service that they would not routinely be expected to deliver.^{66,81} In Uganda documented evidence shows that task-shifting has been implemented

since 1918 to fill gaps caused by shortages in higher skilled cadres of health workers.⁸² It is well-established and effective and as such has been recommended by the WHO to reduce the burden of insufficient healthcare-workers in resource stretched settings.^{83–85} Although initially discussed for use with HIV/AIDS services, due to its success, the WHO have since recommended its role in maternal health services.⁸⁵ However, a key roadblock noted in Uganda is the lack of incentive provided for lay-staff to deliver this additional service.^{66,83} This has led to poor compliance and a lack of sustainability of past postnatal projects.

Involving mothers and birth companions in their care.

Increasingly focus and attention has been placed on the value of self-care strategies. These strategies are a vital mechanism to support individuals, families and communities to promote and maintain health, prevent disease, and cope with illness and disability with or without the support of a health worker.^{86,87} In addition, self-care has been highlighted by the WHO as a key equitable strategy to strengthen access to and coverage of reproductive health services especially in rural and low income settings experiencing provider shortages.^{86,87}

This was particularly of note in recent years, where global shocks including the Covid-19 pandemic, have resulted in severe disruptions to access of essential services including for reproductive health and those worst affected were in remote settings.⁸⁸ Self-care strategies provided an unique opportunity to enable continuity of services and has prompted the WHO to provide operational guidance and a call for action for strategies that support self-care interventions.⁸⁹ However, many existing self-care interventions for maternal health target antenatal care, with minimal strategies existing for postnatal care. Given the high morbidity and mortality in the immediate postnatal period, there is therefore a need for concerted action in the immediate postnatal period too.

Beyond the programmatic and health systems value of improving coverage and access to services, self-care strategies provide a unique opportunity to improve quality of care too. The recent healthcare provision paradigm has shifted to ensure care is more woman-focussed. It is important that healthcare workers not only provide high quality clinical care but deliver a positive experience that meets the needs of mothers and their family.

Input has therefore been sought directly from mothers regarding their experiences of postnatal care and shows that globally mothers are keen to be informed, educated and

mobilised in their care.⁹⁰ In addition, mothers are keen for their family members including birth companions to be more centrally involved too.⁹⁰ These global viewpoints resonate with mothers in Uganda mothers who were also keen for timely information and involvement by themselves and their birth companions in their care.⁹¹ Self-care strategies provide a mechanism to enable mothers and birth companions to have active roles in their care.

Self-care strategies also act as a vehicle for empowerment. Recent literature has highlighted the value of self-care strategies in increasing autonomy and agency through empowerment of individuals, particularly vulnerable populations.⁹² Self-care strategies provide mothers and birth companions with access to information and resources that allow them to take care of themselves appropriately. This equips mothers and birth companions with informational power and women gain agency, and autonomy.

When self care strategies have been explored in the postnatal care period, they have been found to be successful. A systematic review found that the task-shifting of third stage management to the woman herself was successful in reducing PPH rates and moreover between 80-99.7% of mothers found managing their own third stage to be acceptable and would recommend it to other friends and family.⁹³ As such the recent WHO postnatal care guidelines have stated that “interventions that promote the involvement of men during pregnancy, childbirth and after birth are recommended to facilitate and support improved self-care of mothers”.²⁷

As mentioned, there is however a paucity of self-care strategies within the postnatal period. Counselling and education of families on postpartum maternal and neonatal danger signs is recommended within WHO guidance.²⁷ Early recognition of these danger signs by families is very important to enable mothers to seek clinical care speedily. Delays in diagnosis can result in maternal death or the need for more invasive treatments to save mother’s lives. A recent study carried out in secondary-level facilities in Uganda found that 20% of mothers who eventually received treatment for PPH had initially identified the heavy bleeding on their own or with support from their birth companions.⁹⁴ However, studies have also shown that in practice, a mothers memory recall for such danger signs are poor.⁹⁵ This suggests that there needs to be rethinking into the methods of education and counselling to ensure mothers are able to understand, retain and recall the information given to them effectively.

We therefore need strategies to be more memorable and usable and it would be key to explore how these components of positive postnatal experience translate into implementation considerations for providers.

Chapter 2- Methodology

Purpose of this chapter

Following the background chapter, this chapter provides the rationale for developing an Immediate Postnatal Women's Assessment (ImPoWA) tool. The chapter provides an overview of the core aim for the overall study as well as the individual objectives and structure of the PhD thesis. An overview of the methodology for the study including the individual methods for developing an immediate postnatal self-assessment tool is provided.

The rationale for developing the ImPoWA tool

As presented in Chapter 1, there has been a large increase in health facility births and there are growing difficulties in providing postnatal observation globally. Task-shifting in the postnatal period is promising and mothers and their birth companions are demonstrating a keenness to be actively involved in their care. Given this, we now ask, could we empower mothers with the support of their birth companions through providing information of key immediate postnatal signs and symptoms to self-assess their health in the immediate postnatal period? Additionally, in light of the Covid-19 pandemic and the reduction of use of reproductive services, the WHO has made a call for strategies and interventions that promote self-care.⁸⁶

The vision for this tool is not to replace the critical role of health workers. However in view of the increased burden placed on health-workers, the tool aims to foster the collaboration between mother and provider and support the clinicians to be able to prioritise those who require urgent clinical care. This ethos is very much in-line with other self-care approaches.⁸⁶

To the researchers knowledge, this strategy for active, regular, self-monitoring in the immediate postnatal period by mothers and their birth companions in health facilities has not been developed or researched before.⁹⁶ However, the current political climate, focused on the engagement and empowerment of mothers, provides a unique opportunity to effectively employ this strategy to empower mothers and their birth companions in their postnatal care.

Study Purpose statement (AIM) and research objectives

The purpose of this study is to employ a mixed methods approach to develop an acceptable and usable ImPoWA tool for Ugandan mothers supported by their birth companions, to use in healthcare facilities to self-assess their health in the immediate postnatal period.

The specific objectives have been outlined (Table 1). This table demonstrates where and how each objective will be addressed within the thesis. At the beginning of each chapter the reader will be signposted to specific objective(s) that will be addressed within the chapter:

Table 1: Structure of PhD Thesis

Thesis Objectives	Chapters in which objective will be addressed	How will the objective be addressed?	What this work will inform
Objective One: <i>To provide a background and overview of the work</i>	Chapter One: Introduction and background	Review of relevant literature on maternal health care in Uganda.	An overview of the global and national burden of maternal morbidity, the criticality and content of immediate postnatal care, the current challenges of immediate postnatal care in Uganda and why this work is needed.
Objective Two: <i>To provide an overview of the intended methodology for PhD thesis.</i>	Chapter Two: Methodology	Review of relevant literature on mixed methodology.	The overall methodology, aims and objectives of the PhD thesis.
Objective Three: <i>To describe the coverage and timing of immediate postnatal care for mothers following childbirth in healthcare facilities in Uganda between 2006 and 2016.</i>	Chapter Three: Trends, coverage and determinants of iPNC in Uganda	DHS Survey analysis	Establishing what the current coverage and utilisation of immediate postnatal care is in healthcare facilities in Uganda. Identifying key determinants that affect the coverage and utilisation of immediate postnatal care in healthcare facilities in Uganda.
Objective Four: <i>To explore user experiences of iPNC in Uganda along with barriers, facilitators and opportunities to improve care.</i>	Chapter Three: Barriers, facilitators and strategies to improve iPNC in Uganda	Key Informant Interviews	Understanding existing iPNC from a user and provider perspective. Identifying the barriers to the coverage and utilisation of immediate postnatal care in healthcare facilities in Uganda. Exploring strategies to improve utilisation of immediate postnatal care in healthcare facilities in Uganda including the ImPoWA tool
Objective Five: <i>To generate a list of all maternal signs and symptoms which international</i>	Chapter Four: Key maternal signs and	Systematic literature review	Identifying an evidence-based list of all maternal signs and symptoms assessed in the immediate postnatal care within international clinical practice

<i>clinical practice guidelines for health workers recommend should be assessed in the immediate postnatal period.</i>	symptoms in iPNC		guidelines.
Objective Six: <i>To gain consensus and establish the core content of the ImPoWA tool</i>	Chapter Five: Developing the content of the Immediate Postnatal Women's Assessment (ImPoWA) tool	Delphi Survey	Establishing content validity through expert consensus on which key signs and symptoms are most predictive of significant morbidity in post-partum period for inclusion in the ImPoWA tool
Objective Seven: <i>To create a draft ImPoWA tool to be culturally and setting-specific for Ugandan mothers supported by their birth companions in the immediate postnatal period</i>	Chapter Six: Contextualising the Immediate Postnatal Women's Assessment (ImPoWA) tool	Qualitative interviews with mothers, birth companions, skilled and other health workers	Development of a draft ImPoWA tool that is context specific to Ugandan mothers supported by their birth companions. Establishing the content, presentation and acceptability of the tool. Exploring the usability and training needed to implement the tool into practice.
Objective Eight: <i>To evaluate the understanding of the content of the ImPoWA tool and assess the presentation, usability and training of the tool for mothers and birth companions in the postnatal period in Uganda.</i>	Chapter Seven: Evaluating the Immediate Postnatal Women's Assessment (ImPoWA) tool	Pre-test of ImPoWA tool with mothers and birth companions	Evaluating the understanding of the content of the ImPoWA tool. Assessing the presentation, acceptability, usability and training provided for use of the tool.
Objective Nina: <i>To consolidate learnings from the overall study</i>	Chapter Eight: Discussion and Future Work	Discussion of the implications of the development and evaluation of the Immediate Postnatal Women's Assessment (ImPoWA) tool on future research	Scaling up for a validation study and future potential roll out of the ImPoWA tool.

Methodology

Crotty's 1998 framework for development of a study methodology was utilised to examine the lead researcher's (TD) beliefs and world views.⁹⁷ The researcher finds that reality (ontology) can be both singular and multiple and thereby acknowledges that whilst single hypotheses can be tested, there may be multiple different interpretations and perspectives.

As such the researcher's relationship with the research (epistemology) is practical and they will either distance or embed themselves within the data depending on what works best to address the practical research question.

As such an overall pragmatic philosophical worldview has been adopted for this study as the primary focus is developing a tool that is useful and applicable to postnatal mothers and their birth companions in real life practice. The researcher is therefore focussed on the consequence of the research and how best to investigate what works in real life practice. Therefore, the study question is of primary importance to the researcher and given the question, multiple methodologies will be utilised which best fits the research question asked.⁹⁸ Fitting with the researcher's pragmatic worldview, the researcher adopts multiple stances both that their values can impact (biased) and that their values do not impact (unbiased) the data.

Reflexivity Statement

The researcher has questioned to what extent their own values may potentially impact the research and subsequent findings given her own life experiences.⁹⁹

Being a clinician, I have been trained to have a largely quantitative mindset where there are clear answers to every question. This approach is very distinct to the subtleties and nuances garnered through qualitative data.

Being a UK obstetrician yet not a mother myself- I do have experiences of clinical maternal care but do not have personal experiences of labour or birth. I have witnessed maternal care provision in other global LMIC settings, but not in Uganda. My view-point is therefore skewed towards experiences I have been a part of and witnessed in the UK and other LMIC clinical settings as a health care provider.

Having lived for my early childhood in Nigeria and India and frequently visiting a range of LMIC's, I do have some experiences of these settings. However I have only visited Uganda itself once and prior to this work I had not lived in Uganda.

It is important to take the time to recognise and be mindful of these life experiences and the potential impact they may have on subsequent research processes. Within each chapter a clear overview of the researcher conducting the data collection is provided. It is also

important to continue practising reflexivity throughout the study conduct and as such the researcher kept a personal researcher diary to log this.

⁹⁹*Mixed Methods Methodology*

A mixed methods research methodology has been taken for this study. This approach enables the triangulation of quantitative and qualitative methods to answer a particular research question.¹⁰⁰ A definition for mixed methods research proposed by Johnson *et al* is to be used for the study:¹⁰¹

Mixed methods research is an intellectual and practical synthesis based on qualitative and quantitative research; it is the third methodological or research paradigm (along with qualitative and quantitative research). It recognizes the importance of traditional quantitative and qualitative research but also offers a powerful third paradigm choice that often will provide the most informative, complete, balanced, and useful research results.

History of Mixed Methods Methodology

Over the past 60 years, mixed methods research has evolved to become a distinctive methodology spanning globally across a multitude of disciplines. Mixed methods research began with Campbell and Fiske in 1959 who argued that increasing data through multiple quantitative methods would increase the robustness of conclusions drawn.¹⁰² In the 1970's, work by Jick, Sieber and Denzin expanded this theory and argued for the use of both quantitative and qualitative methods in a research study.^{103,104} However, there were concerns regarding the appropriateness of this integrative approach due to perceived difficulties in combining differing philosophical perspectives. This paved the way for a new pragmatic worldview to be developed which reconciled that multiple paradigms could be used to address a research question.¹⁰⁵ Writers were now able to set aside the paradigm debate and focus efforts on increasing understanding of how to conduct mixed methods research effectively through the development of various frameworks and toolkits.¹⁰⁶ Work continued to formalize mixed methods research as its own discipline through an increase in publications using mixed methods globally as well as an increase of funding by national research institutions to ensure it remained high on the agenda.

The value of mixed methods methodology in this study

This methodology was chosen as it is practical and allows the freedom to use whichever method or indeed combination of methods that best answers the research question in line with the researcher's pragmatic paradigm. This is advantageous as it harnesses the strengths and offsets the weaknesses of individual qualitative and quantitative disciplines. Furthermore, it provides depth to analysis and enables questions to be answered that could not be answered by a single discipline.^{107,108} As such it has been used consistently in maternal health to explain initial results and obtain more complete and corroborated results.^{107,108}

However, there are challenges to conducting mixed methodology studies. They require a high skillset, are costly and need sufficient time to conduct.¹⁰⁹ These difficulties need to be considered and appropriated for when conducting the research. Therefore, a core multi-speciality supervisory research team across disciplines (obstetrics, midwifery, international maternal health academia) in the UK and Uganda was established to guide the organisation and conduct of the study. Sufficient funding was also sought appropriately with grants received from the Wellcome Trust, Overseas Development Assistance Fund (ODA) at University of Liverpool and Royal College of Obstetrics and Gynaecology (RCOG). Careful planning was undertaken early with a timeline created with key check points to monitor work.

Study Design

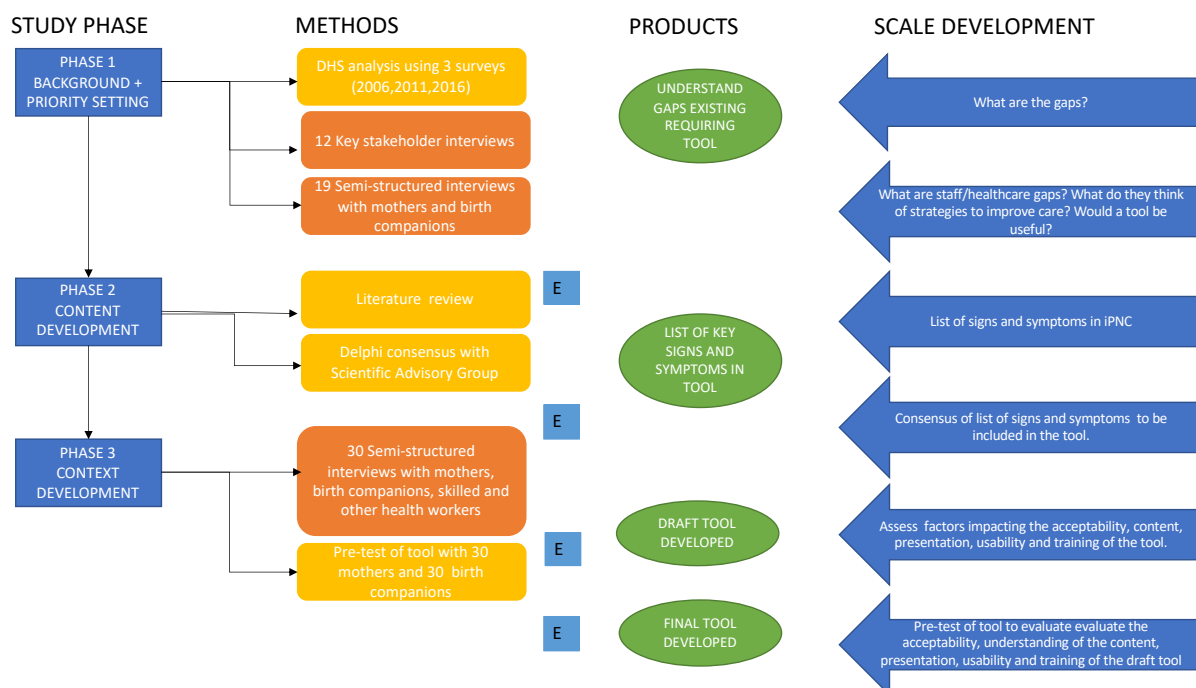
An exploratory sequential three phase mixed methodology study was established to explore the phenomenon of immediate postnatal care in Uganda and development of a new strategy to improve iPNC. This approach was adapted from the roadmap for designing health measurement scales proposed by Streiner et al in 2015 and instrument development by DeVellis 2012.^{110,111}

Throughout the development of the tool both qualitative and quantitative methods were utilised to provide ample ability to corroborate results found, explain results, involve participants and effectively develop the ImPoWA tool. This approach is useful in scenarios where no existing tool or instrument exists, as is the case with the ImPoWA tool.

Qualitative data from key stakeholders, healthcare workers, mothers and their birth companions were used to inform, design and develop the quantitative measure i.e. the ImPoWA tool. The tool was then pre-tested using quantitative methods for understanding

and acceptability. Preliminary evaluation of implementation factors including presentation, usability and training was undertaken to ensure the tool is fit for the context. This is important to increase motivation and cooperation among the respondents and reduce dissatisfaction to ultimately ensure adoption of the tool by the mothers and their birth companions. The rationale for this approach is that it enables the creation of a tool that is centred on the culture and setting of the participants in Mbale, Uganda. The three phases for the tool are outlined below (Figure 7).

Figure 7: Overall flow chart for study



From the start, efforts were in place to ensure local and community co-design of the research study to ensure the work was responding to the needs of the Uganda people. This was especially important, given that the lead researcher was from the UK and from a different setting and culture to where the study was conducted. An initial scoping visit to Kampala and Mbale in Uganda was conducted to understand what the preliminary needs were before embarking on the work. This visit also provided the opportunity to meet with a local research team to discuss the study and build trust and mutual respect necessary to conduct this work. Given the ties of the local research team to the community, it was agreed that it would be most appropriate for them to conduct the local data collection especially with regard to the

qualitative components. Further information on the individual researcher conducting the data collection has been detailed in each individual chapter.

Throughout all 3 phases of the study, an expert committee (E) of nine members was created and purposefully selected to guide the development and running of each subsequent phase. The methods for creating an expert committee were adapted from the WHO regulations for expert advisory panels and committees.¹¹² Members were selected who had an extensive technical ability and working experience in immediate postnatal care. Diversity was ensured through involving multi-stakeholders in the committee e.g., academics, patient advocates, public health specialists, clinicians with lived experience of postnatal care in Uganda. They represented the most recent thinking in this area. The members included spanned a large range of disciplines to ensure a spread of opinion. Members were identified through prior participation in international and Ugandan national steering groups looking to optimise postnatal care provision. No remuneration was made to the expert committee for their time and contribution to the study.

Ethics approval was successfully gained from research ethics committees in the UK and Uganda (Appendix 1.1 and 1.2).

There were two specific points of integration between qualitative and quantitative data.

Phase 1, priority setting, aimed to identify where the gaps exist for coverage of postnatal care and which factors promote or inhibit coverage. To do this involved the integration of quantitative data from DHS survey analysis with qualitative data from key informant interviews. An explanatory sequential Quan→Qual approach was taken whereby the qualitative data from the key informant interviews was used to provide depth and new nuances to the findings noted from the DHS analysis.

Phase 3, context setting, aimed to ensure the tool is truly setting and culturally specific to the Ugandan mothers and this was the main point of integration during the study. An exploratory sequential QUAL→Quan approach was taken whereby qualitative data from mothers, birth companions and health care worker interviews was initially sought. These responses were instrumental to help inform, develop and design the new quantitative feature i.e., the ImPoWA tool that is grounded in the culture and perspectives of the participants. The tool was then assessed quantitatively in practice.

Overall, the mixed methodology study largely followed a fixed methods design in that the methods used were pre-determined and planned. This approach was chosen as it provided a range of well-defined options to allow a solid approach to addressing the research problem systematically. In addition, it enables pre-emptive recognition of potential challenges early so that they could be resolved and not delay the conduct of the study. However, there was also an element of emergent design. Given the sequential approach, certain methodological components for the design, collection and analysis of the individual sub-studies were informed by the findings from the prior sub-studies. An example of this included the categories for the purposive sampling of participants in the pre-testing of the ImPoWA tool were informed by data gained from the earlier qualitative interviews.

Chapter 3- Trends, coverage and determinants of iPNC in Uganda

Purpose of this chapter

A sequential explanatory mixed methods approach (Quan → Qual) was undertaken to best understand the phenomenon of immediate postnatal care coverage in health facilities in Uganda. This mixed methods approach involved both quantitative and qualitative methods used equally, whereby the quantitative findings are explained by the qualitative findings.

Firstly, an analysis of the 2006, 2011 and 2016 Demographic Health Surveys in Uganda has been conducted to establish the trends, coverage and determinants of utilisation of immediate postnatal care in healthcare facilities in Uganda. This provided quantitative data. The methods, findings and interpretations of the DHS analysis are presented in this chapter and had been published in *BMJ Global Health* (Appendix 3.1).¹¹³

Secondly, interviews with key stakeholders, mothers and birth companions in Uganda have been undertaken to help explain the initial quantitative results in more depth and explore data that was unable to be collected through the initial quantitative methods. The interviews provided qualitative data and the methods, findings and interpretations of the qualitative data are presented in Chapter 4. The initial quantitative data was analysed first to guide the design, collection and analysis of the qualitative data.

Objectives

The overall objective is to describe the coverage and timing of immediate postnatal care for mothers following childbirth in healthcare facilities in Uganda between 2006 and 2016.

The sub-objectives are:

- To describe the sample of mothers who birthed in health care facilities between 2006-2016
- To estimate the coverage of maternal and neonatal iPNC by health care professionals within 24 hours
- To describe the distribution of timings of first assessment.
- To list the key determinants of maternal iPNC following births in healthcare facilities in Uganda in 2016.

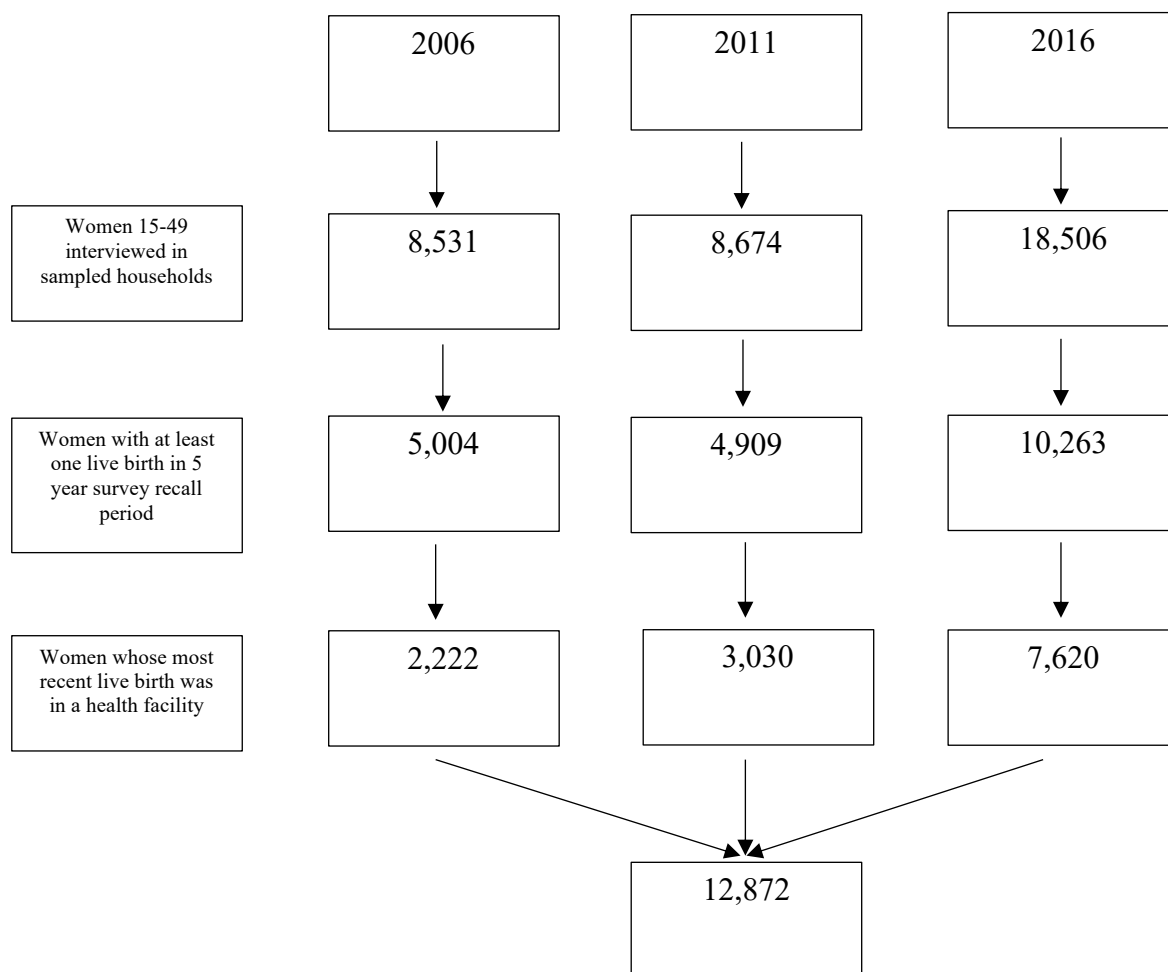
Methods

Data

Household surveys are the main source of data used within maternal health to compare coverage trends and inequalities both within and between countries.² The Demographic and Health Surveys (DHS) are cross-sectional nationally representative household surveys, usually covering 5,000 to 30,000 households. They collect data from women of reproductive age (15-49 years) about births and their use of reproductive and maternal care. We used the DHS collected in Uganda in 2006, 2011, and 2016. The DHS use a multi-level cluster sampling survey design; individual women's survey weights, and the elements of stratification and clustering are needed in analysis to adjust for this design and for non-response.

Population

The most recent live birth within a recall period of five years to women aged 15-49 at the time of survey, was included in the analysis, if the birth occurred in a health facility. Data from prior births or from those outside of a facility were excluded. This resulted in a total of 12,872 eligible mothers included for analysis (Figure 8).

Figure 8: DHS Study population flow diagram

Definitions

The main outcome is the women's report of receiving an immediate postnatal health assessment by a health care professional within 24 hours of childbirth while still in the health care facility. This was a binary outcome (yes/no). This variable was created with a conceptual link to the WHO Postnatal care recommendations, which state that all women giving birth in healthcare facilities and their babies should remain in the health facility for a minimum of 24 hours following uncomplicated vaginal childbirth and receive frequent routine postnatal care assessments during this period.¹¹⁴

Four variables were used to construct this outcome, based on separate questions that women were asked: 1) Whether the woman received a postnatal assessment while still in the facility; 2) Length of stay of woman in the facility where the birth took place; 3) Timing of the first postnatal assessment in the facility where birth took place; and 4) Cadre of professional

conducting the first postnatal assessment on mother. As per the WHO recommendations, the coverage of optimal iPNC was expected to be 100%.

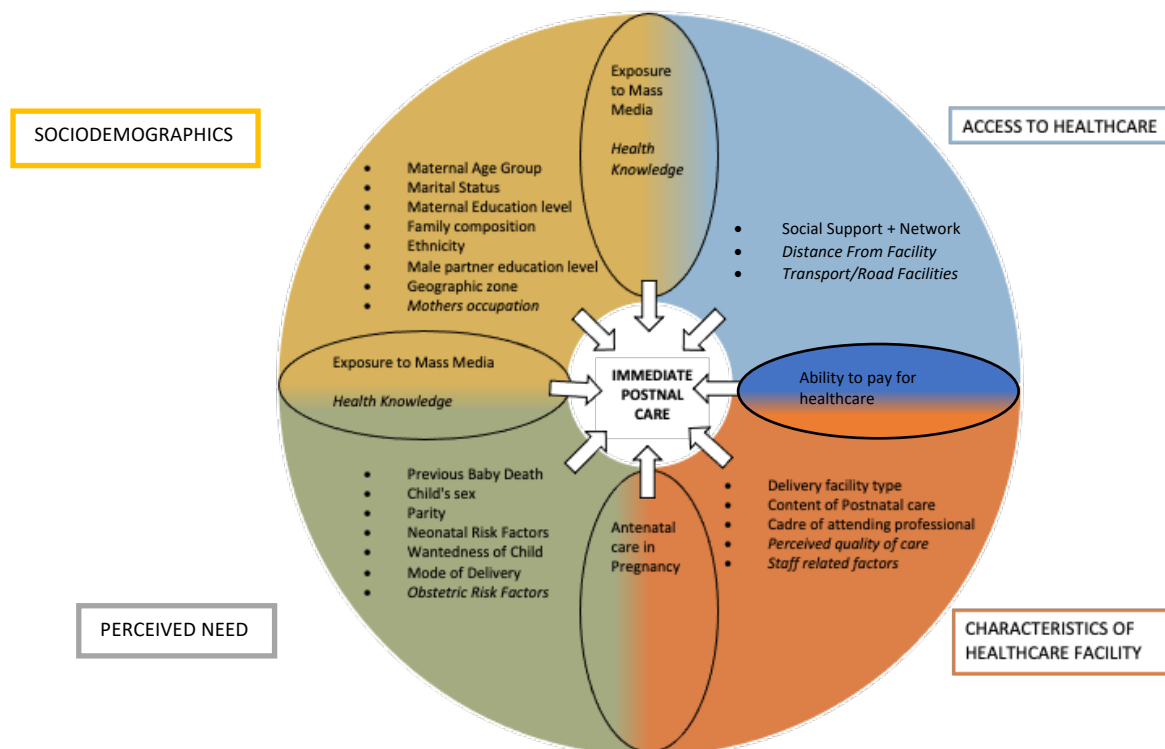
There were no differences in the question wording used in the three surveys. Women who reported a stay in the facility of under 24 hours after childbirth needed to have received such an assessment before discharge. Among women who remained at the facility for 24 hours or more, the timing of the postnatal assessment variable was used to determine whether the first postnatal health assessment occurred within 24 hours of childbirth. Healthcare professionals were categorised as: doctor, nurse/midwife, and medical assistant/clinical officer. The timing of the immediate postnatal assessment for mothers who had received at least one assessment was analysed by using the mother's response to the question on timing of the first postnatal assessment in the facility where birth took place. Timings were constructed according to the following categories: 1) <1 hour; 2) 1-4 hours; 3) 4-8 hours; 4) 8-12 hours; and 5) 12-24 hours.

In addition, it was important to note if mothers reported that their babies had received a postnatal health assessment by a health care professional within 24 hours of childbirth while still in the health care facility, or not. This was done to examine missed opportunity where an assessment is conducted for one of the dyad, but not the other. This was important to consider given the inclusion of the introduction of neonatal clinical guidance within the recent 2016 Ugandan Clinical Guidelines.²⁹ To construct this outcome a composite of four variables was used akin to the process of constructing the maternal receipt of postnatal care outcome.

Conceptual framework

The existing published literature was reviewed to form a list of key variables noted to impact coverage of postnatal care to create a conceptual framework (Figure 9). These were examined within the most recent survey as the information and data would be most relevant and up to date to guide action by policy makers and programmers. These were grouped into four categories (socio-demographic factors, access to healthcare, perceived need, and characteristics of healthcare facility). Some factors fell into multiple conceptual categories which have been highlighted in the shaded intersecting portions of the diagram. Unfortunately for certain factors, there were no matching questions asked in the DHS questionnaire and therefore these factors remained in the framework but were not examined in analysis (these are in italics).

Figure 9: Conceptual framework displaying key factors thought to influence coverage of immediate postnatal care.



Perceived need

Seven dimensions of perceived need for postnatal care were identified, including wantedness of child (wanted at the time of pregnancy or not), mode of birth (vaginal or caesarean), and child sex (female, male). Parity was categorised as first birth, 2-3, 4-5, and 6+ births. It was not possible to include obstetric or neonatal risk factors (e.g. maternal co-morbidities and foetal abnormalities) because the DHS did not collect data pertaining to these dimensions. For obstetric risk factors, use of proxies such as maternal body mass index and anaemia were considered. However, as this data related to the woman at time of the survey and not at time of birth, it was decided to ultimately not include these proxies. For neonatal risk factors, proxies were utilised through “perceived size of the baby at birth” which was categorised as very small or not. This was reflective of the perceived need for care by mother as babies perceived to be smaller by the mother are more likely to be seen to and assessed. For the dimension ‘death of a previous baby’, a new variable for previous baby death was constructed (no child death, child death within 24 hours of birth, child death later than 24 hours of birth).

This variable was explored through sensitivity subgroup analysis of women with previous children (parity >1).

Antenatal care (ANC) in pregnancy was thought to reflect both perceived need and characteristics of healthcare facility. As those women who received facility based antenatal care were likely to give birth in that same facility. This dimension was examined by categorising the number of antenatal care visits during the pregnancy (no ANC, 1-3 visits, 4+ visits).

Health knowledge and exposure to mass media were thought to reflect the perceived need and socio-demographic factors. There were no questions in the DHS that assessed health knowledge and this dimension could therefore not be analysed further. Exposure to mass media was explored through the variables; any use of television (TV), internet, newspaper, and radio (or not) at the time of the survey.

Socio-demographic factors

Eight socio-demographic factors were considered for inclusion into the model. Maternal age group at birth of baby (in five-year age groups), marital status (married or cohabiting at time of survey or not), highest maternal education level (no education, primary education, secondary and higher education), and ethnicity (Christian, other religions) were assessed. The boundaries of districts and regions changed over the ten-year period covered by the three DHS and were not identical. We therefore constructed four larger zones (Eastern, Western, Northern, Central-Table 2) which are consistent over time, as done previously.¹¹⁵

Table 2: DHS districts by zone and survey year

Zone	DHS districts included in each zone, by survey year		
	2006	2011	2016
Central	Central 1, Central 2 and Kampala	Central 1, Central 2 and Kampala	South central, North central, Kampala
Eastern	Eastern and East Central	Eastern and East Central	Busoga, Bukedi, Bugisu, Teso,
Northern	West Nile and North	West Nile and North and Karamoja	Karamoja, Lango, Acholi, West Nile
Western	Western and Southwest	Western and Southwest	Bunyoro, Kigezi, Ankole, Tororo

Family composition was assessed by number of persons (<4, 4-5, 6+ persons) and number of children under the age of 5 years (0-1, 2-3, 4+) in the woman's household. Women's

occupation was not examined, as data in DHS pertained to the time of the survey and not at the time of index birth. Household wealth quintile, place of residence (urban versus rural) and the woman's autonomy were thought to reflect both socio-demographic factors and access to healthcare factors. Household wealth quintiles were provided in the dataset and constructed using principal component analysis of household assets using an established method.¹¹⁵ The dimension of financial autonomy was explored with the binary variable of the woman having a bank account or not. Further exploration of autonomy to healthcare and finances was conducted in sensitivity analysis among married women through the variables who makes decisions about healthcare and finances (respondent alone, respondent and male partner, male partner alone, other). Male partner's highest education level (no education, primary education, secondary/higher education) was explored further in subgroup analysis among women married at the time of survey.

Characteristics of Healthcare Facility

Five dimensions related to characteristics of the healthcare facility where the birth occurred, were identified. The sector of the health facility was categorised as public (government hospital, government health centre, other public sector) or private (private hospital/clinic, other private medical sector). Assistance with the birth was captured by considering the highest cadre listed (doctor/non-physician clinicians (NPC), nurse/midwife, other/none). Staff-related factors were conceptually important, but not available on DHS. The dimension patient perceived quality of care was not directly asked within the DHS and no proxies for this dimension could be found. There were no direct variables that asked women to recall the content of their postnatal care. The variable of whether the woman reported that the baby was weighed (or not) was used as a proxy for this dimension as it is reflective of the available staffing, procedures and resources.

Access to healthcare

One dimension - social support and network – was analysed for access to healthcare. This dimension was captured by the 2 created variables: number of persons (<4, 4-5, 6+ persons) and number of children under the age of 5 in the woman's household (0-1, 2-3, 4+). The distance of the house to the nearest facility or the facility where the birth occurred, or transport/road facilities are not captured on the DHS. Ability to pay for healthcare was thought to reflect both characteristics of healthcare facility and access to healthcare. The

variable of whether the woman was covered by health insurance or not, was used to reflect this dimension.

Statistical Analysis

All analyses were conducted in STATA 16 SE (College Station, TX, USA). Analysis included descriptive statistics of demographic characteristics of women who gave birth in health facilities on all three surveys. The percentage was computed of mothers who reported receiving immediate maternal postnatal care among mothers who gave birth in health facilities. The distribution of the timing of the first assessment was described amongst the mothers with such an assessment. The percentage of babies born in health facilities receiving a postnatal assessment within 24 hours was calculated and disaggregated by type of facility.

For the 2016 survey, an analysis of mother-baby dyads was conducted. Percentages were calculated of those receiving immediate postnatal care within 24 hours while still in health care facilities for mother only, baby only, both, and neither. Additionally, logistic regression was used to explore the crude associations between factors outlined in the conceptual framework and the mother's receipt of immediate postnatal care by a health professional in the facility. A multivariable logistic regression model was created as it enabled an in depth analysis of how multiple factors together impact coverage in order to find patterns between variables simultaneously, and as such it is more reflective of the real world reality. Construction of the multivariable analysis occurred by analysing each individual variable and excluding those that were collinear with existing variables. This enabled the multivariable model to reflect the conceptual model. A likelihood test was finally conducted to ensure the multivariable model has good fit with the original data set.

Two sensitivity analyses using crude and multivariable logistic regression were conducted. First, among the sub-sample of women married/cohabiting at the time of survey, highest level of male partner education, and autonomy with finances and healthcare were additionally included. Among women with previous children, the model included previous baby death.

The survey set command was used to adjust all analyses for survey sampling design and non-response using individual sampling weights, stratification and clustering.

Missing Data

There were low levels of missing data in the variables used. In the 2006 dataset, the mode of birth component identified one missing data point which was recoded as vaginal birth as it was thought a mother would be likely to remember having a caesarean section if she had had one. For the highest cadre of healthcare worker at birth, five responders selected both doctor and NPC and so they were only counted once. When creating the component of women being assessed within 24 hours, 1417 responders were classed as missing which accounted for women who had no assessment, women who had an assessment, but the timing recorded was missing as well as women who had an assessment but >24 hours. These values were excluded.

In the 2011 dataset, for the highest cadre of healthcare worker at birth, four responders selected both doctor and NPC and so they were only counted once. When creating the component of women being assessed within 24 hours, 1574 responders were classed as missing which accounted for women who had no assessment, women who had an assessment, but the timing recorded was missing as well as women who had an assessment but >24 hours. These values were excluded.

In the 2016 dataset, the mode of birth component identified 39 missing data points which was recoded as vaginal birth as it was thought that a mother would be likely to remember having a caesarean section if she had had one. For the highest cadre of healthcare worker at birth, 22 responders selected both doctor and NPC and so these were only counted once. When creating the component of women being assessed within 24 hours, 2623 responders were classed as missing which accounted for women who had no assessment, women who had an assessment, but the timing recorded was missing as well as women who had an assessment but >24 hours. These values were excluded. When creating the component who makes decisions about healthcare and who makes decisions about large household purchases, 1409 missing responses were noted and were counted as women who aren't married/don't have a partner and therefore are excluded from analysis. When creating the component number of facility-based ANC at time of index pregnancy, 37 responses were "don't know" which have been pragmatically classed as '1-3 visits' as it is likely that if the woman had received no ante natal care, she would have reported this. Equally if the woman had received more than 4 visits this would have been reported too. Additionally, 32 women

reported having some antenatal care but not in a health facility which have been classed as “0” visits. When creating the previous baby death variable, 1731 responses were missing which were for women who had no previous child and therefore were excluded from the variable. When looking at the was baby weighed at birth variable, there were 128 ‘don’t know’ responses which were recoded as not being weighed at birth as otherwise the mother would likely have remembered. For the size of baby variable, 55 responders classed the baby weight as “don’t know” which suggested the weight was not significantly small to be noticeable and therefore these responses were classed as “other”. For time of breastfeeding, there were 197 missing responses which were recoded as being over one hour as it is likely a woman would remember if breastfeeding occurred immediately or within an hour.

Results

Description of women birthing in health care facilities 2006-2016

The sample of women who gave birth in health facilities was 2,222 (2006), 3,030 (2011) and 7,620 (2016). The percentage of most recent births in healthcare facilities increased from 44.6% (CI: 41.9-47.3%) in 2006 to 60.1% (CI: 57.2-62.9%) in 2011 to 75.2% (CI:73.4-77.0%) in 2016.

Socio-demographic characteristics of women who gave birth in health facilities on each survey are shown in Table 3. The majority of births in health care facilities were in the public sector on all three surveys.

Table 3: Description of women who gave birth in healthcare facilities for most recent live birth in Uganda, DHS 2006, 2010, 2016

Factor	Categories	2006			2011			2016		
		n=2222	%	95% CI	n=3030	%	95% CI	n= 7620	%	95% CI
Health facility	Public sector	1563	71.8	68.6 -74.9	2296	76.1	73.3-78.8	6132	78.2	76.4-79.9
	Private sector	659	28.2	25.1-31.4	734	23.9	21.2-26.7	1488	21.8	20.1-23.6
Residence	Rural	1679	75.6	70.1-80.4	1960	75.6	70.4-80.2	5788	72.7	68.5-76.5
	Urban	543	24.4	19.6-29.9	1070	24.4	19.8-29.6	1832	27.3	23.5-31.5
Household wealth quintile	Poorest	327	13.9	11.7-16.5	476	15.5	13.2-18.1	1697	18.2	16.6-19.9
	Poorer	362	16.3	14.2-18.6	515	17.9	16.0-19.8	1457	17.9	16.5-19.3
	Middle	341	16.0	14.0-18.1	483	17.5	15.7-19.5	1389	18.1	16.7-19.5
	Richer	458	21.4	18.9-24.0	519	18.3	16.3-20.6	1392	19.3	17.9-21.0
	Richest	734	32.4	28.4-36.6	1037	30.8	27.0-34.9	1685	26.5	23.6-29.6
Geographic zone at survey	Central	784	34.6	31.2-38.2	1027	33.8	30.5-37.3	1801	30.0	27.4-32.7
	Eastern	579	26.5	23.3-30.0	682	26.5	23.4-29.8	1995	25.6	23.4-27.8
	Northern	488	17.7	14.8-21.2	767	16.6	14.4-19.1	1977	21.1	19.4-22.8
	Western	371	21.2	17.9-24.9	554	23.1	19.8-26.8	1847	23.3	21.8-25.1
Maternal age at birth	<20	409	18.5	16.8-20.4	493	15.9	14.4-17.4	1328	17.4	16.4-18.4
	20-24.9	635	29.1	26.9-31.4	870	28.7	27.0-30.5	2218	29.6	28.3-31.0
	25-29.9	566	25.1	23.2-27.0	739	24.7	22.9-26.6	1826	24.3	23.1-25.5
	30-34.9	331	14.8	13.2-16.6	482	15.5	14.0-17.2	1193	15.0	14.1-16.0
	35-49.9	281	12.5	11.1-14.0	446	15.2	13.8-16.8	1055	13.7	12.8-14.6
Highest level of maternal education at survey	No education	299	13.2	11.2-15.4	321	9.6	8.2-11.3	814	8.8	7.82-9.9
	Primary	1304	59.1	56.6-61.5	1680	57.7	55.0-60.4	4395	55.8	53.7-57.8
	Secondary+ higher	619	27.7	25.1-30.5	1029	32.7	29.8-35.6	2411	35.4	33.3-37.6
Parity	One	514	23.7	21.8-25.7	623	19.4	17.7-21.3	1731	23.3	22.1-24.5
	Two-three	666	29.7	27.6-32.0	992	32.3	30.2-34.5	2653	35.9	34.5-27.3
	Four- five	487	21.8	19.9-23.7	654	21.3	19.5-23.1	1614	20.5	19.6-21.6
	6+	555	24.8	22.9-26.8	761	27.0	25.0-29.1	1622	20.3	19.0-21.6
Mode of delivery for last birth	Caesarean birth	178	8.1	6.9-9.5	331	10.2	8.9-11.7	682	9.7	8.9-10.6
	Vaginal birth	2044	91.9	90.5-93.1	2699	89.8	88.3-91.1	6938	90.3	89.4-91.1
Highest cadre of health professional at birth	Doctor/NPC	292	13.1	11.5-14.8	486	15.3	13.6-17.0	1166	15.8	14.7-16.9
	Nurse/Midwife	1895	85.5	83.6-87.1	2480	82.2	80.4-84.0	6321	82.5	81.3-83.6
	Non skilled/Other/None	35	1.4	1.0-2.2	64	2.50	1.8-3.6	133	1.7	1.4-2.2

NPC – non-physician clinician (includes medical assistant, clinical officer)

Receipt of immediate maternal postnatal care

Table 4 reflects the receipt of immediate maternal postnatal care in women who had a health facility birth. Among women who gave birth in healthcare facilities, the percentage that reported receiving an immediate postnatal assessment increased from 35.7% (CI 33.4-38.1%) in 2006 to 46.6% in 2011 to 65.0% (CI: 63.2-66.7%) in 2016. These increases occurred across all social and demographic groups of women. However, in 2016, wide variations in receiving immediate maternal postnatal care remained, particularly in the Western zone, which was far lower than the other zones, and lower among women who had a vaginal birth compared to those with a caesarean section.

In 2016, 67.6% (CI: 65.8-69.3%) of babies born in health care facilities received immediate postnatal care. Among the 7,620 mother-baby dyads, in 57.9% both the woman and the baby received immediate postnatal care, in 25.4% neither the mother nor the baby received immediate postnatal care, in 7.1% only the mother and in 9.6% only the baby received immediate postnatal care.

Table 4: Percentage of women birthing in healthcare facilities who reported receiving immediate postnatal care in Uganda DHS 2006, 2011, 2016

Factor	Categories	2006			2011			2016		
		n	%	95%CI	n	%	95%CI	n	%	95%CI
Overall		805	35.7	33.4-38.1	1456	46.6	44.0-49.3	4997	65.0	63.2-66.7
Health facility	Public sector	555	35.3	32.7-38.0	1110	47.0	44.1-49.9	4005	64.4	62.6-66.2
	Private sector	250	36.6	32.2-41.3	734	45.5	40.2-50.9	992	66.9	63.4-70.2
Residence	Rural	574	33.9	31.3-36.6	8731	44.0	40.9-47.1	3720	63.0	60.9-65.1
	Urban	231	41.2	35.7-46.9	585	54.7	48.9-60.4	1277	70.2	66.9-73.3
Household wealth quintile	Poorest	111	32.9	26.3-40.2	234	47.5	41.7-53.3	1151	65.7	61.6-69.6
	Poorer	104	28.8	23.5-34.8	203	39.3	34.2-44.6	926	61.6	58.1-64.9
	Middle	103	29.9	24.7-35.8	199	38.3	33.2-43.7	842	59.8	56.4-63.0
	Richer	155	32.7	28.3-37.4	238	45.5	40.7-50.4	854	61.7	58.2-65.1
	Richest	332	45.2	41.1-49.4	582	55.9	51.1-60.1	1224	72.7	65.0-75.6
Geographic zone at survey	Central	329	42.1	38.4-45.9	581	56.4	52.1-60.6	1268	69.9	66.5-73.1
	Eastern	222	40.1	35.7-44.8	306	46.7	42.0-51.4	1413	69.0	65.1-72.6
	Northern	168	31.1	25.2-37.6	374	46.3	41.6-51.1	1378	68.6	64.6-72.4
Maternal age at birth	Western	86	23.5	19.4-28.1	195	32.5	27.5-37.9	938	50.9	47.9-53.9
	<20	133	34.3	29.4-39.5	238	45.7	40.8-50.7	822	61.0	57.9-64.1
	20-24.9	221	32.8	29.0-36.9	425	46.8	42.4-51.3	1440	64.9	62.0-67.7
	25-29.9	203	35.1	30.9-39.5	341	45.2	40.5-49.9	1224	65.7	62.9-68.4
	30-34.9	136	40.3	34.9-45.9	232	47.6	42.6-52.7	815	67.5	63.9-70.9
Highest level of maternal education at survey	35-49.9	112	40.1	34.0-38.1	220	48.7	43.1-54.3	696	65.9	62.4-69.3
	No education	92	30.3	25.0-36.3	152	41.5	35.4-47.9	558	64.1	59.4-68.6
	Primary	415	31.5	28.8-34.4	728	42.6	39.7-45.6	2726	61.3	59.2-63.3
Parity	Secondary+ higher	298	47.0	42.6-51.5	576	55.3	50.4-60.0	1713	71.0	68.6-73.3
	One	185	36.7	32.2-41.4	311	45.7	40.6-51.0	1162	66.9	63.9-69.7
	Two-three	262	38.0	33.7-42.5	522	52.3	47.9-56.7	1722	64.4	62.0-66.8
	Four-five	158	31.5	27.3-36.0	288	42.8	38.5-47.2	1072	65.6	62.5-68.6
Mode of delivery for last birth	6+	200	35.7	31.2-40.4	335	43.5	39.6-47.4	1041	63.1	60.0-66.2
	Caesarean birth	101	55.6	46.6-64.3	199	61.6	54.8-68.1	565	82.2	78.4-85.4
Highest cadre of health professional at birth	Vaginal birth	704	33.9	31.5-36.4	1257	44.9	42.2-47.7	4432	63.1	61.3-64.9
	Doctor/NPC	136	45.3	38.5-52.2	283	59.8	54.4-65.0	853	73.3	69.8-76.4
	Nurse/Midwife	661	34.4	32.0-37.0	1154	44.9	42.1-47.8	4072	63.6	61.8-65.4
	Non skilled/Other/None	8	22.8	10.1-43.7	19	22.7	13.4-35.8	72	52.9	42.9-62.8

Timing of first maternal postnatal assessment in health care facilities in 2006, 2011, 2016 surveys

Table 5 presents the timing of first maternal postnatal assessment in health care facilities. Across the three surveys, among women who received a postnatal assessment within 24 hours, the most common time period for the first postnatal assessment was 1-4 hours after birth; this level was similar in facilities from both sectors. The overall mean time for the first postnatal assessment decreased from 7.3 hours after birth in 2006 to 4.5 hours in 2011 to 3.1 hours in 2016; and the median time from 4 hours to 2 hours to 1 hour.

Table 5: Distribution, Mean and Median time of first postnatal assessment in women having immediate postnatal care in health care facilities by sector in Uganda DHS 2006, 2011, 2016

2006	Categories	n	Overall	Public Sector	Private Sector
	<1 hour	90	11.0%	10.8%	11.5%
	1-4 hours	352	44.1%	42.9%	46.6%
	5-8 hours	150	18.6%	19.0%	17.7%
	9-12 hours	59	7.2%	7.8%	5.9%
	13-24 hours	154	19.1%	19.5%	18.3%
	<i>Distribution in hours</i>		<i>Mean (median)</i>	<i>Mean (median)</i>	<i>Mean (median)</i>
TOTAL	805	7.25 (4)	7.36 (4)	6.99 (3)	
2011	Categories	n	Overall	Public Sector	Private Sector
	<1 hour	261	18.9%	16.4%	27.1%
	1-4 hours	756	52.6%	53.7%	49.1%
	5-8 hours	213	14.3%	15.1%	11.8%
	9-12 hours	89	6.0%	6.8%	3.4%
	13-24 hours	137	8.2%	8.0%	8.6%
	<i>Distribution in hours</i>		<i>Mean (median)</i>	<i>Mean (median)</i>	<i>Mean (median)</i>
TOTAL	1,456	4.49 (2)	4.61 (2)	4.11 (2)	
2016	Categories	n	Overall	Public Sector	Private Sector
	<1 hour	1,565	31.8%	30.0%	38.4%
	1-4 hours	2,520	49.5%	50.1%	47.5%
	5-8 hours	513	10.3%	11.1%	7.4%
	9-12 hours	190	3.7%	3.8%	3.1%
	13-24 hours	209	4.7%	5.0%	3.6%
	<i>Distribution in hours</i>		<i>Mean (median)</i>	<i>Mean (median)</i>	<i>Mean (median)</i>
TOTAL	4,997	3.09 (1)	3.23 (1)	2.62 (1)	

Factors associated with immediate maternal postnatal assessment on the 2016 survey

Table 6 presents the association of key factors with receiving an immediate maternal postnatal assessment in the most recent survey. In bivariate analysis of the 2016 survey, birth in a private sector facility, richest wealth quintile, Central zone residence, maternal age,

secondary or higher education, being married, having a bank account, having health insurance, receiving antenatal care, reading a newspaper, listening to the radio, watching TV, using the internet, having a mobile phone, having a female baby, having the baby weighed at birth, having a caesarean section and having the birth conducted by a doctor or NPC were associated with receiving an immediate postnatal assessment after a facility birth.

In the multivariable analysis, compared with receiving no facility-based antenatal care, those with 1-3 visits had an OR of 2.18 (CI: 1.39-4.2) and those with 4+ visits had an OR 2.34 (CI: 1.50-3.64) of receiving immediate maternal postnatal care. The use of internet had an OR of 1.39 (CI: 1.04-1.86) of receiving immediate postnatal care compared to not using the internet. Having the baby weighed at birth had an OR of 1.84 (CI: 1.58-2.14) of receiving immediate postnatal care compared to not being weighed at birth. Mode of birth was also an important factor; women who had a caesarean section were 2.93 times (CI: 2.28-3.75) more likely to receive immediate postnatal care compared with those who had a vaginal birth in a health facility.

Table 6: Bivariate and multivariable logistic analysis of factors of coverage of immediate maternal postnatal care of woman who gave birth in healthcare facilities for most recent live births in Uganda 2016

Factor	Categories	Crude analysis (n=7620)			Multivariable analysis (n=7620)		
		OR	95% CI	Wald p-value	aOR	95% CI	Wald p-value
Health facility	Public sector	1 (REF)			1 (REF)		
	Private sector	1.12	0.96-1.30	0.156	1.14	0.98-1.33	0.099
Residence	Rural	0.72	0.60-0.87	0.001	0.96	0.78-1.17	0.684
	Urban	1 (REF)			1 (REF)		
Household wealth quintile	Poorest	1 (REF)			1 (REF)		
	Poorer	0.84	0.68-1.02	0.083	0.95	0.77-1.18	0.653
	Middle	0.77	0.61-0.98	0.033	0.95	0.74-1.22	0.688
	Richer	0.84	0.68-1.05	0.125	0.87	0.68-1.13	0.300
	Richest	1.39	1.10-1.76	0.006	0.98	0.73-1.31	0.880
Geographic zone at survey	Central	1.04	0.83-1.32	0.718	0.77	0.61-0.97	0.024
	Eastern	1 (REF)			1 (REF)		
	Western	0.47	0.38-0.58	0.000	0.40	0.32-0.49	0.000
	Northern	0.98	0.76-1.27	0.895	0.93	0.72-1.19	0.549
Maternal age at birth	<20	1 (REF)			1 (REF)		
	20-24.9	1.18	1.00-1.38	0.039	1.18	0.98-1.42	0.079
	25-29.9	1.22	1.04-1.44	0.018	1.24	1.00-1.53	0.046
	30-34.9	1.32	1.09-1.61	0.005	1.52	1.17-1.98	0.002
	35-49.9	1.24	1.01-1.51	0.041	1.54	1.15-2.06	0.004
Highest level of maternal education at survey	No education	1 (REF)			1 (REF)		
	Primary	0.91	0.73-1.13	0.379	0.89	0.73-1.08	0.235
	Secondary+higher	1.28	1.03-1.61	0.029	0.94	0.74-1.18	0.582
Marital status at time of survey	Yes	1.08	0.94-1.23	0.260	1.04	0.91-1.20	0.553
	No not in union	1 (REF)			1 (REF)		
Total persons in residence at time of survey	<4	1 (REF)					
	4 to 5	0.93	0.79-1.09	0.379			
	6+	0.88	0.74-1.04	0.139			
Total children <5 in residence at time of survey	0-1	1 (REF)					
	2 to 3	0.99	0.88-1.11	0.901			
	4+	0.77	0.58-1.03	0.075			
Religion	Christian	0.85	0.71-1.01	0.078			
	Other	1 (REF)					
How much of a problem does getting permission pose to getting to the doctor when sick?	Big problem	0.85	0.68-1.07	0.160			
	Not a Big Problem	1.00					
Bank account at time of survey?	Yes	1.77	1.46-2.15	0.000	1.26	1.03-1.54	0.027
	No	1 (REF)			1 (REF)		
Health insurance at time of survey?	Yes	1.24	0.75-2.07	0.398	0.83	0.47-1.46	0.521
	No	1 (REF)			1 (REF)		
Number of ANC attendances at health care facilities	None	1 (REF)			1 (REF)		
	1-3 visits	2.43	1.55-3.83	0.000	2.18	1.39-3.42	0.001
	4+ visits	2.74	1.74-4.31	0.000	2.34	1.50-3.64	0.000
Read a newspaper at time of survey	Yes	1.89	1.60-2.22	0.000	1.38	1.15-1.65	0.000
	Not at all	1 (REF)			1 (REF)		
Listened to the radio at time of survey	Yes	1.22	1.08-1.43	0.002	1.13	0.98-1.31	0.091
	Not at all	1 (REF)			1 (REF)		
Watched TV at time of survey	Yes	1.49	1.28-1.72	0.000			
	Not at all	1 (REF)					
Use of Internet at time of survey	Yes	2.40	1.88-3.08	0.000	1.39	1.04-1.86	0.027
	Not at all	1 (REF)			1 (REF)		
Mobile phone at time of survey	Yes	1.24	1.10-1.41	0.000	0.96	0.84-1.09	0.501
	No	1 (REF)			1 (REF)		
Parity	One	1 (REF)			1 (REF)		
	Two-three	0.89	0.77-1.04	0.140	0.83	0.70-0.99	0.033
	Four-five	0.95	0.79-1.13	0.547	0.83	0.66-1.04	0.110
	Six+	0.85	0.71-1.01	0.068	0.75	0.57-0.98	0.036
Wantedness of last pregnancy at time of pregnancy	Wanted	1 (REF)			1 (REF)		
	Unwanted	0.85	0.76-0.95	0.003	0.87	0.78-0.98	0.019
Sex of last baby	Female	1.06	0.95-1.20	0.255	1.10	0.98-1.24	0.116
	Male	1 (REF)			1 (REF)		
Was baby weighed at birth	Yes	2.08	1.79-2.42	0.000	1.84	1.58-2.14	0.000
	No	1 (REF)			1 (REF)		
How big did the woman think the baby was at birth	Other	1 (REF)					
	Very small	0.87	0.68-1.11	0.259			
	Within an hour	1 (REF)			1 (REF)		
Start time of breastfeeding	>1 hours	0.95	0.83-1.09	0.474	0.72	0.62-0.83	0.000
	Yes- CS	2.70	2.13-3.41	0.000	2.93	2.28-3.75	0.000
Mode of delivery for last birth	No- Vaginal	1 (REF)			1 (REF)		
	Doctor/NPC	1.56	1.32-1.84	0.000			
Highest cadre of health professional at birth	Nurse/Midwife	1 (REF)					
	Other/None	0.64	0.43-0.96	0.03			

Additional analyses

Within a sub-sample of 6,211 women who were married or cohabiting at the time of the survey it was found in multivariable analysis that male partner's education was not significantly associated with receipt of immediate postnatal care among women (Table 7). We analysed a separate sub-sample of 5,889 women who had a previous child (Table 7). In multivariable analysis, women who reported a previous child dying within 24 hours of birth were not more likely to have reported an immediate maternal postnatal assessment than women without a previous child death (aOR 1.05(CI: 0.80-1.38)).

Table 7: Crude and Multivariable logistic analysis of a subgroup of married women who received immediate postnatal care in 2016 and subgroup of women who had previous children and who received immediate postnatal care in 2016

Factor		Subgroup Married women- Crude analysis (n=6211)			Subgroup Married women- Multivariable analysis (n=6211)			Subgroup Women with previous children- Crude analysis (n=5889)			Subgroup Women with previous children- Multivariable analysis		
		aOR	95% CI	Wald p-value	aOR	95% CI	Wald p-value	aOR	95% CI	Wald p-value	aOR	95% CI	Wald p-value
Health facility	Public sector	1 (REF)			1 (REF)			1 (REF)			1 (REF)		
	Private sector	1.12	0.95-1.33	0.173	1.13	0.95-1.35	0.158	1.11	0.94-1.31	0.234	1.12	0.94-1.34	0.188
Residence	Rural	0.72	0.59-0.86	0.001	0.96	0.77-1.20	0.716	0.76	0.62-0.92	0.006	1.01	0.81-1.24	0.960
	Urban	1 (REF)			1 (REF)			1 (REF)			1 (REF)		
Household wealth quintile	Poorest	1 (REF)			1 (REF)			1 (REF)			1 (REF)		
	Poorer	0.82	0.65-1.03	0.094	0.92	0.73-1.18	0.521	0.81	0.64-1.03	0.080	0.93	0.73-1.20	0.598
	Middle	0.81	0.62-1.05	0.112	1.00	0.76-1.32	0.997	0.79	0.60-1.04	0.091	0.96	0.72-1.29	0.811
	Richer	0.86	0.68-1.09	0.201	0.90	0.68-1.18	0.446	0.86	0.67-1.10	0.224	0.91	0.69-1.21	0.537
	Richest	1.47	1.15-1.87	0.002	1.01	0.73-1.40	0.936	1.42	1.08-1.85	0.012	0.96	0.69-1.33	0.809
Geographic zone at survey	Central	1.07	0.84-1.37	0.575	0.73	0.57-0.94	0.013	1.06	0.82-1.37	0.655	0.78	0.60-1.00	0.053
	Eastern	1 (REF)			1 (REF)			1 (REF)			1 (REF)		
	Western	0.47	0.38-0.58	0.000	0.38	0.30-0.48	0.000	0.46	0.36-0.59	0.000	0.40	0.31-0.51	0.000
	Northern	0.99	0.76-1.28	0.932	0.97	0.75-1.26	0.831	1.04	0.79-1.36	0.805	0.99	0.76-1.29	0.940
Maternal age at birth	<20	1 (REF)			1 (REF)			1 (REF)			1 (REF)		
	20-24.9	1.10	0.92-1.32	0.286	1.04	0.84-1.29	0.718	1.38	1.06-1.79	0.016	1.24	0.95-1.63	0.108
	25-29.9	1.26	1.04-1.53	0.019	1.18	0.92-1.52	0.203	1.46	1.11-1.92	0.007	1.21	0.90-1.63	0.211
	30-34.9	1.29	1.03-1.61	0.028	1.42	1.05-1.92	0.024	1.64	1.25-2.14	0	1.49	1.07-2.06	0.017
	35-49.9	1.21	0.96-1.54	0.113	1.49	1.06-2.10	0.023	1.54	1.15-2.06	0.004	1.51	1.05-2.16	0.025
Highest level of maternal education at survey	No education	1 (REF)			1 (REF)			1 (REF)			1 (REF)		
	Primary	0.93	0.75-1.15	0.506	0.94	0.76-1.16	0.547	0.90	0.73-1.10	0.31	0.89	0.73-1.10	0.289
	Secondary+higher	1.42	1.12-1.81	0.004	0.98	0.75-1.26	0.849	1.46	1.16-1.85	0.001	1.00	0.76-1.30	0.975
Highest level of education of husband at survey	No education	1 (REF)			1 (REF)								
	Primary	0.86	0.67-1.11	0.248	0.88	0.69-1.13	0.332						
Secondary+higher	1.20	0.92-1.56	0.176	0.88	0.67-1.15	0.346							
Marital status at time of survey	Yes							1.21	1.03-1.42	0.020	1.15	0.98-1.35	0.095
	No not in union	1 (REF)			1 (REF)			1 (REF)			1 (REF)		
Who makes decisions about healthcare	Respondent	0.99	0.43-2.29	0.976	1.42	0.57-3.56	0.448						
	Patient+ husband/partner	1.10	0.48-2.53	0.828	1.77	0.70-4.46	0.223						
	Husband/partner	0.86	0.37-2.00	0.727	1.39	0.56-3.48	0.479						
	Other/ someone else	1 (REF)			1 (REF)								
Who makes decisions on large household purchases	Respondent	0.50	0.18-1.34	0.166	0.32	0.09-1.06	0.063						
	Patient+ husband/partner	0.63	0.24-1.68	0.356	0.37	0.11-1.24	0.107						
	Husband/partner	0.58	0.22-1.57	0.284	0.39	0.12-1.29	0.123						
	Other/ someone else	1 (REF)			1 (REF)								
Bank account at time of survey?	Yes	1.76	1.44-2.15	0.000	1.24	1.00-1.54	0.055	1.75	1.42-2.16	0.000	1.20	0.96-1.51	0.116
	No	1 (REF)			1 (REF)			1 (REF)			1 (REF)		
Health insurance at time of survey	Yes	1.09	0.64-1.85	0.759	0.74	0.40-1.36	0.326	1.19	0.69-2.06	0.526	0.79	0.43-1.48	0.468
	No	1 (REF)			1 (REF)			1 (REF)			1 (REF)		
Number of ANC attendances at health care facilities	0	1 (REF)			1 (REF)			1 (REF)			1 (REF)		
	1-3 visits	1.86	1.07-3.22	0.027	1.68	0.96-2.94	0.069	2.35	1.36-4.06	0.002	2.09	1.22-3.59	0.007
	4+ visits	2.10	1.22-3.61	0.007	1.83	1.06-3.15	0.030	2.60	1.50-4.48	0.001	2.19	1.29-3.74	0.004
Read a newspaper at time of survey	Yes	1.89	1.58-2.26	0.000	1.38	1.14-1.67	0.001	1.86	1.55-2.23	0.000	1.29	1.05-1.58	0.014
	Not at all	1 (REF)			1 (REF)			1 (REF)			1 (REF)		
Listened to the radio at time of survey	Yes	1.28	1.10-1.49	0.001	1.16	0.99-1.36	0.067	1.31	1.12-1.54	0.001	1.21	1.01-1.44	0.035
	Not at all	1 (REF)			1 (REF)			1 (REF)			1 (REF)		
Use of Internet at time of survey	Yes	2.41	1.80-3.22	0.000	1.33	0.94-1.87	0.105	3.44	2.30-5.16	0.000	1.89	1.19-3.02	0.007
	Not at all	1 (REF)			1 (REF)			1 (REF)			1 (REF)		
Mobile phone at time of survey	Yes	1.32	1.15-1.51	0.000	1.01	0.87-1.18	0.888	1.27	1.11-1.46	0.001	1.01	0.87-1.16	0.936
	No	1 (REF)			1 (REF)			1.00	REF	REF	1.00	REF	REF
Parity	One	1 (REF)			1 (REF)				DROPPED	DROPPED	1 (REF)		DROPPED
	Two-three	0.95	0.80-1.13	0.572	0.94	0.76-1.16	0.552	1 (REF)			1 (REF)		
	Four-five	1.02	0.83-1.25	0.878	0.96	0.74-1.26	0.778	1.06	0.91-1.22	0.466	1.07	0.89-1.29	0.493
	six+	0.85	0.69-1.04	0.109	0.79	0.57-1.08	0.137	0.95	0.81-1.11	0.488	1.01	0.78-1.30	0.940
Wantedness of last pregnancy at time of pregnancy	Wanted	1 (REF)			1 (REF)			1 (REF)			1 (REF)		
	Unwanted	0.82	0.73-0.92	0.001	0.84	0.74-0.96	0.010	0.79	0.70-0.90	0.000	0.81	0.71-0.93	0.003
Sex of last baby	Female	1.01	0.89-1.14	0.858	1.04	0.91-1.18	0.573	1.06	0.93-1.21	0.386	1.10	0.96-1.26	0.160
	Male	1 (REF)			1 (REF)			1 (REF)			1 (REF)		
Was baby weighed at birth	Yes	2.01	1.70-2.37	0.000	1.80	1.52-2.13	0.000	2.12	1.78-2.52	0.000	1.89	1.59-2.25	0.000
	No	1 (REF)			1 (REF)			1 (REF)			1 (REF)		
Start time of breastfeeding	Within an hour	1 (REF)			1 (REF)			1 (REF)			1 (REF)		
	>1 hours	0.92	0.79-1.08	0.308	0.71	0.60-0.85	0.000	1.01	0.86-1.19	0.874	0.75	0.63-0.90	0.002
Previous baby death	No child death	1 (REF)			1 (REF)			1 (REF)			1 (REF)		
	Child death within 24 hours	0.99	0.78-1.27	0.962	0.85	0.73-0.99	0.035	0.99	0.78-1.27	0.962	1.05	0.80-1.38	0.740
	Child death over 24 hours	0.85	0.73-0.99	0.035	0.90	0.76-1.07	0.228	0.90	0.76-1.07	0.228	0.90	0.76-1.07	0.228
Mode of delivery for last birth	Caesarean birth	2.63	2.05-3.39	0.000	2.88	2.19-3.78	0.000	3.54	2.60-4.82	0.000	3.83	2.78-5.27	0.000
	Vaginal birth	1 (REF)			1 (REF)			1 (REF)			1 (REF)		

Discussion

Over the 15-year period under investigation, when the percentage of births in health facilities increased, the percentage of women who remained in health facilities for 24 hours or longer remained stable at just above 70%, and coverage of immediate maternal postnatal care after facility birth increased to 65.0%. Large geographic variations were found in immediate maternal postnatal care after facility births on the 2016 survey, particularly between Western and Eastern Uganda. In the 2016 survey, the proportion of babies and mothers receiving immediate postnatal care was similar. The majority of first postnatal assessments after facility

births occurred at 1-4 hours postpartum and the median time interval from birth to first assessment reduced between 2006 and 2016 surveys, with the shift toward earlier assessments most marked in private sector facilities. The most significant factor independently associated with receipt of immediate postnatal care was mode of birth; women who had a caesarean section had nearly three times the odds of immediate postnatal care compared to those with a vaginal birth. Other factors positively associated with higher odds of being assessed included exposure to mass media, baby having been weighed at birth, and receipt of antenatal care.

The findings show the most significant improvement to immediate postnatal care provision occurred between 2011-2016 where coverage increased by 20%. This is in line with the 15.1% increase in births in health care facilities in line with current global trends and recommendations. Despite this, immediate postnatal care coverage after such births remained suboptimal at 65%.^{114,116} This rate is higher than the 50% coverage reported in Uganda by Ndugga *et al*, although this report included births at both home and facility.³⁹ A common reason given for poor coverage of care is that women do not remain in facilities long enough (for 24 hours) to receive postnatal care.⁷⁷ However, this study shows that even if women do stay for 24 hours, the coverage of immediate postpartum assessments still remains suboptimal. As such, this finding may be more reflective of the lack of priority given to mothers in the postpartum period.¹¹⁷ Emerging qualitative data has shown that postnatal care is largely undervalued by communities and often perceived as a low priority for health professionals; these perceptions negatively influence the uptake and coverage of care.^{90,118} At present, coverage of immediate postpartum assessments is globally poor and the worst performing aspect in the obstetric continuum of care.^{30,31} In fact, there is no current global standard metric available to evaluate progress in quality and content of care which otherwise exists for both antenatal and intrapartum care.¹¹⁹ Additionally, with the increased number of facility births, health facilities are busier than ever before. The poor coverage of immediate care could therefore be a sign of over-burdened and burned-out health care providers struggling to keep up with the increasing demand.⁴³ Furthermore, although WHO Postnatal care recommendations do exist, there is a paucity of literature providing guidance and frameworks to health workers at country or system level on how to provide high quality

maternal care, particularly after facility birth.¹²⁰ As a result, the care provided is often incomplete and not universal to every women at birth.⁴⁰

Although not universal, women from central Uganda were noted to receive the highest coverage of immediate postnatal care after facility birth. In a cross-sectional study of factors affecting utilisation of early postnatal care (within 7 days of birth) in Central Uganda following health-facility births, formal employment was identified as the key socio-economic factor increasing the likelihood of women receiving early postnatal care.¹²¹ Through employment, women not only have a better financial status and ability to use quality health services but are also empowered to participate in the decision-making process about their healthcare.¹²¹ DHS data does not provide the means to accurately examine the role of a women's occupation on receipt of immediate postnatal care and therefore it might be useful to examine this factor directly at regional level. Care was still noted to not be universal in the Central region. The Central Uganda region contains Kampala, the capital and largest city in Uganda. Coupled with the rise in health-facility births, crowding does exist within facilities and this has been found to have an ongoing detrimental effect on the quality of respectful care received by women.^{31,43} Other examples of a lack of respectful postnatal care in Uganda (physical and verbal mistreatment by staff, and stigma and denial of care for marginalised communities) have been shown to contribute to a negative care experience by mothers.⁴⁷ This has resulted in a reduced utilisation and therefore coverage of postnatal care services.¹²² Again, data for respectful care were not collected in the DHS and this would also be worth examining directly at regional level.

Conceptually, a key factor thought to impact maternal immediate postnatal care provision is if immediate postnatal care is provided for the baby. In the 2016 survey, nearly two-thirds of mother-baby dyads received both maternal and neonatal immediate postnatal care, whilst a quarter did not receive any immediate postnatal care for either mother or baby. Very few women reported receiving only maternal or only neonatal immediate postnatal care. This suggests that if a baby is to receive immediate postnatal care, a mother is likely to as well, and vice versa. This finding is perhaps driven by the notion that those mothers and babies with complications (for example, mothers most unwell following birth or with existing conditions, and babies which are smaller, premature, or who are most unwell), will be prioritised to receive care.⁴⁷ This idea is further exemplified in the multivariable model which

found reporting that the baby was weighed at birth was positively associated with the mother received an immediate postnatal assessment. To the researchers knowledge there is no existing literature examining this interaction. With this knowledge, further work perhaps should focus on integrating maternal and newborn immediate postnatal care within in-facility postnatal care guidelines to aid in improving coverage of overall immediate postnatal care.³¹

The timing of the first postnatal assessment, examined in all datasets, found that the majority of first assessments occurred consistently between 1-4 hours. This is in line with Ugandan guidelines and several factors encourage this early postnatal review.²⁹ For example, many resource-stretched maternity units are in need of early discharge to make space for new births.⁷⁷ Additionally, for women birthing in private facilities, having an early assessment will often enable women and babies to leave as soon as possible to reduce the cost incurred for time spent in the facility.^{77,123} Unfortunately, the DHS did not gather data on quality or components of postnatal assessments, and it was not possible to determine if the speed of assessment compromises the quality of care provided. Early postnatal assessments are not necessarily ideal.⁷⁷ The WHO recommends that all new mothers remain in the facility for 24 hours following birth because the majority of maternal and neonatal deaths occur during this period.¹⁸ Mothers receiving only one assessment in the first hour following birth therefore, without any further assessments, might not be sufficiently monitored to detect complications of birth.^{18,114} As such, it has been suggested that in sub-Saharan Africa >75% of women receive suboptimal postnatal health assessments.^{40,77} Further qualitative work focussing on quality of care and actions taken following postnatal assessments would be important to enable this finding to be explored further.

Factors affecting coverage of immediate postnatal care were explored through crude and multivariable logistic regression analysis in the 2016 database. Having a caesarean section increased the odds of being assessed compared to those women who had a vaginal birth which has been noted in existing literature from Bangladesh.¹²⁴ Women having a caesarean section are at a higher risk of severe acute maternal morbidity, particularly in low resource settings.¹²⁵ As such, clinicians faced with time pressures and a large number of patients to see, might prioritise examining high risk post-operative women.⁴⁰ That said, coverage of immediate postnatal care for mothers giving birth by caesarean section was still suboptimal at 82% (2016). In sub-Saharan Africa, up to 20% of caesarean sections are conducted under

general anaesthesia.¹²⁶ Following a long labour and emergency caesarean under general anaesthesia, women can often be drowsy and disorientated resulting in poor recall of birth and postnatal care events. The figure of 82% coverage should therefore be interpreted with caution.

Women who had access to mass media were noted to have a higher likelihood of receiving immediate postnatal care. This finding is in line with previous studies across sub-Saharan Africa.¹²⁷ Mass media can be harnessed as a platform to educate and inform mothers in order to increase their access to knowledge and improve their ability to seek care.³⁹ In all low-resource settings, education has consistently been noted as key to postnatal care utilisation.¹²⁸ Additionally, coverage of ANC was identified as an important factor. The more antenatal visits a woman received the higher the chance of receiving immediate maternal postnatal care compared with those receiving no ANC in facility. This finding was in line with studies from Ethiopia.¹²⁹ ANC has also been proven a worthy platform to provide effective maternal education to reduce postpartum morbidity and may provide the opportunity for mothers to understand key features of their continuum of care.¹³⁰ This finding could be confounded by wealth/social capital as well as the presence of any pre-existing conditions requiring receipt of more ANC and therefore resulting in a higher need to be assessed postnatally.

Strengths

This is the first study to undertake a comprehensive analysis of coverage of immediate maternal postnatal care in healthcare facilities in Uganda. By using three DHS datasets from 2006 to 2016, it was possible to explore changes over time over 15 years of births based on recall periods and examine the coverage and determinants of coverage of immediate postnatal care in health facilities. Second, existing global research has often focussed on postnatal care coverage among rural and home-based births or all births and there is little literature specific to care following facility births in Uganda.^{131–133} Third, the intersection between maternal and newborn postnatal care coverage has not been described in previous work and this study provided novel evidence.

Limitations

There are, however, some limitations to this work. First, the DHS relies on women's recall of the immediate postnatal period up to 5 years preceding the survey. This relies on the accuracy of the woman's memory of the receipt and timing of postnatal care provided in the immediate postnatal period. A study in two sub-Saharan African settings showed that women were able to recall key postnatal events to an acceptable threshold.¹³⁴ However, the results in this study flagged some clear anomalies as across the three surveys women consistently reported caesarean sections being conducted by nurses/midwives and other health workers. This could be that women are actually remembering the latter parts of intrapartum care prior to birth. Studies on the validity of women's recall in the immediate postnatal care have found that women are consistently less able to recall indicators in the intrapartum period and within 1 hour of birth immediately postnatally.^{135,136} With assessments being conducted earlier, there is additionally a higher chance of women being unable to distinguish between the latter parts of intrapartum care and immediate postnatal care.¹³⁵ We attempted to limit the extent of recall error by restricting responses to the respondents' most recent birth. Second, the DHS questions do not capture the presence of complications, nor the quality and content of postnatal care. The ability to examine postnatal care comprehensively and adjust for important confounders was therefore somewhat limited.¹³⁴ Third, demographic data within the DHS survey such as marital status are taken at the time of the survey being conducted and not at the time of birth. Nonetheless, the DHS recall period of live births is limited to 5 years and thus it limits the extent of discrepancies.

Conclusion

Although there have been significant advances in coverage of postnatal care globally, there still remains a large gap. This study complements other global papers to strengthen the argument for focus and attention to immediate postnatal care. Future research in postnatal care coverage is key to ensure it gains a pivotal place on the global maternal health agenda. In Uganda, it would be useful to understand the barriers to provision of immediate postnatal care after facility births at national level. This would enable policy stakeholders to galvanise support in prioritising postnatal care provision and equitable coverage. Additionally, it would provide data on how to ensure best practice through guidelines training and implementation. One strategy could be to look at further integrating maternal and newborn care services, even

beyond discharge. Another would be to acknowledge that increasing facility-based births or the number of women remaining in facility for 24 hours following birth has not led to the sufficient change needed to make immediate postnatal care coverage universal, nor reduce maternal and neonatal mortality. If anything, the resulting crowding has increased the pressure on overburdened and burned-out healthcare providers, reducing respectful quality postnatal care provision and preventing the swift recognition and action if postnatal complications are identified. Perhaps education and active involvement of mothers and their partners in their care could act to enhance respectful care and improve coverage and utilisation of care. Finally, there is need for a direct needs assessment of health system, staff and quality of care, to identify factors that impede immediate postnatal care coverage. It would be useful for the work to be conducted by region to help uncover the geographical and subnational differences that exist in care provision.

Chapter 4- Barriers, Facilitators and Strategies to improve iPNC in Uganda

Purpose of the chapter

In the previous chapter, an analysis of data from 12,872 mothers in the 2006, 2011 and 2016 DHS identified that the coverage of iPNC increased from 35.7% (CI 33.4-38.1%) in 2006 to 65.0% (CI: 63.2-66.7%) in 2016. Additionally, factors associated with positive receipt of immediate postnatal care were birth in a private sector facility, richest wealth quintile, central zone residence, maternal age, secondary or higher education, being married, having a bank account, having health insurance, receiving antenatal care, reading a newspaper, listening to the radio, watching TV, using the internet, having a mobile phone, having a female baby, having the baby weighed at birth, having a caesarean section and having the birth conducted by a doctor or NPC.

Following on from this work, interviews with key informants, mothers, and birth companions were conducted in parallel to explain the initial quantitative results in more depth. It also provided an opportunity to explore data that was unable to be collected through the initial quantitative methods specifically on content and quality of care. Twelve key informant interviews conducted to understand the rationale behind the determinants of iPNC reported, key barriers and facilitators of iPNC provision and to discuss potential strategies to optimise care. Additionally, 19 interviews with mothers and their birth companions were conducted to provide understanding of their first-hand experiences of receiving iPNC. The methods, results and key findings from this analysis are presented in this chapter.

Objectives

The overall objective is to explore user and provider experiences of iPNC in Uganda along with barriers, facilitators and opportunities to improve care.

The sub-objectives are:

- To explore user perceptions of receipt of iPNC
- To understand the key determinants of coverage and utilisation of iPNC in healthcare facilities in Uganda
- To identify the barriers and facilitators to the coverage and utilisation of iPNC in

healthcare facilities in Uganda

- To explore strategies to improve utilisation of iPNC in healthcare facilities in Uganda

Methods

The study methods and findings are reported as per the established and widely used COREQ criteria to ensure robustness and high-quality reporting of qualitative work.¹³⁷

Eligibility Criteria

Interviews with mothers and birth companions

Perspectives from those in receipt of iPNC in Mbale Regional Referral Hospital were sought. As such, interviews were conducted with women and their birth companions.

Women were asked to participate if they:

- Had birthed at Mbale regional referral hospital within the last 5 days; and
- Were 18 years old or older (or an emancipated minor); and
- Had the ability to provide informed consent

Birth companions were asked to participate if they had remained as the primary birth companion for the first 24 hours postnatally. A birth companion could be a spouse, family member or friend.

Key informant interviews

Key informant interviews were conducted with pre-identified key stakeholders and decision makers who had expertise in managing and employing maternal health in eastern Uganda. Although not all informants were primarily based in eastern Uganda, each informant had to have had experience in management and provision of maternal healthcare in eastern Uganda. All stakeholders needed a minimum of 2 years' experience in their current role.

Sampling and selection of participants

Interviews with mothers and birth companions

Interviews with 19 mothers and their birth companions were conducted. Participants were identified through maximum variation purposive sampling to ensure transferability of study findings.¹³⁸ Participants were stratified based on cadre type and mode of birth (Vaginal vs Caesarean Section). This method was selected as it has an emphasis on variation to achieve a

breadth of viewpoints from a diverse group of individuals on the content and presentation of the tool.¹³⁹ The input sought is from participants from a range of cadres and as such the viewpoints are likely to be differing. Maximum variation purposive sampling is an effective way to capture these differing views of the participants.¹³⁹ This contrasts with other purposive approaches such as typical case, homogeneity and snowball which have more of an emphasis on finding commonalities between similar viewpoints. Additionally, out of the purposive sampling methods that have an emphasis on variation, maximum variation is preferred as it is recognised as being more representative when sample sizes are typically smaller than 50 participants.^{140,141}

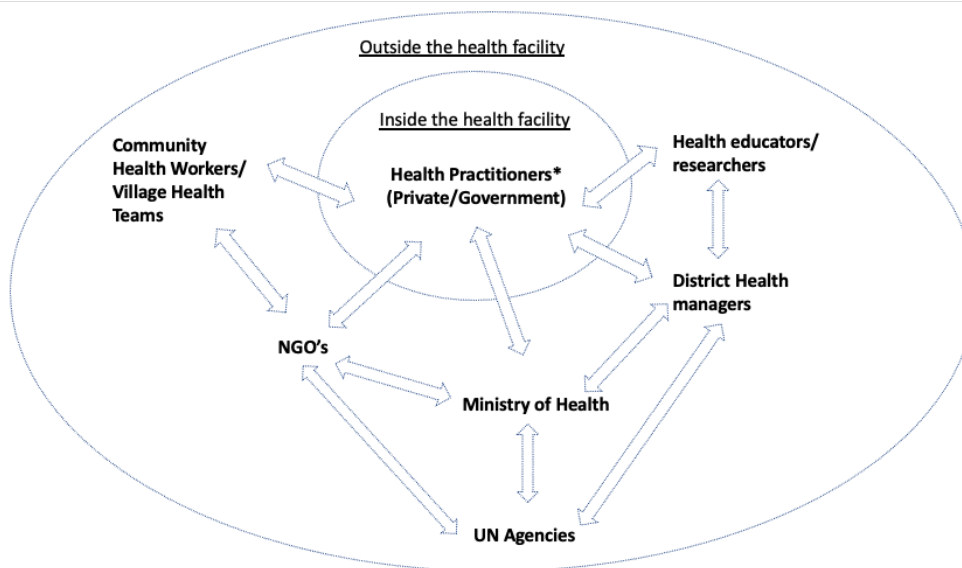
There is a lack of consistency in the existing literature on the best approach to development of sample sizes for qualitative research.¹⁴² The virtue of qualitative methodology negates the ability to use statistics-based rules to set sample sizes precisely. Existing literature suggests anywhere from 5 to 50 participants as adequate.¹⁴³ Therefore a pragmatic approach was taken whereby interviews were conducted until data saturation was reached, that is, when no new themes emerged. A recent review of qualitative sample size methodology guidance highlighted that the principle of saturation was the most cited argument accounting for 55% of all justifications.¹⁴² Additionally another review of empirical studies that assess saturation in qualitative research identified that data saturation reached was achieved within a narrow range of 9-17 interviews.¹⁴⁴

All 19 participants approached consented to participating in the interview. No participants declined. One participant was only able to provide a partial interview related to the content of the tool and requested that the research assistant returned the next day to complete the interview. When the research assistant returned, the participant had already been discharged home.

Key informant interviews

Key informant interviews with 12 stakeholders were conducted. An initial mapping of key national stakeholders involved in the provision of immediate postnatal health care in health facilities was undertaken by the research team (Figure 10). These key stakeholders were purposively selected and included representatives from a wide range of organisations, at different levels and at different sectors. At minimum, the research team were keen to interview at least one participant from each stakeholder.

Figure 10: Mapping of key stakeholders involved in provision of iPNC



*= Doctors or midwives

Participants were selected purposively, and priority was given to those in leadership positions as through their seniority they would likely have greater experience to share including on the inter-relationships between different health systems levels. Interviews were conducted until data saturation occurred.

A total of 17 participants were contacted and invited to be interviewed. There were three respondents that did not respond to the introductory email or follow up and two respondents who were unable to be interviewed due to scheduling conflicts. Twelve participants were ultimately interviewed.

Informed consent

Interviews with mothers and birth companions

Interviews were conducted by a female research assistant (VM) based in Mbale, Uganda. VM has a non-clinical background but is a science graduate who has an interest in maternal and newborn health and experience in qualitative and quantitative data collection. VM is fluent in English and the three local languages in Mbale, Uganda which were Ateso, Lumasaba and Lugwere. As such interviews could be conducted in any of the four languages, as per the participants request.

VM liaised with the head midwives on the labour ward and postnatal ward at Mbale Regional Referral Hospital (MRRH), who were best placed to identify and alert the research assistant to eligible mothers and their birth companions. Following identification of eligible participants, the research assistant approached potential participants and provided each participant with an information leaflet and an explanation of the study. Copies of the participant information sheet and consent form were available in English and were translated into the three local languages in Mbale (Ateso, Lugwere, Lumasaba). The local languages were identified by the local research team and are in line with existing studies conducted in Mbale, Uganda.¹⁴⁵¹⁴⁶ Participants were allowed as much time as they needed to decide if they wanted to participate in the study before discharge.

Written informed consent was obtained from participants who were keen to participate in the study. If the participant was unable to sign the consent form, they were offered the opportunity to place a finger/thumb print on the form to indicate their consent.

All interviewed participants were provided with 10,000 UGX (approximately £2) to reimburse them for their time spent in the study.

Key informant interviews

Interviews were conducted by a female PhD student (TD) who has a clinical background working as an Obstetrician and Gynaecologist in the UK. All interviews were conducted in English.

Potential stakeholders were purposively identified and contacted by an introductory email for their participation. The introductory email contained an information leaflet including explanation of the study and consent form. Stakeholders were requested to reply directly to the lead researcher by email, to indicate their willingness to participate in the study. The lead researcher was then able to establish an individualised date and time for the video-interview. Those who responded favourably, were asked to complete, and sign the consent form and return this to the lead researcher ahead of the interview. Participants were also free to ask questions to the researcher in the lead up to the interview. Consent was re-confirmed at the start of the video-interview by the lead researcher.

All interviewed participants were provided with 20,000 UGX (approximately £4) to reimburse them for their mobile data spent to participate in the interview.

Data Collection

Interviews with mothers and birth companions

A total of 19 semi structured interviews by VM.

The duration of each interview was determined based on the participant's willingness to talk. Length of interviews ranged from 18 to 61 minutes with a median of 43 minutes.

Interviews were conducted face to face over a two-month period between 1st August 2021 - 30th September 2021. Careful consideration was taken to ensure that interviews were conducted at a time that was agreeable to the participants. Cognisant that choice of venue could potentially affect participants' behaviour, efforts were taken to ensure that interviews were conducted in an environment that was private, safe, comfortable, and agreeable to the interviewee.¹⁴⁷ As such, interviews were conducted in an office adjacent to the postnatal ward. In general, only VM and participant were present during the interview. However, companions were permitted during the interview if requested by the participant. If companions were present in the interview, VM highlighted those responses included in the analysis would only be taken from the main participant interviewed.

For the participants' ease and to prevent unnecessary extra travel in view of the Covid-19 pandemic, interviews were conducted whilst the women and their birth companions were still in Mbale Regional Referral Hospital after they had given birth.

Qualitative data were collected via individual, face to face, semi structured interviews. The literature highlights that there is little difference in the generating of general concepts or conclusions between focus group discussions and individual interviews.¹⁴⁸ However individual interviews enable participants to share insights on sensitive issues more readily, honestly and with greater depth.¹⁴⁹ Given the project is on a sensitive topic of health following birth of their baby, and interviews would be conducted following birth at a time that is most special and unique to mothers and their families, individual interviews would provide privacy to the respondents. Additionally, logistically, individual interviews are more cost-effective and easier to schedule around the needs of the participants. As such individual interviews were employed as it was important to explore individual experiences of postnatal care.

A structured interview guide was pre-created with questions seeking the respondent's views on their perceptions of iPNC. The interview guide was based upon the experience of the core

multi-speciality supervisory research team on which questions would be pertinent to explore the perceptions of iPNC. The pre-creation of an interview guide mitigated moderator bias. The semi-structured approach for the questions enabled the researcher to acquire a large amount of information, to be fairly flexible and sensitive to the data provided by the participant. The interview guide was reviewed by members of the core multi-speciality supervisory research team.

Interviews were recorded to enable transcription and data analysis following the interview. At the beginning of each interview, participants provided their background demographics. Participants were asked open ended questions and were probed inductively as necessary to elaborate on answers for further information and to add depth to responses provided. At the end of the interview, the researcher briefly summarised the main points to confirm interpretation with the participant. The non-verbal messages from the participants (such as tone, silence, emphasis, mannerisms) were also documented by the researcher as field notes to demonstrate the reality of the interview.

No repeat interviews were conducted. The interviewees were mothers and their birth companions on the postnatal ward and as such were likely to be discharged home prior to completion of the data transcripts. To confirm understanding of the findings, a summary of the participants key responses was relayed to each interviewee at the end of the interview. This was considered a more acceptable and practical way of member-checking.

Key stakeholder interviews

Twelve semi-structured qualitative interviews were conducted by TD.

The duration of each interview was determined based on the participant's willingness to talk. Length of interviews ranged from 33 to 83 minutes with a median of 59 minutes.

Interviews were conducted over a two-month period between 1st July 2021 - 31st August 2021. Due to Covid-19 restrictions, TD was unable to travel to Uganda, and as such interviews were conducted remotely over "Zoom" video conference. TD conducted the interview in the U.K. in a private office to ensure privacy and confidentiality to the participant. All participants were based in Uganda and were asked to ensure that they were located in an environment that was private, safe, comfortable, and agreeable to them, when joining the video call.¹⁴⁷ Video conferencing for qualitative interviews has been noted to be of benefit particularly in

affording greater data richness by allowing participants to be interviewed from home or in environments most comfortable to them.¹⁵⁰ However using video conferencing, requires participants to have access to digital technology which can be expensive particularly in low resource settings. An inevitable digital divide ensues and can reduce inclusivity for all participants. To mitigate for this, costs for internet access were covered by the research team.

Data collection methods followed those presented for the semi-structured interviews with mothers and birth companions above. As an overview, individual semi-structured interviews were conducted with stakeholders. A structured interview guide was pre-created seeking stakeholder views on the barriers and strategies for iPNC in health-facilities. The interview guide was based in part upon the expertise and experience of the core multi-speciality supervisory research team on which questions would be pertinent to explore the perceptions of iPNC as well as utilising the findings from the DHS analysis on key determinants of iPNC. The interview guide was reviewed by members of the core multi-speciality supervisory research team.

Interviews were recorded to enable transcription and data analysis following the interview. At the beginning of each interview, participants provided their background demographics. Participants were asked open ended questions and were probed inductively as necessary to elaborate on answers for further information and to add depth to responses provided. When discussing the determinants of postnatal care, the researcher read aloud the key determinants identified from the analysis of the demographic health surveys presented in Chapter 3. At the end of the interview, the researcher briefly summarised the main points to confirm interpretation with the participant. The non-verbal messages from the participants (such as tone, silence, emphasis, mannerisms) were also documented by the researcher as field notes to demonstrate the reality of the interview.

One repeat interview was conducted as the initial recording for the interview did not save adequately. Only data for the re-interview was included in the analysis. Anonymised interview transcripts were also shared with participants over email for any comments or feedback they had. There were no additional comments shared by the participants.

Data management

Data management followed pre-used established methods.¹⁵¹ Study data were anonymised. Interviews were recorded, translated to English (where necessary), and transcribed into a password protected MS Word Document at the earliest opportunity by both the researchers. Participants were asked to suggest their own pseudonyms that could be used within the transcripts and for quotations used in publications of the work. Field notes were taken on the context of the interview which included, the local environment as well as the non-verbal messages from the participants such as tone, silence, emphasis, and mannerisms of participant. The field notes that were handwritten during the interview were then typed into a MS Word Document at the earliest opportunity following the interview. Following transcription of the interview, audio recordings on the Dictaphone were permanently deleted and erased.

All personal details (name, address, date of birth) were removed and did not appear in the MS Word transcript document. The anonymised MS Word transcript documents were securely saved and stored to the Liverpool Active Data Store. This is a password protected, centralised, secure, supported data storage facility at the University of Liverpool for electronic data for the life span of a project. Files in this data store could be accessed remotely by the lead researcher in UK using DataAnywhere. DataAnywhere is a secure platform enabling secure transfer of password protected digital files from the Liverpool Active Data Store. This enabled TD to access the transcripts and conduct data analysis whilst the data remained in the University of Liverpool's data secure environment.

Data Analysis

The analysis of the data was conducted by TD. The interview guide for the qualitative interviews with mothers and birth companions contained 15 questions in total (Appendix 1.3). The first two questions within this interview guide explored the perceptions of iPNC from mothers and birth companions. In this chapter, these two questions have been analysed to understand the experiences of mothers and birth companions in receiving iPNC. The analyses related to the remaining questions within the interview guide are presented in Chapter 7.

An interview guide for the key informant interviews comprised of eleven questions in total (Appendix 1.4). The questions referred to the determinants, barriers, and strategies for improvement of immediate postnatal care. All questions were analysed in this chapter to understand stakeholder viewpoints. One question (Question 4) within the guide was asked to explain and understand the determinants of immediate postnatal care that were identified through bivariate analysis of the 2016 DHS. This analysis was presented in Chapter 3.

The two qualitative interview data sets have been brought together in this analysis as it provided a holistic overview of iPNC from both a user and health systems provider perspective. If separated there was concern that the narrative would provide a unidirectional and fragmented perspective.

For the qualitative analysis, all data transcripts were prepared, explored, analysed, and interpreted using the framework analysis methods.^{152,153} This analysis method was selected as it is a robust and comprehensive method involving five distinct phases to enable researchers to work systematically through large amounts of raw data. In addition, it facilitates transparency of the data analysis process to ensure rigor.^{154–156} The approach is also flexible, facilitating both a deductive and inductive / iterative approach at each phase, and enabling emergent themes to be recorded. This contrasts with other analysis methods such as content analysis and grounded theory which tend to follow one approach. Finally, it allows for non-interview data such as field notes to be included within the analysis grid.¹⁵³ The process for data analysis is described below and was conducted by TD.

Initially, familiarization of the data occurred through reading and re-reading the transcripts to fully embed TD in the data and develop an overview of the main ideas in the data. Recurring ideas identified during the familiarization process were grouped together into similar themes and subthemes based on the essence of the phrases and key words being named. The specific recurrent themes have been listed within the sub-themes. These groupings were done manually to enhance familiarity of TD with the data. This resulted in the production of a draft theoretical framework (Table 8). The themes that were determined a priori have been highlighted in bold.

Table 8: Draft theoretical framework for understanding the barriers, facilitators and strategies to improve iPNC in Uganda

Initial Themes	Sub- Themes
<p>Perceptions of receipt of immediate postnatal care</p>	<ul style="list-style-type: none"> ● Importance of IPNC <ul style="list-style-type: none"> ○ Education and guidance on iPNC ○ Prior experience and knowledge of maternal health comorbidities ○ Community knowledge and understanding ○ Education and understanding of other components of maternal care including birth as a comparator to iPNC ● Content of iPNC <ul style="list-style-type: none"> ○ Immediate care following birth of baby e.g. cleaning of mother ○ Medication and treatment provided for complications ○ Ongoing monitoring for mothers ○ Difference between care for Casarean section births and vaginal births ○ Difference between different health system levels ● Duration of iPNC <ul style="list-style-type: none"> ○ Time from birth until discharge ○ Factors impacting discharge inc. mode of birth, complications, health system factors ○ Impact of Covid-19 ● Environment of iPNC <ul style="list-style-type: none"> ○ Clinical area for provision of iPNC ○ Space for provision of care ○ Space and capacity mothers to remain in facility ○ Space and capacity for family members to remain in facility ○ Infrastructure inc. sanitation, water, electricity ○ Impact of Covid-19 ● Delivery of quality iPNC <ul style="list-style-type: none"> ○ Respectful care practice inc. physical and verbal ○ Equity in care ○ Mother-centred practices inc use of family and birth companions ● Resources and cost of iPNC

	<ul style="list-style-type: none"> ○ Service costs ○ Supply of resources
Explanation of determinants of iPNC	<ul style="list-style-type: none"> ● Maternal Age ● Private sector birth ● Richest wealth quintile ● Central Zone residence ● Holding a secondary or higher education ● Marriage ● Having a bank account ● Having health insurance ● Receiving antenatal care ● Reading a newspaper ● Listening to the radio ● Watching TV ● Using the Internet ● Having a mobile phone ● Having a female baby ● Having a baby weighed at birth ● Having a caesarean section ● Having your birth conducted by a doctor or non-physician clinician (NPC)
Barriers and challenges to coverage of iPNC	<ul style="list-style-type: none"> ● Resources ● Training ● Skill- Mix ● Attitude ● Environment
Solutions and opportunities to improve coverage of iPNC	<ul style="list-style-type: none"> ● Increasing facility births ● Task-shifting to health care workers ● Task-shifting to mothers and birth companions ● an Immediate Postnatal Women's Assessment (ImPoWA) tool

The draft theoretical framework was applied back to the transcripts of raw data for indexing, to explore the fit. Themes and sub-themes were refined, combined, and developed further. Emerging themes and subthemes were also acknowledged. This process was done manually. Refinements to the draft theoretical framework were made with care to ensure that the data would fit in only one theme and not be repeated in several.

Charting was conducted where the data were coded to the theoretical framework and summarised into thematic charts in MS Word. This enabled all the data to be easily visualised

as a whole. Finally, the summary charts were reviewed to make sense of the entire data set. Sub themes and themes were merged further.

Rigor of the data in the study was maintained to ensure credibility, dependability, transferability, fittingness, and conformability.¹⁵⁷ At the end of each interview, a summary of key messages and interpretations was fed back to the respondents to ensure that all data had been understood clearly and as such provide credibility to the data.¹⁵⁸ Additionally, during analysis, the transcripts were reviewed repeatedly to achieve a comprehensive understanding of the interviews, to further enhance credibility. Utilising the maximum variation method in selecting participants allowed conformability and transferability of data. The dependability, accuracy and trustworthiness of the qualitative data obtained was optimised through integrating multiple data collection methods through interviewing and taking field notes.

Results

Interviews with mothers and birth companions

A total of 19 semi-structured interviews were conducted with mothers and their birth companions (Table 9). All participants were women, with health insurance, who were mostly married (16/19). All mothers had a basic level of education and three birth companions were unable to read or write. There was an even spread of respondents who had given birth or were supporting a mother who had given birth across vaginal and caesarean births. The majority of participants (15/19) had access to mass media through either a TV, internet or radio. Largely (18/19) participants had access to a mobile phone.

Table 9: Participant characteristics of the semi-structured interviews with mothers and birth companions

Pseudonym	Cadre	Age	Gender	Residence	Number of pregnancies	Marital status	Primary language	Education level	Job	Has a bank account	Has health insurance	Has access to radio	Has access to internet	Has access to TV	Mobile phone?	Mode of birth?
Mercy	Mother	25	Female	Urban	1	Single	Lumasaba	Completed secondary education	Farming-Home garden	No	No	No	Yes	Yes	Yes	Caesarean
Akol	Mother	34	Female	Rural	3	Married	Ateso	Can read and write	Farming	No	No	No	No	No	Yes	Caesarean
Donkey	Mother	32	Female	Urban	3	Married	Lugwere	Completed college and above	Health assistant	Yes	No	No	Yes	Yes	Yes	Caesarean
Brenda	Mother	20	Female	Rural	1	Married	Lugisu	Completed secondary education	Hair dressing	No	No	Yes	No	No	Yes	Caesarean
Saubu	Mother	28	Female	Rural	5	Married	Lugisu	Completed primary education	Farming	No	No	No	No	No	Yes	Vaginal
Joyce	Mother	33	Female	Rural	4	Married	Lugisu	Completed college and above	Nurse	Yes	No	Yes	No	Yes	Yes	Vaginal
Sofie	Mother	15	Female	Rural	1	Single	Lugisu	Can read and write	Self-employed	No	No	Yes	No	No	No	Vaginal
Peruth	Mother	36	Female	Urban	5	Married	Lusamia	Completed primary education	Self-employed	No	No	Yes	No	No	Yes	Vaginal
Scovia	Mother	27	Female	Rural	6	Married	Lumasaba	Can read and write	Self-employed	No	No	Yes	No	No	Yes	Vaginal
Catriona	Mother	32	Female	Urban	3	Married	Lugwere	Completed college and above	Stay at home Mum	Yes	No	Yes	Yes	Yes	Yes	Vaginal
Florance	Birth Companion	50	Female	Rural	3	Married	Ateso	Completed primary education	Farming-home garden	No	No	Yes	No	No	Yes	Caesarean
Vie	Birth Companion	28	Female	Urban	3	Single	Lugwere	Completed university	Professional laboratory technician	Yes	No	No	Yes	Yes	Yes	Caesarean
Scovia	Birth Companion	32	Female	Rural	1	Married	Lugisu	Completed secondary school	Farming	No	No	Yes	Yes	Yes	Yes	Caesarean
Hadijja	Birth Companion	31	Female	Rural	5	Married	Lugisu	Unable to read or write	Farming	No	No	No	No	No	Yes	Vaginal
Florence	Birth Companion	48	Female	Rural	6	Married	Lugwere	Unable to read or write	Farming	No	No	No	No	No	Yes	Caesarean
Jesca	Birth Companion	31	Female	Rural	1	Married	Lugwere	Unable to read or write	Farming	No	No	No	No	No	Yes	Vaginal
Sammy	Birth Companion	19	Female	Rural	6	Married	Lugisu	Completed secondary school	Student	No	No	Yes	No	No	Yes	Vaginal
Catherine	Birth Companion	25	Female	Rural	6	Married	Lugisu	Completed university	Teacher	No	No	Yes	No	No	Yes	Vaginal
Tina	Birth Companion	30	Female	Urban	6	Married	Lugisu	Completed primary education	Self-employed	No	No	Yes	No	Yes	Yes	Vaginal

Perceptions of immediate postnatal care coverage

Interviews with mothers and their birth companions were conducted to explore their perceptions of iPNC for their most recent pregnancy.

Importance of iPNC

Most mothers and birth companions cited iPNC as critical for a variety of reasons. Largely respondents highlighted that treatment in this period is of most importance to help mothers recover from birth quickly and reduce congestion within the health facilities of mothers with complications.

“[Immediate postnatal care is] Very important, it’s very important [emphasises loudly]. When a woman gives birth and they check on her she can heal faster, she will be given treatment in case of problem, and she gets fine.” [Tina, Birth Companion]

Several respondents highlighted that certain health problems could occur within the immediate postnatal period and as such it would be important for mothers to be monitored and assessed during this period.

Most respondents reported a wish for more health information and education about birth and the postnatal period from health workers. Only a few mothers reported that health workers provided health information and it was on how to look after their baby and breastfeeding. One mother reported that this information was critically important especially for first time mothers. Specifically, respondents were keen for information on recovery post birth and how to care for themselves and their baby post birth, family planning and birth spacing, breastfeeding and good hygiene practices. Additionally, several respondents highlighted the importance of debriefing and counselling of the mothers to discuss their birth experiences, especially those who have had a caesarean birth. This information was reported as useful in dispelling myths, misinformation and unsafe cultural practices.

“Women do this [use local herbs] a lot. Instead of buying these drugs for baby’s cord they try other means they can afford that’s why they go in for the local herbs. Even women use them for pressing their stomach, and cleaning in the vagina after delivery so that they can heal faster but they end up endangering her life with those local herbs since they don’t have a prescription for the local herbs. So, you should educate them to follow treated prescribed in hospital to save their lives.” [Catherine, Birth Companion]

Additionally, several respondents highlighted that they were fearful of giving birth as the complications that could arise are severe and include death. As such several mothers and birth companions highlighted that the iPNC was an essential opportunity for women to be cared for.

Respondents cited utilisation of antenatal care as well as integration with other essential services such as immunisation as key opportunities to provide health information.

However, despite the perceived importance of iPNC, there were several maternal viewpoints that iPNC is less important than other components of maternal care and moreover not necessary for certain mothers.

Researcher: *What do you think about the care that women receive in Uganda?*

Sauba, Mother: *It is good [responds in pain] when you have a vaginal birth, you spend one night at the hospital, and you leave. They give you medicine to take from home.*

Researcher: *What about those that give birth by Caesar?*

Sauba, Mother: *They spend 3 days, and they are also discharged.*

Researcher: *Why do those of vaginal birth leave within a day and those with Caesar leave after 3 days?*

Sauba, Mother: *They don't want the ward to congest. That is why they discharge people. It's because of Covid19.*

Researcher: *How come those who push take one day and they are discharged and those who are cut [Caesarean sections] are discharged after 3 days:*

Sauba, Mother: *The vaginal deliveries don't have any problems. The Caesars have issues like the fresh wound. They must monitor them so that they don't rot on the wound. They discharge them and let them come back after one and half months.*

Half of mothers reported that mothers who have a normal birth would not suffer complications and as such would not need iPNC and could be discharged after 6 hours.

One mother reported that bleeding after pregnancy is normal and as such monitoring of this is less necessary. Additionally, one mother highlighted that in general, community members are unaware of the importance of iPNC and what they need to do.

Content of iPNC

Respondents highlighted the clinical management provided to the mothers in the immediate postnatal period. All respondents highlighted that the mothers had received immediate third stage management from the health workers which included delivery of the placenta. Additionally, most mothers and birth companions reported that mothers had been cleaned following birth and health workers provided medicines to prevent bleeding and infection.

“After I gave birth, the midwives cleaned me and pressed my stomach and removed blood clots then I was padded. The blood was too much, and I heard the midwife say I had lost a lot of blood. They put on me a drip then later I was taken to postnatal ward. My sister carried the baby, and I was able to move on my own to the ward where I rested. They said they couldn't discharge me right away because they wanted to monitor my bleeding. I had earlier bled before giving birth. When I got to the postnatal ward, the midwife came and took my temperature and my heartbeat.” [Catriona, Mother]

However, several respondents highlighted that they had not received treatment when requested. One birth companion highlighted that health workers did not respond adequately to critical emergencies and one mother reported that health workers were not responding to the established guidance.

“I expected her to be given some drugs, but I did not see that at all. I thought they would give her some drugs to help her stop the bleeding...You see, even after birth, her clothes were soaked with blood, and I was kind of worried.” [Sammy, Birth companion]

As a result of the poor care received, one birth companion highlighted that the mother whom they were accompanying, was incentivised to discharge early. Several participants highlighted that their experiences of poor quality of care were more common in local settings where for example health care workers were prone to stop working earlier and be unavailable.

There was inconsistency in reports of receipt of iPNC monitoring. Half of mothers and a few birth companions reported that the mothers had received regularly monitoring by health care workers for their essential vital signs and symptoms including headaches and bleeding.

“The doctors monitor us all the time. They check on your condition to see if you're improving or not. They check your temperature, pressure, and a lot more. They use different machines that you don't know but they keep checking and monitoring. [Mercy, Mother]

However, half of mothers and most birth companions reported that the mothers failed to receive any monitoring. One birth companion highlighted the lack of monitoring resulted in no opportunity for mothers to share their concerns. Several respondents reported that even if monitoring occurred, that it was not regularly repeated. Additionally, health workers were more likely to focus monitoring on mothers who had given birth by caesarean section and not give attention to those mothers who had given birth normally.

“I also expected that they would be checking on me in the postnatal ward, but I did not see that. All the health workers go to the other side, where the caesarean mothers are resting... May be because the other have the wound. I really don't understand. That's why when I got stomach-ache, I had to tell them and they gave me treatment. But if I had not told them or looked for them, I should not have gotten help, I guess.” [Scovia, Mother]

“I say [the care that women receive after delivery is] 5/10 because of some gaps. You see when I came to the Postnatal ward, it was my sister that helped me look for the midwife. They [the healthcare workers] won't check on us. They only give the attention to the caesarean sections. The normal delivery have to take care of themselves. We even have to buy our own drugs but I see that the [mothers with] C-sections are given drugs for free. That's unfair. We are all mothers, and we all have financial problems. Then when it comes to pain, I was told to use warm water to massage my stomach. My sister didn't know how to do it and I thought the midwife would be coming to help but Waa [crying out in frustration], you have to handle that yourself. If it's a Caesar case, they will check on you like every hour but the vaginal, you have to look for the health workers yourself.” [Catriona, Mother]

The prioritisation of monitoring of mothers who had given birth by caesarean section birth was expected by several respondents. Moreover, one mother was delighted that she was still able to receive any monitoring despite having had a normal birth.

“Well, when I left the other side [labour suit] I did not think any health worker would even check on me. I was surprised when the midwife came to ask how I was.” [Sofie, Mother]

Almost all respondents highlighted the need for better and more regular monitoring during the postnatal period from health workers as respondents highlighted this would be critical to recognise complications and save maternal lives.

“I expected my sister to be discharged after two days but we have stayed now for 5 days. But it's understandable because they wanted the baby to be fine then we can be discharged. We are likely to leave today. I also expected that they would be checking on her from time to time

but when we left the labour suit no one ever checked on her... When a mother has just given birth so many things changes and since we are not trained health workers, we can't know anything but when they keep checking on her, they can be easy for them to arrest the situation easily.” [Tina, Birth Companion]

Duration of iPNC

Largely both mothers and birth companions reported that the duration of iPNC and time of discharge differed between mothers. All respondents highlighted that the mothers who had given birth normally were discharged first between 6-24 hours. However, mothers who had given birth by caesarean birth were more likely to remain in the facility for at least three days. Additionally, several respondents reported that those mothers who had suffered complications such as post-partum haemorrhage (PPH) or an infection were more likely to remain in facilities longer.

“It differs [how long are women discharged], for example the vaginal deliveries are discharged immediately after delivery if they don't have any complications. If they do, they are kept around for at least 6-24hours as they [the healthcare workers] monitor their health and as for the C-sections, they're discharged after three days because they [the healthcare workers] must monitor if the wound is trying to heal or not. If they get further complications, I think they can still remain here. We are also told to return for reviews, after like a week, if you had a C-section or you had a tear or any other complications.” [Catriona, Mother]

Several respondents reported that health care workers were very quick to discharge mothers. Some of the reasons cited included the Covid-19 pandemic and not wanting large volumes of mothers to be together for long periods of time. Additionally, in view of staffing pressures and the rise of women in facilities, respondents suggested that health workers might be keen to try and reduce the congestion in the wards.

“Yesterday it's the only day she did not sleep on the bed. They requested her to leave because there were many patients, so she had to leave. She later slept where the babies are kept.” [Tina, Birth Companion]

Environment for iPNC

Following birth, most mothers and birth companions reported that the mothers were moved to a distinct postnatal ward. Most respondents cited that the mothers would self-transfer to

the ward. However, a few birth companions cited that the transfer was conducted by health care workers.

All respondents highlighted a considerable lack of space on the postnatal ward and respondents all agreed that mothers who had had a caesarean birth were prioritised to sleep on beds. Whilst mothers who had had a normal birth were asked to sleep on the floor. At times mothers who already had beds were chased from them to make room for caesarean births. Sleeping on the floor was reported to be unpleasant with mothers often crowded together in a small space. One respondent highlighted that the lack of space would sometimes result in mothers being forced to sleep outside in the rain.

“After delivery, I was cleaned, I padded and was told to leave for postnatal ward. When I got to the postnatal ward, there was no space to sleep. There was not even space to step. Normal birth mothers and caretakers had already occupied the space on floor, so I had to sleep on the veranda with my baby. At around 11:00pm, it started raining so we had to get in and also squeeze ourselves in, on the floor.” [Joyce, Mother]

Additionally, all respondents mentioned that there was a lack of amenities to allow mothers to sleep comfortably on the floor. Several mothers reported being forced to buy their own sleeping mats to enable them to sleep on the floor. The lack of space and subsequent poor resting spaces was reported by several respondents as a driver for them to discharge early and leave their facilities. Furthermore, respondents provided examples of being chased from their beds or being forced to leave early by allied health workers in order to make more room for incoming mothers from the labour ward.

All respondents highlighted those essential facilities to allow mothers to remain in facilities for iPNC were lacking. Largely respondents reported they had not received any free meals or nourishment whilst on the postnatal ward and were reliant on their birth companion to provide this. There was additionally a lack of space to prepare and store food which respondents highlighted was critical particularly for rural mothers transferred from their home and communities that are far away. All respondents highlighted a lack of clean and functioning showers and toilets.

“Most of the women don't afford meals. Even if they could afford the meals ...getting some transport to bring you food and then again go home is another thing altogether. Most of us here come from villages and we are just referred here. I wish the hospital can come in and

provide at least a meal for the women who have just given birth. Remember you can't have milk to breastfeed the baby if you have not eaten. If you're here and you don't have food, you will remain hungry... if you don't have money to buy food from here... [Looks up] The other thing is some of us are chased from the beds so that others sleep on them. It's understandable because a caesarean can't sleep on the floor because of the wound. But maybe we also need to add another ward for Caesarean so that we can also be comfortable. The floor is not nice, then the mat, that's why some people want to leave immediately after delivery and even escape. People get tired of these bad conditions.

Meanwhile there was no water yesterday and guess what [emphatically], the whole ward was stinking extremely bad! The bathroom had blood... it was filthy. You'd not wish to be here... but we had no choice than to stay here. Later, water came back but how can a referral hospital have no water for hours, yet women give birth all the time, and we have those people selling water. A 20litre Jerry can cost 1000 shillings so how many Jerry cans will one need to shower, wash and all? The hospital should get tanks so that there's no such case of having no water.

Then the bathrooms should also be cleaned all the time because women use them all the time. Actually, there are only two bathrooms to be used by over 30 women. Tell me how we won't leave this place with infections or become sicker? The general hygiene needs to be improved.”

[Catriona, Mother]

Other wider services mentioned by several participants were the need for clean clothes, soap, and cleaning products to wash and mosquito nets.

Most participants highlighted the need for improvement in infrastructure to be conducive to mothers and birth companions staying in facilities to receive iPNC. Improved quality and number of beds and overall space was highlighted as a necessity by half of all participants. Additionally, several respondents highlighted the need for clean running water and hygienic toilets and bathroom facilities.

“When we came to the ward, there was no water in the birth rooms. We could not even bathe since there was no water. Imagine what happens when women are not bathing. The water came back at night. The hospital should ensure there is water always – unless they want us to stink also, I wish the hospital provides warm water to the woman to use it to clean themselves and also to take so they keep warm. But we just have to buy warm water. What happens if I don't have money? Women need to also clean the babies using warm water but if you can't afford the warm water, you won't get it. They should also provide meals for the women. Some

people don't plan to come and give birth here. Like we thought mummy was going to give birth at the health centre near home. But were referred here and we did not have enough money for meals. We can't afford meals. If you don't have money to buy and you don't have a relative bringing it from home, you can't eat". [Sammy, Birth Companion]

One respondent also highlighted that the lack of space is more of an issue for government hospitals as private facilities have much more space and resources. One respondent also highlighted that the Covid-19 pandemic has improved the space issue in facilities with reducing the number of mothers in facilities.

Delivery of quality iPNC

There were mixed views on whether health workers provided respectful care. Most mothers and birth companions found the health workers to be caring and would often congratulate them on their birth. Additionally, several mothers and birth companions acknowledged that the health workers are doing the best they can for the mothers they care for in order to save their lives. Several mothers reported that health-workers were kind, with excellent communication and supported them through the concerns and worries they had surrounding birth. Specific examples of fears included complications and dangers from birth and fears that their babies may be stolen from the facility. Largely mothers did expect healthcare workers to care for their welfare. Additionally, respondents reported that the attitudes of the healthcare workers had significantly improved compared to their own previous experiences or stories that they had heard from communities about the evil health workers. Healthcare workers were reported as being less rude and arrogant. Additionally, in the past mothers have been left to do much of their own care, so several mothers reported being delighted that health workers were more responsive to the needs of the mothers.

They have been so responsible checking on me, giving me, necessary treatment and they have also been so sweet while communicating. Compared to my previous deliveries this has been good...I had a normal delivery. I delivered at night and the doctors were harsh OMG! I got someone [midwife] who was leaving. She is the one who helped me to deliver, and she was caring but after having come to the postnatal ward... having delivered at night...we couldn't go home. They were segregating us. If you have a normal birth, you are supposed to find your own space. If you have had a section, you would be given a bed. Beds were prioritised for those who had a c- section. It was traumatic. In the morning, they were sending us out as early as

6:00 am with our babies. Of course, we couldn't leave our babies in such a place. It was tough.

[Donkey, Mother]

However, the positive experiences of respectful care from healthcare workers were not shared by all respondents. Several respondents reported experiencing or seeing health care workers not communicating effectively with mothers and furthermore bypassing mothers in pain.

"At around 8:00pm, some health worker chased us out of our bed where she was resting. I was sad. We were asked to either buy a mat or sleep on the bare floor. We could not leave because they hadn't discharged us. Where we slept was up to us now. Actually, up to now we have slept out here. When it rains, we always go and squeeze ourselves into where people are already sleeping in corridors of the postnatal ward. It can be terrible sometimes...In the ward, the beds are only for Caesar mothers, if you're not one you don't waste time getting on them. You can sleep on them for only a few hours or even an hour and you get put on the floor....The health workers tell us while chasing us to get off the beds. "If you're not a Caesar mother leave the bed". Some are so rude. They simply shout at you like we already knew that the beds are few only for Caesar mothers...When they were chasing my daughter off the bed, she shouted "this is not your homes that you're going to sleep comfortably, leave the beds" but they had not even told us that we are not allowed to sleep on their beds. I pray we get discharged soon. On that day, my daughter cried when the health worker chased her off while shouting [laughs] you know she is young." **[Jesca, Birth Companion]**

Participants largely called for consistent and equal care for all in all settings. Several birth companions suggested that healthcare workers prioritise providing high quality care to mothers with money which leaves mothers fearful of health workers and the power they have. This disrespectful care was reported to also occur by allied and non-skilled health professionals who were reported to be exceptionally rude too. One birth companion highlighted being bullied by a porter and demanded to pay additional payment to transfer a mother to the postnatal ward.

"She was put on that bed they push, and they bought her here [the postnatal ward]. The gentleman that carried/pushed the bed to here also asked us for money. I had to pay him because he demanded for it so bad and assured me that he did not want to quarrel with me, so I promised to pay it and I did the following day... I almost inquired from other health worker

if it's right for me to pay for it, but I thought he would easily lose his job." **[Florence, Birth companion]**

Experiences of disrespectful care including staff rudeness were reported by several participants as more common in local settings.

The lack of health worker numbers was recognised by the majority of participants as a key determinant of a lack of provision of iPNC. Several participants acknowledged that health-workers were stretched in their settings and understood the pressure upon them. As such one birth companion highlighted that they are providing the best care they can with what they have. Several respondents highlighted that governments must focus on increasing the staff available to provide key services. Adequate remuneration and payment was cited as specifically important.

In addition, as a result of poor staffing several participants highlighted that there was an increase reliance on utilising birth companions in iPNC. Several participants did report that they expected birth companions to be involved in iPNC through providing meals, encouraging mothers to take medications and through task shifting, undertaking some health worker roles such as monitoring blood pressures and heart rate.

"After the baby was delivered, she was then brought here to the postnatal ward... my sister has been given attention, they come and administer drugs, they also come and check on her after every 8-12 hours. The attendants advise on what to do especially monitoring her BP [Blood Pressure] and heart rate. It's done to C-section mothers. They monitor your heartbeat and pressure for the next 24hours depending on how you cope up with the whole situation. The doctors in there taught us how to use that machine [points at it] to use to measure her heartbeat and record after every 4 hours." **[Vie, Birth Companion]**

Engagement of community members including birth companions in iPNC was cited as important to improve care, by most participants. Several mothers highlighted that community members would have a unique value in supporting mothers with their physical and mental health as well as wider care including bathing and nutrition. Specifically, the training of birth companions including husbands and male partners was highlighted as particularly important and several respondents called for them to have a greater role in immediate postnatal care.

"As for the husband, I think they need counselling, they are always absent in the lives of their wives when they give birth. The child belongs to both the husband and wife. Why should the

husband not show up in hospital?...Some of them come to the hospital and some of them don't...Some men come but others don't care, well you can ask their wives for their phone number, and you encourage them to be in the lives of their wives...This makes women feel loved. [Scovia, Birth companion]

Furthermore, one mother highlighted the importance of stressing to families the need for birth companions for birth during early antenatal visits. Additionally, one mother highlighted that birth companions are also useful to mothers who don't have their own birth companion.

Resources and Cost of iPNC

Mostly respondents reported that although the care from health care workers was free, they were required to buy their own medication. In addition, they were expected to buy essential resources required by the healthcare workers to provide care which included gloves and a monitoring and observation charts. There were mixed expectations from respondents on the acceptability of having to pay this cost. Some respondents were critical of the payment, with others happy to have not had to pay for the health-workers care.

Additionally, several respondents highlighted there was an inconsistent supply of resources such as medication including blood and health staff particularly in rural settings leaving mothers fearful for their survival. There was therefore a call to optimise the continuity provision of essential resources. Several respondents highlighted that focus on improving access to certain treatments and medications through ensuring they are free is critical as unfortunately not all can afford to pay, and several mothers highlighted this might result in mothers skipping essential treatment.

"They should also give us treatment sometimes they will write for you to buy some medicine but if we don't have money, does that mean we should be. Ignored? Let the government kindly provide free drugs for women and children's treatment...I was asked to buy some drug and I was treated but I am now thinking, not everyone can afford that so they should avail those drugs." [Peruth, Mother]

Key informant interviews

Interviews were conducted with 12 key stakeholders to explore the barriers, facilitators and potential strategies to improve iPNC (Table 10).

Largely respondents were women (9/12) and interviews were conducted with at least one respondent from each stakeholder group. The majority of respondents (8/12) had more than 10 years' experience.

Table 10: Participant characteristics of the key informant interviews

Pseudonym	Gender	Type of stakeholder	Years of experience
Joyce	Female	Government health facility health care worker	20 years
Catherine	Female	Government health facility health care worker	7 years
Tumya-Muhika (T.M)	Male	Government health facility health care worker	16 years
Sharon	Female	District health manager	3 years
John	Male	Health educator/researcher	12 years
Alice	Female	Ministry of Health worker	8 years
Luke	Male	Private health facility health care worker	16 years
Maggie	Female	United Nations (UN) agency worker	22 years
Jean	Female	Non-Governmental Organisation (NGO) worker	29 years
Nina	Female	Community health worker	20 years
Apple	Female	Government health facility health care worker	2 years
Nestar	Female	Private health facility health care worker	28 years

Determinants of immediate postnatal care coverage

Twelve stakeholders were asked their viewpoints on the determinants of iPNC that were identified within the DHS survey analysis (outlined in Chapter 3). Responses on the following determinants were provided.

Private sector birth

Largely participants agreed with this determinant. Private facilities were reported to have more and better equipment, medicines, and resources for health care workers to be able to provide care. Additionally, given the associated costs, participants reported fewer women would be able to access these services which would in turn relieve the mother to staff ratios. As such most respondents reported this would be a positive factor in reducing the workload pressure on staff and enable staff to be able to provide a higher quality of care. This was a

stark contrast to government facilities who respondents highlighted do not have that capacity.

“There is quite a difference between the private sector and the government sector. Because in the government sector there is an over workload. For example- there may be one person running around [gesticulating] the whole hospital.... So, I’m overseeing like 100 patients and beyond a day. Whereas in a private sector you will find there are very many doctors.”

[Catherine, Government health facility health care worker]

Respondents suggested that private sectors would also provide a better environment that would enable mothers to feel more comfortable to stay in facilities. Additionally, the fact that mothers and companions had to pay for their services was reported as a key factor affecting provision of care. First, respondents highlighted the intersection between wealth and education and highlighted that the mothers who can afford to pay for their care would be more likely to be educated and as such be more aware of the need for postnatal care. Second, respondents highlighted that the payment for services would heighten the expectations of care. Mothers and their families would be more likely to expect and demand for a higher quality care or a better environment with more space and privacy. Largely respondents highlighted that this would influence coverage of care as due to their payment for service, mothers would expect that the doctors would provide quality care and moreover be empowered to request services as needed.

“Umm... the second one private sector, that is true because they pay money and the number of patients that go there to pay money... they demand for services equivalent to their money. So, you find that the number is very small... they can have like one mother and yet.... There are five staff, so they have to give that good quality care such that they attract patients. And more so the patients demand them to get services according to what they have paid.”

[Joyce, Government health facility health care worker]

“So that's what we expect it because the private institutions have better staffing levels have better facilities have way more medicines and equipment. And people who go there are more demanding because they are paying for the care. And therefore, you must provide the care that they are paying for.”

[John, Health educator/researcher]

Richest wealth quintile

No participants disagreed with this determinant and several participants agreed that mothers with more money were more likely to receive care. Respondents highlighted the linkages between wealth, social standing, and power which would increase the mothers' agency to call for help. Additionally, mothers who were richer are more likely to be able to afford private health care and give birth in a facility that has better equipment and resources. Better resources and equipment were seen as an indicator for quality of care.

"Affordability of care is better in employed women. They can afford care they can decide when to travel and seek care compared to someone who is depending on her spouse, to give them, the care or permission to move" **[Nina, Community health worker]**

Central zone residence

Respondents highlighted that this determinant would commonly reflect an urban setting and that the differences identified were more due to the comparison between an urban and rural setting. Several reasons were provided for why this determinant contributed to coverage of immediate postnatal care. Urban settings were reported to offer a higher density of health care facilities and quality health workers for mothers to be able to birth in and in doing so receive immediate postnatal care.

"We know that, like, in central Uganda ...the majority of the health providers in this country right from the obstetricians and the midwives are best in central Uganda. And therefore, I also suspect the kind of care for this one [mother] to be much, much better." **[John, Health educator/researcher]**

In addition, one participant highlighted that given the frequency of health facilities mothers are less fearful of facilities compared to rural settings.

Mothers accessing urban facilities are more likely to be educated, well informed and as such able to seek care. Additionally, these mothers are more likely to speak a national language enabling them to communicate effectively with health care workers. This was reported to be less possible in rural settings where a multitude of local languages exist.

Holding a secondary or higher education

All respondents agreed with this determinant having a positive impact on coverage of immediate postnatal care. Mothers with a higher education level were reported as more likely to be able to understand the importance of immediate postnatal care and appreciate the health risks, for themselves and their babies, that can ensue without postnatal care. They would also be more likely to have the impetus and drive to seek out health information. These factors would enable mothers to have a greater confidence to demand care.

“[Mothers with secondary education receive postnatal care] because, they are sensitised, they take up the information they that they get, whether through the media or newspapers. They even get to know about things that we may not have time as health workers to teach them. They take their time and they read and really get to know that, “oh okay there are these risks if one doesn’t seek for health work intervention”.... there are such risks... so they are informed. That is why they comply, I think. Yes.” [Alice, Ministry of Health worker]

“When you have lower education levels, you don't have this confidence to speak to the health workers, even if they could have been friendly if you had opened up. So, you may even see them not being able to communicate, but your actually frightened as a woman.” [Maggie, UN agency worker]

Having a bank account

Respondents did not disagree with this factor and reported that it was linked to wealth. Those with a bank account were more likely to be wealthy from urban settings and as such would be more likely to receive immediate postnatal care.

“The majority of our mothers especially in the government setting, they are the poorest. Some of them don’t even have a bank account, if they have a bank account ...its redundant and not active. Bank accounts are applicable to urban areas with money. But when you look at peri urban and poor rural it may not be practical” [Sharon, District health manager]

Having health insurance

Respondents did not disagree with this factor. Private facilities were generally reported as having a higher quality of care and better chance of receipt of quality postnatal care in the eyes of mothers and their families. However, affordability of private care is a key issue. Respondents highlighted that health insurance would enable mothers to seek private care.

“The health insurance goes to the private wing we have a private wing where they pay their money and they are welcome from the other side.” [Joyce, Government health facility health care worker]

Moreover, one respondent highlighted that lack of insurance is what drives mothers to give birth in government hospitals.

Receiving antenatal care

Most respondents highlighted the positive impact of receipt of ANC on coverage of iPNC for mothers. Through receipt of ANC, mothers and families could be introduced to information on postnatal care so that following birth they would be most comfortable and equipped to use and ask for iPNC. Several respondents highlighted that without this prior information, mothers would be more fearful to use and demand iPNC.

“Antenatal has a lot and this term means a lot of things. So, if we encourage these mothers to attend antenatal it is the most ground-breaking issue. All the issues we have whether it is perinatal death, whether it is maternal death... the problem is because our mothers do not attend antenatal...But if our mothers attend antenatal and the midwives give them exactly the information they need to know, the important risks of not doing certain things, then to me I think the postnatal bit of it will be just as we expect.” [Sharon, District health manager]

Several respondents highlighted that the format of antenatal care was conducive for mothers gaining knowledge on iPNC. Stakeholders recognised that given that ANC is spread over multiple sessions, it would enable mothers to have multiple opportunities to gain iPNC information in case it is missed or forgotten. Additionally, as mothers are able to bring companions to ANC appointments, it would also provide the opportunity for knowledge to be shared with the mother’s birth companions and partners too.

Use of mass media (including, reading a newspaper, listening to the radio, watching TV, and using the internet).

Most participants agreed that use of mass media would positively impact the coverage of iPNC. The key reason cited by participants was the ability for mass media to be used for health information sharing and education. Respondents highlighted that increasing usage of innovative and community focussed mechanisms to share health information would increase

the knowledge around iPNC for mothers and their families and improve their usage of iPNC. An example of novel and innovative mechanisms included radio adverts and social media.

“You realise that women with more information who are educated and attend antenatal, tend to stay in towns, who are exposed to social media, basically the issue of information is key. So, women who have information about postnatal care and its implication and its usefulness, tend to stay and attend or come back to attend. And particularly in the first 24 hours they tend to stay behind to receive the care. But those who are illiterate who basically don’t know much, about postnatal care are the ones who leave the hospital before time. That’s why I strongly agree with those reasons that you’ve found at that time.” **[T.M, Government health facility health care worker]**

“Mass media has gone round, that’s number 1. Especially the radio, TV, people are using mobile phones for their radios. And then, they have heard this being advertised on the radios and this actually has given the mothers education on what kind of care they need. And therefore, when they go to health units, they try to expect that kind of care. And when you expect a certain level of care, the health provider will naturally have to provide it. Because even the patient will be asking you doctor or nurse, I have come here, but you have not checked my blood pressure. And you see they are able to ask that, they are knowledgeable and therefore that’s why we think that education is a key driver in this.” **[John, Health educator/researcher]**

Respondents also highlighted the critical intersection between mass media and wealth status. Both being positive determinants of coverage of iPNC.

Having a caesarean section

Largely respondents agreed with this determinant. Respondents highlighted that mothers who give birth by caesarean section are at a higher risk of complications and less likely to be discharged before 72 hours. As such respondents highlighted that those mothers would be more likely to be assessed more comprehensively by health care workers and receive the needed iPNC.

“A Caesar mother of course, they discharge them after maybe 72 hours maybe. With a Caesar of course you are supposed to be in a health unit. This one factor is combined with the delivery by doctor and the midwife because if you were delivered by a skilled person, we tend to communicate “come back” or we tend to at least to do some [postnatal care] ...But if she's not

delivered by a skilled person by a doctor or midwife, then sometimes they miss out the importance.” [Nestar, Private health facility health care worker]

Having your birth conducted by a doctor or Non-Physician Clinician (NPC)

Respondents mainly agreed with this determinant which linked to the rationale provide for mothers who have had a caesarean section birth. Births conducted by doctors or NPCs were reported as being riskier for mother and/or baby and at the greatest risk of complications needing more intensive monitoring. These mothers are therefore more likely to receive iPNC.

“Birth by a doctor what that also means is this mother had a complication, because our normal deliveries are conducted by midwives, students. So if the doctor comes to see it means that mother has had a complication, so we need to look at her critically after delivery to prevent further complications. And all our babies we weigh them it is part of essential newborn care.”

[Joyce, Government health facility health care worker]

Overall viewpoints on determinants

In general respondents highlighted that coverage of iPNC is multi-factorial and it would be difficult to attribute iPNC coverage to a single determinant. In addition, respondents highlighted that numerous determinants intersect and are co-dependent. Several respondents highlighted that this intersection could be reflective of their overall socio-economic status.

“I’m not surprised [by these factors] because they all point one thing. That those that probably belong to a better social economic status [e.g.] central region do better. If you’re in the central region, you’ve probably had higher education, you probably have some kind of income, probably more likely to listen to radio, TV or the newspaper. And so it follows you are more likely to be the one to start your antenatal clinics early and attend all the visits, you’re more likely to deliver in a better equipped health facility probably have a birth preparedness plan, and if that is true, then you’re most likely to go to a facility that doesn’t have a lot of mismatch between the health workers and the patient [numbers] is not so high so you’re most likely to receive better postnatal care... And then, because you are educated, you probably are better able to perceive that even after I’ve had a normal delivery, I’m still at risk in the postnatal period so that’s what I would think.” [Luke, Private health facility health care worker]

Additionally, some participants highlighted that the determinants presented to them were also suggestive of women’s empowerment:

“Maybe if I was to summarise them all [the factors listed]... it’s the education of this mother. Because the majority of our mothers are illiterate. And then we have these male dominancy issues where even for the mother to go for postnatal service after 6 days... I don’t see this man releasing money for this mother to go. Because you have delivered in any case, what are you going to do? So, all those factors that have been seen are showing the empowerment of this women...Definitely, if a woman is well empowered [she] will receive postnatal services, will even demand will even trust herself to feel her uterus because they can, if they are injecting themselves now with the family planning methods, they can check their uterus if they are told.”

[Jean, NGO worker]

No specific viewpoints were provided on maternal age, being married, having a mobile phone, having the baby weighed at birth. That said, respondents did not cite them as not important. The lack of comment on these factors suggests that these determinants may be less important to those aforementioned.

The only determinant that the respondents strongly disagreed with was having a female baby. All respondents were surprised by this finding. Given the cultural tendencies for some Ugandan families to value a boy, respondents would have expected that male baby birth would have instead been a positive determinant.

“Yeah, having a female baby [laughs] is one I think has surprised me...I don’t see any correlation having a female baby and somebody staying 24 hours to be reviewed.” **[T.M, Government health facility health care worker]**

“Okay, [laughing and pausing to reflect] Ok having a girl or a female baby, it depends. Because that one has surprised me...Because from my experience... some of the couples like for those who have had the same sex of the baby, you find that.... For instance, there was one who we delivered at one time she was having I think the seventh son and immediately after she delivered, she was like “no I’m leaving”. She was actually disgusted. “I’m leaving” and she wanted to leave the baby for us. And so, I counselled her, and I advised her and comforted her that it’s... it’s what God has given us...So having a female baby ... maybe elaborate me the reason why they took it up that way.” **[Alice, Ministry of Health worker]**

Respondents also suggested additional determinants. Mothers with pre-existing comorbidities would be more likely to receive intensive monitoring by virtue of their condition.

“Hmmm...Maybe we could have looked at mothers with complications. Mothers with conditions like pre-eclampsia, eclampsia. Mothers who got PPH. How they are being...yeah [thinking]. Those ones there. Mothers with APH, they needed to be monitored keenly after [birth]. So, they are the special cases. Mothers with anaemia in pregnancy, after delivery we need to monitor them closely. Those are the things we always put as a priority.” **[Joyce, Government health facility health care worker]**

Additionally, respondents highlighted that certain cultural practices could interfere with postnatal care provision and thus influence coverage of care. Examples of certain practices include physical ligatures to aid uterine contraction, food restrictions and the use of herbal medicine.

Barriers and challenges to provide iPNC

Several barriers and challenges to provision of iPNC were highlighted by the 12 key informants.

Lack of political will

Most respondents highlighted that there is a lack of political will for iPNC. Respondents highlighted that this contrasts to other areas in the maternal health continuum such as antenatal care and intrapartum care.

“Yeah, because I can see a lot of [political] attention has been given to the delivery side. People are talking delivery; a lot of attention has been garnered for antenatal. They worked to ensure all the services are given to the antenatal. They are very clear. There are guidelines. They are written documents. There are key indicators which people can measure which are really measurable. But when it comes postnatal it feels like the patient has already delivered and so, everything is fine. And so, it is not standardised.” **[Jean, NGO worker]**

As a result, several respondents highlighted that the lack of political contributes to poor implementation of iPNC guidelines and limits the provision of quality care. Additionally, several respondents highlighted that funding and investment is directed by government priorities that do not necessarily align with what the needs are in community.

One respondent highlighted that the impact of lack of political will and prioritisation trickles down to the clinical environment where health care workers feel neglected and marginalised by governments. This was highlighted as negatively impacting their attitude to work.

So, I was talking about why you find a health worker has a poor attitude towards work and patients. They are not self-motivated they don't like patients and they don't love their work.....

I think that stems from where they think they are being overworked. Because of the big numbers of patients and as we talked of different levels of patients. We have these ones who are highly educated coming in and they are giving instructions to this midwife maybe who is one [midwife] and they [the women] are 10. And there are also political officials, and you find are giving commands to this midwife, by the time you [the doctor] come you find her [the midwife] in another attitude. There is political wing monitoring, where politicians are given an opportunity to come in and do supervision of health workers. So, depending on how they have approached that health worker they may misunderstand each other. [Catherine, Government health facility health care worker]

Insufficient staff to patient ratio

All stakeholders highlighted that there is a lack of staffing to meet the health needs of the growing number of mothers giving birth in facilities.

The lack of recruitment of health workers was cited as a key issue. Largely respondents highlighted that government policies have not kept pace with the growing numbers of mothers giving birth in facilities. Several participants also emphasised there was a lack of retention of staff. Factors that were more likely to negatively impact retention included staff being redeployed to rural settings away from their families and without sufficient accommodation, working in complex and unsafe conditions including at night or on their own and working without adequate training or support which was cited as specifically a problem for newly qualified health care workers.

“Our population has grown tremendously. And so, we have high numbers to deal with in all the delivery units. That makes it impossible for the rate at which the health worker training is happening, it is not coping with the level of increase in the population. The resources we have to put on to recruitment, deployment. We have both rural and urban areas. So, we really are different in deploying the health workers. More people in the urban than the rural, but also being influenced by how much they have at the district level and where is this district. Is it attracting health workers in, or actually out. So, there are many issues to deal with, as far as deployment, recruitment and retention of health workers is concerned.” [Maggie, UN agency worker]

The majority of stakeholders also highlighted that staff could be stretched too thinly on the ground, on a daily basis. In recent years several respondents highlighted there had been a push to ensure a package of essential services and as such increase what staff must provide without the appropriate investment in health work force numbers. Staff could therefore be re-deployed to other wards or asked to juggle multiple responsibilities which would compete with their time available to provide iPNC. Additionally, the necessary supportive legal frameworks to allow midwives to carry out these additional services are sometimes not in place. Several respondents mentioned this would increase the burden of work on others.

“Uh [why are there few midwives] that is a bigger question to me [laughs]. Because our staffing norms advocate for a certain number of midwives per certain level. Now what is causing the problem is before we used to have fewer programs/activities. Very many activities have come on board and yet the number of midwives has not been increased according to the staffing norms by the government of Ugandan Ministry of Health. So, you find that previously a midwife was supposed to attend to mothers antenatally, during delivery and postnatally. Now we have family planning which a midwife would do before but now it is an independent activity. We have PMTCT. We have the ID. We have so many other things that have come. So, in a ward where you are supposed to have say 6 midwives, you find they have been divided into different activities to take over other responsibilities. And they are leaving the labour suite, the delivery depleted of human resource. So, because of the many competing activities that have come on board, the number of midwives has gone down to cater for the number of mothers in an unideal way.” [Sharon, District health manager]

One of the most common consequences of poor staff to mother ratios reported was that it generated a high workload for health workers resulting in a high chance of burnout. As a result, health care workers were more likely to not be able to respond to calls for help appropriately, were more likely to make mistakes and as such were not providing the level of quality of care that they would have ideally wanted. Burnout was also commonly reported to impact health-workers motivation and attitude to care and as such meant that health workers were not implementing care as stipulated in established guidelines.

Researcher: *So, what you mentioned, is that the staff are over worked. If they are in the facility does the mother receive that care?*

Nestar, Private health facility health care worker: *Not really, fully because, as I told you, for example, when they deliver four mothers at a go. You deliver this one, you don't even monitor their labour adequately, the outcome is always not very good.*

Researcher: *Okay, and when you say, the outcome is what not very good What do you mean what outcome is not very good.*

Nestar, Private health facility health care worker: *Because when you are not monitored in Labour, for example the foetal heart is not listened to. You can't intervene at any time. My blood pressure may rise when you're not aware. You just see me fitting over there. So, you need to monitor the mother closely to get the good outcomes.*

Additionally, several participants reported a lack of accountability mechanisms in place that would encourage health workers to perform roles to the standard required.

Largely respondents highlighted that the lack of sufficient staffing results in the existing staff having to make amendments to the care they provide. Stakeholders mentioned that this has often resulted in health workers having to prioritise providing iPNC to mothers who were more at risk including those who have had a caesarean section or those mothers who suffer from existing comorbidities. Health workers were also reported to be more likely to speed up the care they provide, reduce the frequency of their assessments or indeed miss out on certain components of care. Largely health care workers were reported to prioritise uterine contraction vaginal bleeding, breastfeeding, or vitals.

“When it comes to postnatal, me, I still feel they a lot of gaps. Because these mothers, even when we discharge them, are times, we just discharge them in a group. See to them, there on a mat and discharge them. We don't touch them- you don't look at their uterus whether they are well contracted. We don't know whether they're still bleeding.” [Jean, NGO worker]

Additionally, several respondents highlighted that health workers may be pressurised to discharge mothers quickly and earlier than they had intended. Several respondents acknowledged this would mean that health workers are likely to miss the mothers who are developing life threatening complications. Several respondents highlighted that this lack of monitoring and recognition of illness is a key reason behind mothers dying in the post-natal period.

“Exactly the mothers want to go. Why, because as I say they probably perceive that the worst is over. After the child has been delivered and everything normal, what else are they waiting

for. Then the other thing is that the health workers, the staff are not enough. So, they don't dedicate enough time to actually look at these postnatal mothers. And actually, this is one of the things that I see in our setting, we actually lose a lot of babies that we're assuming that have delivered normally/vaginally and then they are in the postnatal ward and the next time the mother wakes up the baby is not breathing, or she has developed a PPH and collapsed. It is because we are not in a position to observe them and follow them the way it should be done.” [Luke, Private health facility health care worker]

Lack of education and training

Several stakeholders highlighted that there was a lack of standardised training and guidance on iPNC. Furthermore, training and education could differ across facilities with those in tertiary settings having more training than those in primary settings. Additionally, several stakeholders highlighted that a lack of explicit guidance and protocols existed on what care should be provided.

As such, health workers had a lack of comprehensive knowledge of iPNC compared to other aspects of maternal care. Several stakeholders acknowledged that the existing training would provide health workers with the knowledge of the basic components of clinical care. However, stakeholders highlighted it would not provide intensive training on for example, managing a complex patient, severe complications such as Pre-Eclampsia Toxaemia (PET), and human factors to deal with pressures on the wards. This was reported as a particular issue for junior health workers who would lack experience on how to do things.

“We receive all of it [training and education], but in levels, what the midwives receive is not the same as what the doctors receive. What the allied professionals receive varies, so it depends on the level of training, yes, so when you have a complicated postnatal mother in a lower facility, you need to refer this postnatal mother to a higher facility where all those other services can be offered including the specialists.” [Apple, Government health facility health care worker]

Lack of priority of iPNC by mothers

Several stakeholders highlighted the lack of knowledge by mothers and their communities of the importance of immediate postnatal care especially in comparison to other aspects of maternal care such as antenatal and intrapartum care. Following birth, mothers were perceived to be more relaxed with the assumption that the worst is over and as such that

they can manage at home. This was reported to be particularly true if mothers have not had any complications in previous pregnancies postnatally, they feel fine or have had a normal birth without complications. As such, mothers would be confident that they don't need iPNC and perceive it as a waste of time.

“So, uh we usually want them to stay in for at least 24 hours, But it's not always possible. For several reasons. Where I work, one of the main reasons why they don't stay for long is limited space. So, there's not enough room for them to stay and rest after childbirth, even if they wanted to stay, because they are being pushed off the beds, or the next person coming, and it is even worse with those who have had a normal delivery. Too many of them want to go home because they perceive that after normal delivery the worst that can happen is over, so they see no point in staying in their facility, where they are not even enough beds for them to stay comfortably.” [Luke, Private health facility health care worker]

Consequently, mothers were more inclined to self-discharge earlier especially if they have wider responsibilities to look after their existing families or that they don't have the adequate support in facilities through lack of space or lack of birth companions.

“Um [the reason why mothers, sometimes seek an early discharge is] the environment, sometimes it's, the environment, sometimes its socio-economic issues. There are those who really say I cannot afford to stay in hospital because I have a family to look after, you know who will after my children. So sometimes if they've not prepared well for the birth, you know they give those reasons, they need to go home. But the others are saying, if the place is congested. The mother is not comfortable you know it's a public facility it's shared resources like I've said the convenience places may not be the best. So, someone would actually prefer-say “actually you know I come from, not far away from the hospital, allow me go home and if there's a problem I can always come back after all I stay near”. So those are some of the mothers who sometimes insist on leaving.” [Nina, Community health worker]

Several respondents highlighted that early self-discharge can delay mothers from seeking and receiving care. Moreover, they are more likely to present with higher complications and be much more complex to manage.

Interestingly one respondent cited that the mothers with more education are more likely to self-discharge as they feel they can hope well at home on their own.

Several respondents reported that mothers were also more inclined to follow their own cultural beliefs even if they contradict medical opinion. Respondents highlighted specific examples of Kangaroo mother care and breastfeeding.

Poor maternal experience of health facilities

Poor prior experience of health care facilities by mothers and their families was reported by most stakeholders as a key barrier to coverage of care. These experiences could be both first hand experiences or due to existing poor reputations or rumours from their community.

Key factors associated with poor experiences included long waiting times and overcrowding as well as high costs for interventions. Additionally, several respondents highlighted that past experience of disrespectful care was a key barrier to utilisation of care. Examples of disrespectful care included verbally rude health care workers as well as provision of unwanted interventions without appropriate consent such as caesarean sections.

“[Women may fear health workers] because of maybe poor information. You know being a human being, you find that people say, “you know when you go there, you may not get services, when you get nothing when you go there maybe they are rude”. So, they tend to believe one another when they come to the health facility. Some can even say when you go the hospital before you deliver, they can give you a Caesar, when it is not true so because of their shared information tends to make them believe on one another.” **[Apple, Government health facility health care worker]**

Specifically, one respondent highlighted the role of communication as being key. In Uganda there is a large tribal community and facilities that do not have health workers speaking local languages can deter mothers from attending for iPNC.

Largely the respondents reported that mothers have lost trust with facilities and are less inclined to utilise facility services such as iPNC. Several respondents highlighted that this has influenced mothers in wanting to seek care in specific facilities with better reputations or who are able to provide better care.

Again, the consequence of poor facilities is that mothers will self-discharge sooner without care in order to return home where they are likely to have more space and be more comfortable.

Inadequate infrastructure

All stakeholders highlighted that the reduction of allocated space to provide iPNC and increase in mothers attending facilities has increased the overcrowding in facilities. Due to the lack of beds, mothers were reported to have to share beds or lie on the floor. Mothers who had given birth normally were most likely to be de-prioritised and sometimes asked to give up their beds for mothers who had given birth by caesarean section.

“Why mothers are not receiving good postnatal care is (1) we have the shortage of staff. Our staff are few and the number of mothers who deliver is more than the number of staff we have. Then (2) the ward, the unit where they sleep after delivery Postnatal [ward], have very few beds. And those beds are occupied mostly by the mothers, they have done caesarean section. So, you find that the mothers would deliver normally always have nowhere to stay. They sleep on the floor, so they don't stay for 24 hours...

So, you find that when it reaches 6 hours [and] someone is not bleeding, the uterus is well contracted, the vitals are ok, the babies fine, breastfeeding normal. They normally request to go home. They come the next day to immunise the baby.” **[Joyce, Government health facility health care worker]**

With the rise of additional services as part of the essential package of care, the space allocated to provide existing iPNC services is decreasing in order to make room for these wider services such as maternal and neonatal intensive and high dependency care. Several respondents highlighted that hospital areas that were previously designated for iPNC have now been re-distributed for these wider services. In some settings respondents mentioned that a designated space for iPNC does not exist. This is in contrast to the antenatal and intrapartum care where wards and clinics are specifically allocated.

Additionally, respondents reported that the wider essential amenities such as running water, clean bathrooms are not comprehensively universal in health facilities.

The lack of space in facilities has had a negative impact on privacy and dignity provided to participants. This was cited as an additional reason for mothers to self-discharge earlier and go home to where they are likely to be more comfortable. Again, this was cited as problematic as mothers are more likely to come back with higher complications.

“Sometimes they [the mothers] see that they are not maybe being cared for adequately. Sometimes they look at the congestion and they feel... you know..they are not [laughs] they

should not stay in such a place which is so congested. Other patients would have home problems, you're the only parent at home, you left the kids alone at home. So, after delivery instead of staying in the hospital you want to rush back and see how home is staying. And also, you know, we don't provide things like food, and other things. Apart from healthcare, we don't provide other things in the hospital. So, the patients can't stay hungry, so they better maybe go back home and look forward to eating rather staying in the hospital hungry." **[T.M, Government health facility health care worker]**

Insufficient resources

Lack of resources were highlighted as a particular issue by the majority of stakeholders. All respondents highlighted that supplies including essential medications and resources needed to provide and document care were not consistent and available comprehensively in every setting. As one respondent highlighted this included essential government items such as the Mama-kits. Resources were also reported to be prone to frequent stock-outs and unpredictable disruptions to supply chains.

"No, they are a bit erratic. There isn't sufficient access [to resources and equipment in the postnatal period]. They are a bit erratic. One week they are there, the other week they are not there. Because now the postnatal ward orders for these utilities once a week and these people can project that maybe we will have 30 mothers this week, just as an example, and then you get like 60 mothers in a week. You don't have a lee way for requesting for others before the week ends. So, in that regard, once this stock gets finished, the rest of the days you have to wait for the next day that you request again. So that way it impedes care for these mothers." **[T.M, Government health facility health care worker]**

Several stakeholders also highlighted that certain resources were often lost too.

"One of the challenges that you may find that giving blood pressure machine to some units is actually a problem. You may find a blood pressure machine which is supposed to be used for maybe 10, 20 mothers, so those are some of the challenges. So, equipment, drugs for the postnatal clinic, the postnatal wards, if they are readily available it can go a long way to offset and improve the quality of care in the postnatal wards." **[John, Health educator/researcher]**

Consequently, there can be a lack of access to certain medications and equipment necessary to provide iPNC. Respondents highlighted that staff would often have to share equipment which could delay care from being provided.

“Yeah sure, so we’ve extensively talked about the issue of health facilities. But then the supplies, also have a part to play, for example, if someone wants to give a blood transfusion in the postnatal period. And it's not available, they wouldn't do it. If they want to do an examination in the postnatal period and they don't have the pair of gloves, they will probably skip that. Yeah so, they play a role. Although these are a problem, I don't want to look at them in isolation because these women are coming and having a childbirth or a delivery in the health facility, where the supplies are limited.” [Luke, Private health facility health care worker]

Strategies and solutions to improve iPNC coverage

Better Resources

Respondents highlighted the need for better and more resources for iPNC.

First, all respondents highlighted the need for an increased overall number of staff through recruitment to match the number of women requiring care. Additionally, half of respondents highlighted the importance of focusing efforts on retention of staff through better and consistent pay and providing specific incentives and social amenities to enable health workers work in rural settings. These factors included provision of childcare to provide the health workers the flexibility to conduct shift work without a detrimental impact on family, provision of housing on hospital site to prevent long distance travel to and from facility.

“Maybe really [the factors that attract] the health worker, as they qualify and get in their team as new recruits, one would expect there is a transport in one way or another, taking you to where you are supposed to be working. That there may be a health care facility or house of some sort where you're going to be sleeping where you're going to be accommodated.

That you're going to be getting your monthly salary as a minimum. And that you receive a uniform or something at least to be working in as a health worker. Very simple things. That there'll be a network, I mean Internet to some sort of network to connect you to the people you've left behind. That there may be a school for your children, if you have, but also opportunities for you and your friends and your family. Yes, very simple things like that will attract the health worker to stay in.” [Maggie, UN agency worker]

Respondents highlighted this would increase health workers motivation to provide quality care and mothers would be more likely to be monitored and have better health outcomes. Additionally, to mitigate the impact of burnout, one respondent highlighted the value of

assigning midwives explicitly to postnatal ward to provide immediate postnatal care in order to protect their time.

Second, most respondents emphasised the need to improve the quality of resources available for health workers to utilise in their work. Several participants highlighted that a whole-of-system approach was required to ensure consistent and reliable supply chains for equipment and medicines is provided. Additionally, respondents underlined the importance of better resource preparedness to prevent stockouts and mitigate disruptions in supply of medications. Several examples of mitigation efforts were cited and included provision of a restricted stock of medicines for emergency, as well as provision of heat-stable options of key medications that would withstand power-cuts and service disruptions.

“Remember that for packages, like you need to receive iron and folic acid before you go, you may not have actually iron and folic acid at that very time. There have been a few cases, but now many of the facilities have been taken care of to make sure that there are no stock outs. for oxytocin. So that every mother who delivers really gets their dose, which is expected, the 10 international units. Well, if it is not available, they're also providing the misoprostol alternative. So, they try a lot now, these days, to make sure that the availability of these oxytocics is actually being monitored to ensure that health facilities have no stock outs for the emergency medicines as they are. And that health facilities are well stocked. But and for supplements like iron and folic acid some health units, because of the huge numbers, they may not have the adequate amount. The six weeks required for the mother who has delivered to go back home with.” [Maggie, UN agency worker]

Third, most participants highlighted that improved infrastructure would be conducive to health workers providing and mothers receiving iPNC. Most respondents reported the importance of increasing space on the postnatal ward to provide sufficient area for the mothers to be adequately examined and monitored and additionally provide space for mothers and their loved ones to stay comfortably.

“Monitoring a woman who is lying on the floor is very different from monitoring a mother who is lying on the bed. Yeah, it takes much more time, maybe also for you to kneel and bend for you to see the woman. And then to monitor the blood pressure, take their pulse, examine their abdomen, and see whether the uterus is well contracted, then check the bleeding I think if these ladies are lying down on the floor that means the space is narrow between beds, or in

the corridor, so it becomes very difficult. So those are some of the reasons why they need to increase the space.” [John, Health educator/researcher]

Other factors mentioned as conducive for mothers to stay were space for their birth companions and family members to remain, designated areas to prepare food, cleaner toilets, and private rooms. All these factors speak to the need for increased comfort, safety, and security for the mothers. Largely respondents cited they had access to good electricity and water, however one respondent highlighted that it would be important for consistency and reliability in their service.

Better maternal and birth companion education

Most participants mentioned the value of improving maternal education on the importance and components of iPNC in order to increase the compliance of mothers to receive care.

“If a mother has the information she has been explained why, she we will feel this is very important, she will not even ask for early discharge or immediate discharge, but when they are not aware of the information, then the mothers of course act as they want.” [Nestar, Private health facility health care worker]

In addition, one participant cited that this would empower mothers with the knowledge of what services they need and the confidence to ask for care, should it be missing. New mothers were highlighted as more likely to be responsive to education as it is their first birth.

“We also find that when women are educated and when you made a plan with them. They tend to seek for that care. They are empowered for instance especially in urban areas, among the educated, they can actually even demand for the care. But for the rural, the lay, that’s where we may have issues...They [the educated] know what to expect. They know I must have my pressure checked after birth; they know the danger signs of likely to bleed. So, they will seek interventions. They are self-driven. They can actually say “oh you’ve not had this check I need this check; can you check this”. But for someone who’s not informed, they will not know what they are missing.” [Nina, Community health worker]

Additionally, half of participants highlighted the value of educating birth companions and specifically male partners. Culturally in Uganda male partners were reported as the key household decision makers including with regard to health care. Therefore, engaging with male partners could ensure mothers are able to speedily access care when needed.

Additionally, several respondents reported that birth companions could be mobilised to be involved in care to look out for danger signs.

“Why do we want male involvement, one, they are decision makers. Especially in the mothers of low education, the man will have to make a decision on when you have to go to hospital. [He] will make a decision on what you have to eat because he's the head of the family and he is a breadwinner. He will make a decision, even to give you a transport, to go to hospital and even give you things to use during delivery and as well as postnatal, and so we want their involvement. So that they understand why these mothers should attend antenatal, deliver in the hospital, and also have proper postnatal care. Unless they understand.... If we keep them at the background. You may find that many mothers will be kept at the background. So, unless they understand this, then we shall end up having a very good post-natal care for mothers.”

[Apple, Government health facility health care worker]

However, one participant flagged a concern that some male partners may not be willing to do this monitoring as they would see it as a women's job.

Several participants provided examples of mechanisms on how to educate mothers which included use of ANC and group public health counselling sessions. Additionally, one respondent described the value of mobilising mothers to provide education as they are more aware of the nuances of their locality and cultures and would be more trusted. Most respondents reported health workers to be trusted by families and therefore mothers would be compliant to the information they provide. However, one respondent stated that the mothers could fear health workers too and it would be important to recognise this.

Integration of iPNC with wider services

Most respondents highlighted the value of integrating iPNC with other services such as contraception, immunisation, neonatal services, and HIV testing to ensure effective coverage. Suggested benefits of this approach included that it would incentivise mothers to utilise care and reduce the congestion in the facilities that can impact quality of care. However, one respondent flagged an issue of sustainability of this approach.

“So, I know of some people who have 1. tried to integrate services because as much as women don't come for their own check-up, they will bring their babies for immunization. None of them will stick around until they have received a BCG, or they will go and even return for the BCG shot. I have known of people who have used SMS to try and encourage these women to try

and return for this postnatal care and everything. I've known of people who have used the HIV care, there's something in HIV, the delivery of nevirapine for EMTCT during that period and they have scored some success. And I think why that has had success is that they have good staff there they have the manpower there to make sure these people to receive their medication in the postnatal period. So those are some of the things that I've seen that have been done and they have improved the uptake.

And then, the other people who go to the communities, they take this postnatal service to where the women are...[Hesitant] I would say yes [these strategies have worked]. From what they have reported the problem has been their sustainability over time I think.” **[Luke, Private health facility health care worker]**

Accountability of healthcare staff

Over half of respondents cited the need for instilling accountability mechanisms that ensured health workers provided quality iPNC. Several respondents highlighted a need for clear indicators for quality of care for iPNC which has been noted to help improve care. An example of an indicator suggested by a respondent was ensuring a mother remains for 24 hours for review. These indicators could be tracked and utilised for results-based financing as has been noted in other reproductive health sectors including antenatal care.

“The strengthening of this monitoring and evaluation of these services... if it can be carried out along the way... it can bring a lot of evidence. But right now, there is no evidence. Right now, they say they have checked the mother both mother and baby are well. That is how we report. Both Mother and Baby are well. That is the bracket cover. How well is well? What are you measuring? So, I think we need to develop a checklist to make sure that before this mother leaves this, and this, and this must be done. Instead of saying you have looked at the mother and both mother and baby are well.” **[Jean, NGO worker]**

Better training of healthcare workers

Most participants reported that improved training of health care workers including doctors and midwives would improve coverage iPNC.

Largely, respondents highlighted a need to improve staff knowledge on the importance of iPNC for all mothers including those who have a normal vaginal birth. Additionally, respondents were keen for training on the specific components of iPNC including the need for regular monitoring. One respondent mentioned that through education, health-workers

would be more confident and motivated to persevere and provide the care if they knew its importance. This was described as especially important in challenging or pressurised clinical scenarios where health workers may otherwise be deterred.

“In house trainings and drills on how to do things, it improves things. And those trainings to involve all the staff within the postnatal ward or within maternity. It definitely improves the confidence of all the staff whether they are specialised or not. It improves confidence in them to handle different patients with different complaints.” **[T.M, Government health facility health care worker]**

Respondents also highlighted the value of repeated post-qualification training and education on iPNC, particular in local health centres which does not exist at present.

“The other thing is they need to increase on the capabilities of lower health units in delivering mothers so that those mothers don’t need to come to regional hospital or district hospitals as they can be delivered there and have enough space and be monitored.” **[John, Health educator/researcher]**

Respondents cited this could take the form of near miss training and case evaluation to ensure continuous professional development. Additionally, several respondent mentioned that better tools to remind and aid health workers to provide iPNC comprehensively could be invaluable. Several respondents highlighted that a checklist would be beneficial.

Increasing births in health facilities

All respondents agreed that there has been an increase in health facility births including through use of the maternal health voucher programme. In theory respondents reported that this should improve iPNC coverage as it would enable mothers to be in a facility where they can access care and call for help.

However, most respondents mentioned that while this strategy may have been beneficial for increasing skilled birth attendance, this had resulted in an overwhelming number of mothers on the postnatal ward without the needed investment in increasing the infrastructure and health workforce capacity. Respondents highlighted that this has increased the existing workload on health care workers who are subsequently less able to provide all components of iPNC. This has led to a rise in sub-standard and poor quality iPNC which in turn has resulted in mothers wanting to leave facilities early.

“Of course, it [increasing the births in a facility to increase the coverage of postnatal care] can work. But are they getting quality care? If it is just a matter of them delivering in the health facility, of course if you deliver in a health unit and then you will definitely be seen as I said in the beginning, you will be checked at least twice or three times before you go home. If we are taking the statistics of postnatal care, that’s alright, the number of women giving birth has increased but has the quality of postnatal care improved? Or are we just going back to the same thing, just to give two or three checks to every woman who has delivered and that’s good enough and that they have attended postnatal care. But what we are trying to address here is can we improve on the quality of postnatal care. Can the mother engage the care she is supposed to get in the postnatal ward as stipulated by the guidelines given by the ministry of health? If the answer is no, then increasing the numbers giving birth in facilities is not enough. Then it will need something much more than that to get the quality of the care that they need.”

[John, Health educator/researcher]

Task shifting iPNC to allied health workers

Largely respondents agreed that task-shifting iPNC to allied health workers could be a useful strategy to improve coverage of iPNC. Respondents shared several examples of allied health workers who could be task-shifted to. These included nursing aides, village health teams as well as traditional birth attendants

“I think one of the things which have been tried in this country is the use of assistant nurses. Who actually are taught how to do work in postnatal care. And they can work together with a midwife, so that they can assist in the examining and monitoring of the postnatal mothers. And this has actually happened in other wards also. They have shown some positive results.”

[John, Health educator/researcher]

Specifically, the advantage of training traditional birth attendants and village health team would be that they are trusted and known to the community. Additionally, utilising village health teams would enable wider provision of iPNC to communities enabling a critical link to health units. Several respondents highlighted that the efforts have worked in other aspects of maternal health service delivery and shown to lessen the workload on health care workers. That said, respondents did raise several challenges to this approach. First, careful consideration must be taken on which roles or activities should be task-shifted to staff to ensure it is within their capability.

“I would think if we were task shifting it could be things to do with vital observation. Please take for me the vital observation. Yes. But the question that when you see this like this if you see the blood pressure going down, run it to me very fast. Because I would expect this mother to be bleeding internally. So, we can have task-shifting with a lot of caution. Because we’ve seen these people who have been tasks to do but they have gone beyond they are supposed to stop. And that can worsen the situation of maternal mortality and morbidity and perinatal death which we are struggling with.” **[Sharon, District health manager]**

Additionally, workers would need to be supported with the adequate legal protection and certification to conduct tasks. Second, there would need to be adequate training and education of the allied health workers in performing their new roles to avoid mistakes occurring that could discourage mothers from utilising the facility for their care.

“Maybe [task-shifting could improve postnatal care coverage] if it’s to the one who are qualified and knowledgeable in that. But to someone who is not knowledgeable. It wouldn’t address the issue. In fact, it may worsen. So, it would depend...It may worsen because if one doesn’t know really what to do. And more complications come up, then you find that even more mothers run away from the health settings and from the particular health workers and this may discourage them from making use of the services.” **[Alice, Ministry of Health worker]**

Third, staff may not be motivated to do the additional work and as such adequate remuneration and compensation must be provided. Fourth, this strategy would not fix the urgent issue of insufficient numbers of health workers. One respondent was worried that this strategy might divert attention from the real issue which is the need for an increase in total staffing numbers. Finally, this effort would require heavy and consistent funding and investment and several respondents cautioned that it would not be sustainable.

“Yes [task-shifting post-natal care to less-trained health workers to improve coverage of postnatal care could work], because it would improve the numbers that are available to monitor. Yes, it could work. But there have to be adequate numbers. And why I would think it would work is that maybe there are more readily available, it is less expensive administratively to hire them, because of the remuneration involved. So, you need to have many.” **[Luke, Private health facility health care worker]**

Task shifting iPNC to mothers and birth companions

All respondents highlighted that this strategy would be useful in improving coverage of iPNC. Stakeholders reported it would equip mothers and their birth companions with the knowledge to have active roles in their care. Stakeholders highlighted that health literacy could be used to empower mothers. One stakeholder mentioned that empowerment of mothers unfortunately does not exist in Ugandan culture yet and health literacy could help address this issue. In turn empowerment of mothers was reported by several stakeholders as a useful strategy to improve quality of care and respectful care. Yet, another respondent highlighted that through utilising the birth companion and mother it speaks to the Ugandan culture of family centred birth with all members of community involved. Additionally, utilising mothers and birth companions in their care would relieve pressure on the workforce and ensure mothers were not having to wait for care. Specifically, utilising birth companions was cited as helpful as they would already be present, may already have prior experience and are trusted by mothers and would be the most motivated to care for the mother. Respondents mentioned that community self-care practices for monitoring are already utilised informally and successfully within the postnatal period. Examples of successful practices included asking birth companions to assess uterus contraction, watch for bleeding, monitor intravenous fluid provision, and alert health workers if issues.

“[laughs] It is also very feasible [to use mothers and birth companions in their care], yes, yes. I think that’s one area we’ve not emphasized previously; the role of the birth companion really has been more emphasized during labour, and I think it’s true we we’ve missed it out as far as postpartum care is concerned. We do it but informally, and you know we’ve not given it the strength or the attention, like it’s been done for intrapartum care....We ask them to really support, especially when the mother is particularly ill, with these mothers, where you feel need a second eye and you are kind of busy, then bring in the companion and say “can you keep a close eye on this one. When you see this, when you see this- alert me”. But we don’t do it routinely. We don’t encourage. We may not do for each and every mother.” **[Nina, Community health worker]**

One participant also flagged that the current political climate is focussed on the benefits of self-care practices so would be a brilliant time to galvanise this energy.

Respondents raised several challenges and facilitators to task-shifting to mothers and birth companions. First, several respondents highlighted that good training and education was very important. Careful consideration would need to be given to the timing that education is provided to ensure mothers would be most receptive. One respondent mentioned this could start in antenatal care. Second, fostering a supportive environment where mothers and birth companions feel comfortable and safe to monitor their health and call for help is key. For this approach to be successful, buy in from the health workers, who are sensitised to the approach was cited as critical by several respondents, to ensure they would be receptive to calls for help from mothers and birth companions.

“The only challenge is it changes the attitude of the midwife, when the patient is over demanding of a service. Not to all of them, but some midwives see it is not good for them to be pushed by patients. But it works out because they demand for what they know they have to get at that point. Even for children, if a child is to get treatment at this time, so when I am doing ward round, I tell them, at this time, so when this time reaches and the nurse has not come around, please go and ask, so they go and knock on the door and demand for the service to be offered to them. So that is a very good strategy, and it works out.” **[Catherine, Government health facility health care worker]**

One participant highlighted that to foster a supportive environment it was critical that the distinction between roles for the health care worker and mothers and birth companions was clear. Moreover, it should be apparent that self-care strategies do not replace the role of the health care worker. Special focus and attention to ensure engagement by birth companions and specifically male companions is critical too. Third, there needs to have enough space for mothers and birth companions to all stay comfortable to do the monitoring and ensure privacy. Finally, a clear explanation needs to be provided to mothers and birth companions on what to do next and what the referral pathway should be.

[Immediate Postnatal Women’s Assessment \(ImPoWA\) tool](#)

All stakeholders agreed this strategy could be useful in monitoring the health of mothers in the immediate postnatal period.

Respondents highlighted the ImPoWA tool could be useful as an educational tool to ensure mothers have adequate knowledge on key signs and symptoms in the immediate postnatal period. Most respondents highlighted that whilst tools in iPNC exist they are primarily

targeting health care worker as the key users. To their knowledge, all respondents reported that there was no self-assessment tools for iPNC in Uganda directed for mothers and their birth companions.

Additionally, several respondents emphasised that the value of the tool would be in enabling mothers to regularly monitor their health, even when the health worker wasn't there. This would allow early recognition of mothers with complications who may otherwise die. Several respondents highlighted that through identifying these critical signs and symptoms early, health care workers can intervene and prevent death.

“The checklist is useful because uh it will help us the headworkers, the midwives to recognise danger signs as early as possible when these mothers report to us. It also helps us manage them according to their conditions and we can intervene on time, and we are able to prevent the maternal and neonatal death at the postnatal period.” **[Joyce, Government health facility health care worker]**

Several participants described the value of having a standardised checklist where symptoms can be tracked consistently and could be used for holding health systems accountable to the care they are providing.

There were two key challenges raised by respondents. First, there was a need to ensure the ImPoWA tool was inclusive. All respondents flagged that the tool needs to be free of charge to ensure it can be accessed and used by all. Additionally, the content of the tool must also be context specific to meet the needs of all community members which is most critical to avoid misinterpretation. Respondents suggested mechanisms for how to do this which included, use of context specific pictures, simpler language, translated into local language.

“Literacy is one of the things I would think about. I don't know I've not seen the tool. If it involves reading and writing, a mother might be locked out because of that fact. I don't know. That that's, something that would come to my mind.” **[Luke, Private health facility health care worker]**

Second, there is a need to ensure motivation of mothers and birth companions to use the ImPoWA tool. Respondents highlighted the need to focus on education strategies that emphasise the importance of iPNC to mothers. Additionally, buy-in from community leaders and health care workers, who promote the tool would encourage mothers and birth

companions to use it. Finally, the format of the tool must be easy to use for example through using a checklist or poster.

“The tool should have things that can easily be done by the mother without involving a lot of gadgets to use. For instance, if you want a mother to take her own blood pressure, it will take time to help them get those skills using that BP machine to get it and apply it. So, it has got to be an easy-to-use assessment tool... It should be brief [laughs]. It shouldn't be so long; it shouldn't have so many things to assess. The other thing is that it should be in a language that they can understand, and the best is maybe visual. Instead of writing its better if the tool can have things that can be seen visually and then she either ticks on that, that this is happening or something like that. Of course, if it doesn't involve those sophisticated measures of blood pressure, pulse it would come in handy. But if it involves those it may be difficult for them.”

[T.M, Government health facility health care worker]

Discussion

A total of nineteen interviews with mothers and their birth companions were undertaken to elicit their perception of immediate postnatal care including its importance, content, duration, environment, and delivery. Twelve key stakeholder interviews were conducted to elicit their views on the key determinants of iPNC identified in Chapter 3. In addition, stakeholders highlighted key barriers and strategies to improve iPNC.

Whilst improvements in certain areas have been made, respondents highlighted that there is a lack of universal coverage and utilisation of iPNC with a divergence of care experiences in Mbale, Uganda. This was noted from both provider and user perspective and there were several reasons cited. First, the core components of iPNC are not being evenly provided. Within the data there were reports of some mothers having to pay for treatment and others not, some being monitored regularly but others not, and some mothers receiving wider components of iPNC such as family planning, while others did not. Second, there is a lack of sufficient resources and infrastructure which has resulted in health care workers needing to prioritise provision of iPNC for certain mothers where the risk was deemed highest. Mode of birth and risk of complications in the postnatal period were the most frequently cited considerations for prioritisation. These findings can explain the lack of universal coverage of iPNC reported in Chapter 3. Ultimately, greater policies and investment in immediate

postnatal care is required to ensure that services can be provided evenly across settings. However, in the interim, these findings may speak to the need for novel strategies that help health workers deliver care safely and effectively for all mothers. At present there are no recommendations within national nor international evidence-based guidance on the best approach to safely triage and prioritise care for mothers in the immediate postnatal period. Given this practice is very much in place, it would be prudent for research to investigate the outcomes of such triaging practices further in the immediate postnatal period.

Although the importance of iPNC is acknowledged and agreed, respondents highlighted that, in practice, iPNC was not prioritised by the health system or communities. Within the health system, this lack of priority was clearly seen in the lack of recruitment and retention of healthcare workers to deliver iPNC, the uneven training and guidance provided to health workers to manage key conditions in the iPNC and the poor political will garnered through insufficient policies and investment required. At a community level, the direct financial cost of iPNC as well as the indirect costs from being away from their families has resulted in mothers having to decide if facility-based iPNC is necessary or essential. The existing literature supports this finding with studies highlighting that postnatal care remains largely undervalued by communities and health professionals and these perceptions negatively influence the uptake and coverage of PNC.^{90,118} Without prioritisation of iPNC, mothers and their newborns do not receive iPNC and are more likely to be discharged or self-discharge. Given the criticality of the postnatal period and high risks for mothers and newborns, efforts must be taken to prioritise delivery of iPNC at every level. Mass education, awareness and advocacy is needed at every level to ensure that sufficient investment and policies are in place for iPNC. This action is needed across sectors to ensure that wider influences on iPNC delivery are addressed too. At a health facility level, education needs to be provided to iPNC providers and users to convey the risks and ensure that all mothers and newborns can access the vital iPNC required. Disrespectful care practices were reported to be a key factor influencing mothers and birth companions to leave facilities early without care. It was also reported to impact their future health seeking behaviour. This has also been noted in a recent global systematic review evaluating maternal experiences of care in the postnatal period.¹¹⁸ Reports of disrespectful especially in resource stretched settings are not new.^{43,47} However interestingly the findings in this study have highlighted that such practices are being exhibited not only by the primary

care provider but by the wider allied health staff too. This finding highlights the wider impacts of an established culture of disrespectful care. Focus and attention on respectful care is increasing globally and recognised within international maternal health guidance.^{27,159} This finding highlights that it is imperative that new guidance, trainings and programmes aimed to improve respectful care are developed for all health-workers involved in iPNC including those that are allied health professionals and not primary care givers. Only then can the system wide culture change necessary to ensure comprehensive delivery of respectful care, be ensured.

Quality of iPNC was explored within this study. Even if care was provided, both users and providers highlighted that the care was not comprehensively conducted or to a high quality. In accordance with a human rights-based approach, postnatal care efforts must expand beyond coverage and survival alone to include quality of care. Focus and attention are greatly needed to improve quality of iPNC. There is a paucity of quality indicators for PNC. Those that do exist are generally focussed on high income countries.¹⁶⁰ As such large household surveys including DHS do not include such metrics. WHO has recently updated its recommendations on maternal and newborn care for a positive postnatal experience, providing the latest guidance on evidence-based interventions to inform policy and practice.²⁷ Within the new guidance two provisional metrics for quality of care have been proposed: length of stay in facility and provision of early routine care. Whilst these metrics can assess for the coverage of safe and effective care, these metrics do not assess the utilisation of a people-centred approach- a key facet in quality service delivery.¹⁶¹ There is therefore need to work on quality indicators that move beyond simple coverage of service but acknowledge quality of care too.

Socio-economic inequity was highlighted as a key factor driving iPNC coverage and utilisation. In the DHS analysis in Chapter 3, poorer, rural and less educated mothers were shown to have a lower coverage of iPNC. Stakeholders in this study highlighted that these individual factors are often interlinked and mutually reinforcing, as mothers who were educated were more likely to be wealthier and as such able to afford access to mixed media and a private facility. These findings match with the existing literature across low- and middle-income countries that use of iPNC services remains highly inequitable and varies markedly with socioeconomic status.³³ Correction of this inequity requires a multi-sectoral approach. In this study, mothers and their families were acutely aware of the intersectoral approach to health as reported the

negative impact that lack of nutrition, WASH and education had on iPNC coverage within facilities. Education was highlighted as critical strategy in building confidence and empowerment. Aligning with the SDG era, it is of critical importance that efforts are focussed on vulnerable communities and adopt equity enhancing and inclusive strategies and approaches that cut across sectors to improve iPNC coverage.³¹

Findings from the interviews have highlighted the essential role that engagement with community members can have in improving coverage of iPNC. Birth companions, who are trusted by their communities, are increasingly being utilised and successfully task-shifted components of maternal health. This included monitoring of vital signs and assisting with delivery of medication and resources. A recent study carried out in secondary-level facilities in Uganda found that 20% of women who eventually received treatment for PPH had initially identified the heavy bleeding on their own or with support from their birth companions.⁹⁴ In addition, mothers voiced their willingness to receive the necessary knowledge to be engaged in their care more. Engaging community members has benefits for both the health care user and provider through relieving staffing pressures and building confidence and autonomy through health literacy to ensure effective provision of iPNC. In the recently updated WHO recommendations on maternal and newborn care for a positive postnatal experience, there is an explicit recommendation for involvement of men as birth companions to support improved self-care of women.²⁷ Going forward, it is critical to explore strategies that can actively engage and empower mothers supported by their birth companions to have more active roles in their iPNC. The development of the ImPoWA tool is an example of such a strategy and was universally supported by the key stakeholders.

Strengths

First, a sequential explanatory approach was taken whereby the design, conduct and analysis for this work was informed by the initial DHS analysis conducted in Chapter 3. This enabled an analysis of factors not covered by the DHS survey including quality of care and staff related factors. As such this enabled a rich and in-depth assessment of the issue of coverage and utilisation of iPNC in Uganda. Second, careful consideration was taken to ensure viewpoints were ascertained from both health care users and providers to provide a holistic view of iPNC provision. As birth is a family centred process, viewpoints were sought from the mothers and the birth companions that support them. Third, an initial mapping of stakeholders was

conducted to ensure representation from all stakeholders across health system levels. Finally, interviews between the different cadres of respondents were conducted across similar time periods to ensure the context was as consistent as possible.

Limitations

First, as a consequence of the Covid-19 pandemic, interviews with key stakeholders were conducted over video teleconference and not in person, and this may have limited the rapport built for the respondent to be able to answer freely. To mitigate this issue, the interviewer engaged in a regular email correspondence before the interview to establish a relationship and ensure interviews were conducted at a time where the respondent would be in a private environment more comfortable to them. Second, transcripts were reviewed by a single researcher for analysis which may limit the conclusions generated. To mitigate for this, methodological aspects were established to ensure rigour and reduce bias. The transcripts were repeatedly reviewed across the analysis to ensure a comprehensive understanding of the data. Additionally, the preliminary analyses were discussed during supervision meetings to discuss the conclusions drawn. Third, there was a large number of key informant participants from government health facilities with fewer respondents across the other types of organisations and stakeholders. That said, cognisance was taken to ensure interviews were conducted with respondents from each type of organisation. Additionally, the respondents from the government hospitals were across different health system levels, cadres and seniorities. The responses were therefore thought to be reflective as data saturation on key themes, was achieved. Finally, the interviews with mothers and birth companions were conducted from only one hospital and as such may not be representative of all districts in Uganda. And, of course, these findings only relate to Uganda. This may limit the overall generalisability of the findings.

Conclusion

The study has presented the current state of iPNC in Mbale Uganda from a user and key stakeholder perspective. The study has also determinants, barriers and facilitators of care including key strategies for improvements to iPNC coverage. Inequity was reported as a key determinant of iPNC provision with individual socio-demographic components interlinked and mutually reinforcing. Key barriers of iPNC included lack of political will, poor importance

of iPNC by mothers and health workers, disrespectful care, poor staffing and inadequate infrastructure and resources. Community engagement that involves education, confidence building of mothers and birth companions was highlighted as a critical mechanism to increase iPNC coverage. The development of the ImPoWA tool was universally supported by the key stakeholders. These findings provide the insights for future strategies to improve iPNC coverage in Mbale Uganda.

Chapter 5- Key maternal signs and symptoms in iPNC

Purpose of the chapter

In the previous chapter, interviews with key informants, mothers and their birth companions in Uganda were conducted. These interviews highlighted that strategies that focussed on maternal education and empowered mothers supported by their birth companions to have active roles in their care could be beneficial as a strategy in improving the coverage and utilisation of immediate postnatal care. The interviews highlighted support for the creation of an Immediate Postnatal Women's Assessment (ImPoWA) tool.

The core content of the ImPoWA tool was developed through a two-step process and is presented in Chapters 5 and 6 of the thesis. This chapter presents the first step in this process where a systematic review of the literature was conducted to identify the signs and symptoms which international clinical guidelines recommend should be assessed during the immediate postnatal period. The methods and results for the systematic review are summarised and presented within this chapter.

Objectives

The overall objective is to generate a list of all maternal signs and symptoms which international clinical practice guidelines for health workers recommend should be assessed in the immediate postnatal period.

The sub-objectives are:

- To retrieve global clinical practice guidelines for maternal care in the immediate postnatal period
- To assess the quality of clinical practice guidelines for the immediate postnatal period
- To list the key signs and symptoms identified within clinical practice guidelines for assessing key conditions in the immediate postnatal period.

Methods

A wide multi-stage systematic review of the literature was conducted to examine the evidence base and identify a comprehensive list of signs and symptoms assessed by

healthcare workers during the immediate postnatal period. A systematic review of the literature was selected as it enables a comprehensive and unbiased synthesis of the best available existing knowledge and evidence using rigorous and transparent methods.¹⁶² Additionally, the evidence recovered from the review was subject to a quality assessment before inclusion which is critical as the evidence included will form the basis of the ImPoWA tool created.

The methodology for the systematic review was conducted in accordance with PRISMA guidelines.¹⁶³

The conception and creation of the protocol was conducted by the lead researcher and PhD Teesta Dey (TD). The conduct of the search, data collection and data extraction were conducted by TD and Nada Bassiony (NB) a third-year medical student with an interest in maternal health. Discrepancies in viewpoints during data collection and extraction were discussed with a third researcher; Andrew Weeks (ADW) who is an Obstetrician, Professor and global expert in maternal health.

Eligibility Criteria

Guidelines included in this review were published from January 2010 until June 2020. The time-period used was based upon guidance from the WHO handbook for guideline development.¹⁶⁴ Although there is no set time period from which a guideline should be updated, the WHO handbook for guideline development suggests that standard and full guidelines should be updated within a minimum of two years and a maximum of five years.¹⁶⁴ The ten year time period was therefore selected as it was expansive enough to ensure comprehensive retrieval of guidance but limited to ensure the guidance was as up to date and relevant to current clinical practice. Only guidelines in English or where English translations were available through Google Translate were included due to the language expertise of the research team. The accuracy of the Google Translate translations used during systematic reviews, was assessed in a recent 2019 study. Google Translate was found to be a viable, accurate tool for translating non-English language studies for the purpose of conducting systematic reviews.¹⁶⁵ This approach was beneficial in increasing the potential for guidelines to be included in the review and as such would limit the selection bias. For any guideline noted to have a restricted access (for example, member organisations or paying visitors), an email to the authors was sent to request a copy of the guideline.

Inclusion criteria

- International clinical practice guidelines that are freely available online, available through the University of Liverpool library, or which are provided to the researchers free of charge.
- Guidelines published since January 2010 using the most recent version available
- Guidelines published in English (or English translation available)

Exclusion criteria

- Guidelines not specific to postnatal women.
- Clinical primary research studies including observational, RCT, cohort studies, clinical trials, or case control studies.
- Guidelines not specifying signs or symptoms assessed during the postnatal period
- Historic versions of a guideline where a more up to date version is available.
- Guidelines created prior to January 2010
- Guidelines not in English with no English translation available.
- Abstracts from conferences
- Local guidelines (produced by a group from a single hospital, town, city or district).
- Guidelines that were Covid-19 specific

Definitions

The following definitions for terms used in the systematic review are listed below.

Immediate postnatal period

As per the WHO Technical consultation on postpartum and postnatal care, the immediate postnatal period is defined as the first 24 hours following birth of baby. This time period starts following birth of baby and is irrespective to the time of placental delivery.¹⁶⁶

Signs and Symptoms

As per the 2006 NICE guidelines for postnatal care up to 8 weeks, a sign is defined as information about the patients' health identified through clinical observations.¹⁶⁶ A symptom is defined as information about the patients' health reported by the patient themselves.¹⁶⁶

Clinical practice guidelines

The definition for clinical practice guidelines was defined as per the WHO handbook for guideline development definition of a guideline and previous studies on clinical practice guidelines in maternal health.^{163,164,167} Documents were considered clinical practice guidelines if they were evidence based and systematically developed through triangulating best evidence and technical/clinical expertise that had been issued by a professional medical, society, government body or similar organisation and provides structured advice for healthcare professionals.^{163,164,167}

Search Strategy and selection

An expansive multi-stage search strategy was utilised to locate both published and unpublished recommendations. An initial template search matrix was developed (Appendix 2.1) combining search terms for 'guideline' and 'postnatal' as exploded MESH headings and free-text terms. Synonyms for the key search terms and Boolean operators were provided to formulate the search strategy matrix.

Given the anticipated paucity of data specifically on the immediate postnatal period, as well as the objective to generate a list of signs and symptoms from global and country guidelines a wide multistage search strategy was employed (Appendix 2.2). First, 15 published databases (PubMed – Medline, Excerpta Medica Database (EMBASE), Cochrane Library, Cumulative Index to Nursing and Allied Health Literature Cumulative Index to Nursing and Allied Health Literature (CINAHL), Latin-American and Caribbean System on Health Sciences Information (LILACS), Turning Research Into Practice (TRIP), Canadian Medical Association Infobase, E-guidelines, Geneva Foundation for Medical education and Research, WHO Guideline Repository, National guideline clearing house, International Guideline library, African Index Medicus, African Journals Online, Global Health Library) and 3 unpublished databases (Google Scholar, Scopus, Grey Matters) were searched. For those databases with no advanced search function, the search strategy was adapted accordingly. Second, hand searching of professional organisations and societies specialised to obstetrics and gynaecology known to be working on immediate postnatal care were also searched. Organisations to review were collated from past clinical guideline literature reviews in maternal health as well as advice from experts.^{168,169} These organisations included professional bodies in obstetrics and

gynaecology, multi-lateral organisations and non-governmental organisations. Finally, references of selected guidelines were also reviewed to identify additional data.

Source of Evidence selection

Following the search, guidelines were screened through title and abstract screening against the inclusion criteria by one researcher (NB). All potentially relevant guidelines were collated and uploaded into a Microsoft Excel file. A full text review of selected recommendations was assessed in detail against the inclusion criteria by two researchers (NB) and (TD). The reasons for exclusion of sources of evidence at full text that do not meet the inclusion criteria were recorded and reported. Any queries were resolved through discussion with a third reviewer (ADW). A flow chart for the selection of guidelines has been provided in the results section.

Data extraction

Of the eligible documents retrieved, background and outcome data were collected on an Excel spreadsheet as per the exact plain language wording used in the document without transformation. The data collection points were:

- Article Title
- Primary Author name
- Year of publication
- Commissioning agency
- Stage of pregnancy for recommendation
- Proposed setting of use
- Signs
- Symptoms

Study quality

Quality assessment is a key component within systematic reviews. In addition, given that a wide search was conducted, utilising both published and unpublished guidance, the research team were keen to assess and present the robustness of the included guidelines. The quality of the guidelines included in the review was assessed by using the AGREE II instrument.¹⁷⁰ This instrument was created primarily to assess the quality of guidelines and has been widely used in published literature. The tool consists of 23 key items organised within 6 domains.

Domain 1- Scope and Purpose

Domain 2- Stakeholder Involvement

Domain 3- Rigor or development

Domain 4- Clarity of presentation

Domain 5- Applicability

Domain 6- Editorial Independence

NB and TD assessed the study quality of the included recommendations.

Data synthesis

The outcomes are not numerical, but a list of signs and symptoms that will not be transformed. Signs and symptoms were then categorised according to the clinical condition they related to, based on clinical opinion. An initial set of pre-defined postnatal key clinical conditions were created based on clinical opinion and NICE guidelines and included: ¹⁶⁶

- Postpartum haemorrhage
- Genital tract sepsis
- Pre-eclampsia/ eclampsia
- Thromboembolism
- Postnatal depression
- Mastitis

Any additional pertinent immediate postnatal conditions noted in the literature during data collection were subsequently added.

For each sign or symptom, there was heterogeneity in the terms used to describe the sign or symptom and how it was measured. The language used for each sign/ symptom was not transformed however similar signs and symptoms were grouped together under each condition category based on expert clinical opinion. Any signs or symptoms noted to be duplicative in wording were also removed.

Data analysis

Background and outcome data has been presented descriptively. The frequency of guidelines mentioning each sign and symptom grouping was formed to identify the common signs and symptoms identified.

The quality of the guidelines included in the review was assessed using the AGREE II instrument.¹⁷⁰ Two researchers (TD and NB) independently reviewed the quality of each of the included guidelines. Scores were reviewed and discussed and where discrepancies occurred, additional input was taken from a third researcher (ADW). Sensitivity analysis of each guideline was conducted to exclude those guidelines of low quality. The AGREE II tool itself doesn't set minimum domain scores to rate quality. However, previous literature involving use of the AGREE II tool for clinical guideline has suggested guidelines where each domain has a score of >60% is sufficient.¹⁷⁰⁻¹⁷² Following scoring the guideline for quality as per each of the 6 domains, TD and ADW provided an overall assessment of each guideline to determine if it was:

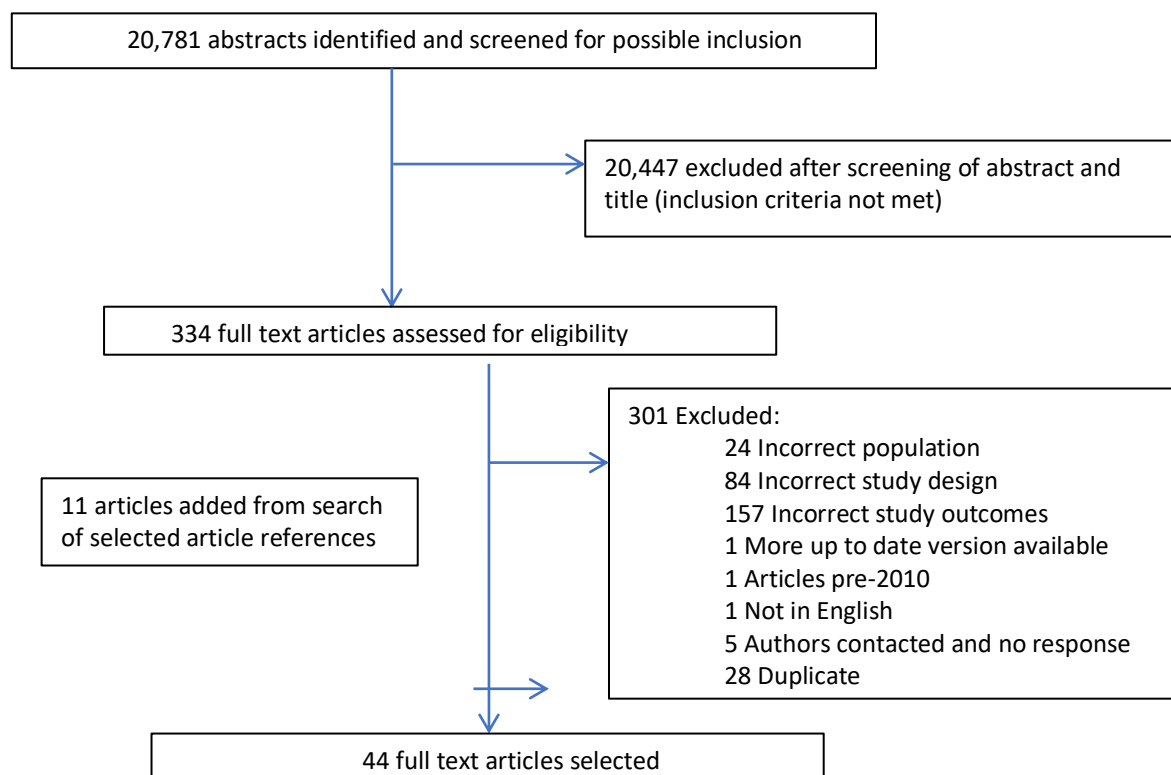
- recommended
- recommended with modifications
- not recommended

For this review, 'recommended' was given to a guideline if most domains (four or more) scored above 60%. A guideline was considered 'recommended with modifications' if most domains (four or more) scored between 30-60%. 'Not recommended' was assigned to any guidelines where most (four or more) of the domains scored below 30%. Given the anticipated paucity of literature and with the knowledge that an expert review will be conducted during consensus building, it was decided that guidelines listed as 'recommended' or 'recommended with modifications' were included. Those guidelines listed as not recommended were excluded.

Results

A total of 20,734 articles relevant to immediate postnatal care were identified. 20,391 were excluded through screening of abstract and title where the inclusion criteria was not met. There were 340 full text articles assessed for eligibility and 307 excluded for various reasons (Figure 11). A further 11 articles were added through a search of selected article references.

Figure 11: PRISMA Flow chart for systematic review



Forty four guidelines fulfilled the pre-specified criteria and were selected for inclusion in the study (Table 11). Notably, 13 guidelines were intended for a global or multi-country audience. There were 30 guidelines created specifically for high income countries and six were created for low- and middle-income settings. Most guidelines were created by professional organisations, seven guidelines were produced by government organisations and four guidelines were created by WHO. There were 11 guidelines specific to the postnatal period.

Table 11: List of demographics of guidelines

Title	Year Published	Commissioning Agency	Stage in Pregnancy (Antepartum, Intrapartum, Postpartum)	Proposed Setting for use
Quantitative Blood Loss in Obstetric Haemorrhage: ACOG COMMITTEE OPINION, Number 794. ¹⁷³	2019	ACOG	P	USA
ACOG Practice Bulletin No. 212: Pregnancy and Heart Disease. ¹⁷⁴	2019	ACOG	A, I, P	USA
ACOG Practice Bulletin No. 196: Thromboembolism in Pregnancy. ¹⁷⁵	2018	ACOG	A, I, P	USA
Emergent Therapy for Acute-Onset, Severe Hypertension During Pregnancy and the Postpartum Period. Committee Opinion, Number 692. ¹⁷⁶	2017	ACOG	A, I, P	USA
Hypertension in Pregnancy. Report of the American College of Obstetricians and Gynaecologists' Task Force on Hypertension in Pregnancy. ¹⁷⁷	2013	ACOG	A, I, P	USA
ACOG Practice Bulletin No. 183: Postpartum Hemorrhage. ¹⁷⁸	2017	ACOG	P	USA
Guidelines of the American Thyroid Association for the diagnosis and management of thyroid disease during pregnancy and postpartum. ¹⁷⁹	2011	American Thyroid Association	A, I, P	USA
UK guidelines on the management of iron deficiency in pregnancy. ¹⁸⁰	2019	British Society of Haematologists	A, I, P	UK
Prevention and treatment of postpartum haemorrhage in low-resource settings. ¹⁸¹	2012	FIGO	A, I, P	Global
FOGSI's GCPR on Hypertensive Disorders in Pregnancy (HDP) 2019. ¹⁸²	2019	Federation of Obstetric and Gynaecological Societies of India (FOGSI)	A, I, P	India

FOGSI good clinical practice recommendation on management of Iron deficiency Anaemia in pregnancy. ¹⁸³	2017	FOGSI	A, I, P	India
Peripartum Haemorrhage, Diagnosis and Therapy. Guideline. ¹⁸⁴	2018	German Society of Gynaecology and Obstetrics (DGGG), the Austrian Society of Gynaecology and Obstetrics (OEGGG) and the Swiss Society of Gynaecology and Obstetrics (SGGG)	P	Germany, Austria, Switzerland
Clinical practice guideline the diagnosis and management of severe pre-eclampsia and eclampsia. ¹⁸⁵	2011	Institute of Obstetricians and Gynaecologists, Royal College of Physicians of Ireland	A, I, P	Ireland
Clinical practice guideline management of urinary retention in pregnancy, post-partum and after gynaecological surgery. ¹⁸⁶	2018	Institute of Obstetricians and Gynaecologists, Royal College of Physicians of Ireland	A, I, P	Ireland
Clinical practice guideline management of urinary tract infections in pregnancy. ¹⁸⁷	2018	Institute of Obstetricians and Gynaecologists, Royal College of Physicians of Ireland	A, I, P	Ireland
The classification, diagnosis and management of the hypertensive disorders of pregnancy: A revised statement from the ISSHP. ¹⁸⁸	2014	International Society for the Study of Hypertension in Pregnancy	A, I, P	Global
Guidelines for obstetrical practice in Japan: Japan Society of Obstetrics and Gynaecology (JSOG) and Japan Association of Obstetricians and Gynaecologists (JAOG). ¹⁸⁹	2014	JSOG/JAOG	A, I, P	Japan
Clinical Practice Guidelines for prevention, detection early and treatment of complications of pregnancy, childbirth, or the puerperium. ¹⁹⁰	2013	Ministry of Health Columbia	A, I, P	Columbia
National Standards for maternal and newborn care. ¹⁹¹	2010	Ministry of Health Honduras	A, I, P	Honduras
Patient blood management in obstetrics: prevention and treatment of postpartum haemorrhage. A NATA consensus statement. ¹⁹²	2019	NATA/FIGO/IFG/EBCOG/ESA	P	Europe

Patient blood management in obstetrics: management of anaemia and haematinic deficiencies in pregnancy and in the post-partum period: NATA consensus statement. ¹⁹³	2017	NATA/FIGO/IFG/EBCOG/ESA	A, I, P	Europe
S3-Guidelines for the Treatment of Inflammatory Breast Disease during the Lactation Period. ¹⁹⁴	2013	National Breastfeeding Committee and German Society for Gynaecology and Obstetrics	P	Germany
Observation of Mother and Baby in the Immediate Postnatal Period: Consensus statements guiding practice. ¹⁹⁵	2012	New Zealand Ministry of Health	P	New Zealand
Antenatal and postnatal mental health: clinical management and service guidance. ¹⁹⁶	2014	NICE	A,P	UK
Postnatal care up to 8 weeks after birth. ¹⁶⁶	2015	NICE	P	UK
Hypertension in pregnancy (NICE clinical guideline 107). ¹⁹⁷	2019	NICE	A, I, P	UK
Mental Health Care in the Perinatal Period. ¹⁹⁸	2018	RANZCOG	P	Australia + New Zealand
Management of Women with Mental Health Issues during Pregnancy and the Postnatal Period. ¹⁹⁹	2011	RCOG	A, I, P	UK
Sepsis following Pregnancy, Bacterial (Green-top Guideline No. 64b). ²⁰⁰	2012	RCOG	P	UK
Prevention and Management of Postpartum Haemorrhage. ²⁰¹	2016	RCOG	P	UK
Thromboembolic Disease in Pregnancy and the Puerperium: Acute Management. ²⁰²	2015	RCOG	A, I, P	UK
Management of perinatal mood disorders. ²⁰³	2012	SIGN	A, I, P	Scotland
SOGP Recommendation for the Diagnosis and Management of Iron Deficiency Anaemia in Pregnancy and Postpartum. ²⁰⁴	2018	SOGP (Society of Obstetricians & Gynaecologists of Pakistan)	A, I, P	Pakistan
SOMANZ guidelines for the investigation and management sepsis in pregnancy. ²⁰⁵	2017	SOMANZ	A, I, P	Australia + New Zealand

Guideline for the Management of Hypertensive Disorders of Pregnancy. ²⁰⁶	2014	SOMANZ	A, I, P	Australia + New Zealand
Recommendations for the diagnosis and treatment of deep venous thrombosis and pulmonary embolism in pregnancy and the postpartum period. ²⁰⁷	2011	SOMANZ/ ASTH	A, I, P	Australia + New Zealand
Guidelines for Hypertension in Pregnancy. ²⁰⁸	2019	Swedish Society of Obstetricians and Gynaecologists (SFOG)	A, I, P	Sweden
Provision of care, treatment and services standards for maternal safety. ²⁰⁹	2013	The Joint Commission	A, I, P	USA
Ugandan Clinical Guidelines 2016	2016	Ugandan National Council for Science and Technology	A,I,P	Uganda
Consensus-derived clinical decision rules to guide advanced imaging decisions for pulmonary embolism in pregnancy and the postpartum period. ²¹⁰	2018	University of Sheffield	A, I, P	U.K.
WHO Pregnancy, childbirth, postpartum and newborn care A guide for essential practice (3rd edition). ²⁸	2015	WHO	A, I, P	Global
WHO recommendations on postnatal care of the mother and newborn. ¹¹⁴	2013	WHO	P	Global
WHO recommendations on maternal health: guidelines approved by the WHO Guidelines Review Committee. ²¹¹	2017	WHO	A, I, P	Global
Managing Complications in Pregnancy and Childbirth: A Guide for Midwives and Doctors. 2nd ed. ²¹²	2017	WHO	A, I, P	Global

An assessment of study quality was conducted using the AGREE II score (Appendix 3.2). There were 12 guidelines which scored >60% in all domains. All guidelines scored well (>60%) on “Domain 1- scope and purpose” and “Domain 4- Clarity of presentation”. Poor scores were most seen for “Domain 5- Applicability” where 26 guidelines scores <60%. Poor scores were also noted in “Domain 3- Rigor of Development” where 8 guidelines scored <60%. There were 43 guidelines which were assessed to be included. One guideline was assessed to be included with modifications. As such all guidelines were deemed suitable for inclusion and their content abstracted.

Table 12: List of signs and symptoms categorised by condition

	Condition	Number of included recommendations	Number of sign and symptom category
A	PET/Eclampsia/HELLP	18	50
B	Postpartum haemorrhage	16	49
C	Genital tract sepsis	11	40
D	Anaemia	11	47
E	Urinary dysfunction	6	24
F	Cardiovascular disease	4	23
G	Postpartum psychosis	2	11
H	Venous thromboembolism	11	18
I	Postnatal depression	8	47
J	Pulmonary Embolism	8	19
K	Mastitis	6	15
L	Postpartum thyroiditis	1	8

A total of 351 signs and symptoms were recovered and categorised into 12 condition categories (Table 12). Following data extraction, a further five condition categories were added to the original list included in the protocol. These five additional categories were cardiovascular disease, urinary dysfunction, anaemia, postpartum psychosis, postpartum thyroiditis. The condition category with the highest number of guidelines relating to it was pre-eclampsia/eclampsia/HELLP where 18 of the guidelines mentioned 50 signs and symptoms related. The condition category with the least number of guidelines associated was postpartum thyroiditis where only one guideline mentioned eight signs and symptoms specific for this condition. Great variation was noted in phrasing certain signs and symptoms with the majority of sign and symptom categories citing multiple phrasings to be used (Appendix 3.3).

Discussion

A total of 351 maternal signs and symptoms across 12 condition categories pertaining to the immediate postnatal period were recovered from 44 guidelines. Of these guidelines, 13 were intended for a global or multi-country audience, 30 guidelines were created specifically for high income countries and six were created for low- and middle-income settings. Only 25% (11 guidelines) were specified for the postnatal period.

The four conditions with the highest number of recommendations associated were postpartum haemorrhage, PET/eclampsia, genital tract sepsis and anaemia. Global findings indicate that postpartum haemorrhage, PET/eclampsia and genital tract sepsis account for more than half of maternal deaths worldwide.²² Additionally, anaemia is widely regarded as a risk factor for worsening outcomes in those experiencing postpartum haemorrhage. Given the high morbidity and mortality associates, it would therefore seem logical that a greater number of guidelines would be created focused on these conditions. However unfortunately, most guidelines were created specifically for high income settings. This is problematic as the largest morbidity and mortality for mothers occur in low- and middle-income settings. Additionally, there were few country specific recommendations which is critical to meaningfully operationalise guidelines into practice. There is therefore urgent need for contextualised guidelines to effectively guide health workers in these settings to deliver high quality care.

There were no clinical practice guidelines explicitly created for the immediate postnatal period. Of the 44 guidelines included in the review, only 25% (11 guidelines) were specified for the postnatal period. Most guidelines stemmed across the antenatal, intrapartum and postnatal period. This has been noted in existing literature where only 6 global guidelines were identified specific to postnatal care in a 2014 systematic review of guidelines for postnatal care in primary care.²¹³ Over the past decade, there has been a global paradigm shift to move past individual services and promote continuity of care through integration of services and care. The benefit of this approach is well established in ensuring better health outcomes for mothers. However, a growing concern exists for services that are poorly covered such as immediate postnatal care where the morbidity and mortality.³¹ Development of standalone explicit clinical guidelines provide the much-needed focus and attention on key pertinent health issues for health care providers, programme officers and policy makers to

provide effective high-quality care and ensure it is not missed. There is therefore great need for explicit guidance on postnatal care.

There was great variability in the quality of guidelines specifically on the rigor of development and applicability of guidelines, namely due to lack of reporting of processes by the guideline developers. These findings are consistent with other quality assessments of clinical practice guidelines in maternal care.^{168,213,214} There is a need for guidelines to be transparent in detailing the development processes used to formulate guidelines in order to hold guideline developers accountable that the guidance provided is evidence based but additionally enable the user to make an informed decision to adopt the guidance recommended.

Strengths

First, an intensive, comprehensive systematic search was conducted utilising published and grey literature databases, handsearching of professional organisation, reference review and purposeful outreach of guidelines not freely accessible. This minimised the chance of missing any relevant guidelines. Second, all clinical practice guidelines were assessed for quality using a valid and reliable tool that is widely and consistently used in existing literature. Guidelines were critiqued and there was an opportunity for poor quality guidelines to be removed before data extraction and analysis. Third, both national and international guidelines were included to ensure a breadth of findings.

Limitations

First, maternity specific institutes were hand-searched during the review. However, it was noted that certain guidelines specific for postnatal conditions were created by wider medical organisations for example, cardiovascular guidelines by the American Physicians Association. It may have been prudent to also hand search medical organisations too. Despite that, the search strategy utilised was rigorous involving published and grey literature and as such it was hoped that these recommendations would be recovered during this process. Second, there were no guidelines explicitly created for the immediate postnatal period. Within the guidelines included, it was at times difficult to unpick whether the signs and symptoms within recommendations were specifically for the immediate postnatal period, or postnatal period in general. Clinical expertise and judgement were utilised to data extract for signs and symptoms thought relevant to the immediate postnatal period. Third, although international

guidelines were searched, due to the language limitations within the research team, inclusion of guidelines were restricted to those written in English or where an English translation was available. Even so, the review included 13 global or multi-country guidelines which should reflect the information seen at country level too.

Conclusion

This review provides a comprehensive list of signs and symptoms which international clinical practice guidelines recommend should be assessed during the immediate postnatal period. The review has highlighted that there is a lack of clinical practice guidelines for the immediate postnatal period especially within lower-and-middle-income settings. Additionally, the review has found that there are multiple signs and symptoms and phrasings of signs and symptoms pertinent for each immediate postnatal condition. Consensus across which key signs and symptoms that are pertinent for assessment during the immediate postnatal period should be sought.

Chapter 6- Developing the content of the Immediate Postnatal Women's Assessment (ImPoWA) tool

Purpose of the chapter

In the previous chapter, a list of signs and symptoms assessed by healthcare workers in the immediate postnatal period were recovered following a systematic review of the literature.

This chapter presents the next step in this process to establish the core content of the Immediate Postnatal Women's Assessment (ImPoWA) tool. The summary and outcomes from the systematic literature review presented in the previous chapter has been utilised by steering group consultations and two Delphi survey rounds to develop consensus on which signs and symptoms are important to be assessed in the immediate postnatal care for women in Uganda. The methods and results from the two Delphi survey rounds and steering group consultations are presented in this chapter. A discussion of the results and final description of the content for the ImPoWA tool is also presented.

Objectives

The overall objective is to gain consensus and establish the core content of the ImPoWA tool.

The sub-objectives are:

- To establish content validity through consensus on which key signs and symptoms are most predictive of significant morbidity in the post-partum period.
- To establish face validity from experts in postnatal care provision that the wording of the signs and symptoms clearly reflect what each sign and symptoms

Overall process of methods

In order to develop the core content of the ImPoWA tool, a series of methods needed to be undertaken (Table 13). A pool of signs and symptoms were generated from the systematic review in Chapter 5, for which some may not be especially relevant. Therefore, consensus needed to be sought over which key signs and symptoms are best to be included in the final tool and enable both content and face validity.

Various consensus methodologies were reviewed for use and included the Consensus development panels, Nominal Group Process and RAND appropriateness measure.²¹⁵²¹⁶ The

Delphi technique is a multi-stage consensus building technique designed to help condense individual opinion into group consensus.²¹⁷ The Delphi Technique is a well-established and relatively inexpensive method and was selected to be used to achieve consensus as it is anonymous and thereby relatively non-threatening to help limit biased/coerced responses.²¹⁷ Additionally, it allows several iterations with controlled feedback and each person responding has the same weighted response to eliminate dominance from more vocal participants.²¹⁷ Furthermore, it can be easily completed electronically and does not require face to face contact so allows easy global contribution from a large number of participants.²¹⁶²¹⁵²¹⁸ This was especially important as the survey was conducted during the Covid-19 pandemic where face to face meetings were not permissible due to restrictions.

Table 13: Outline of process for establishing content of the ImPoWA tool

Step	Aims	Participants	Methods
1	Systematic literature review to generate comprehensive list of signs and symptoms that clinical practice guidelines suggest should be assessed in the immediate postnatal period	N/A	Systematic Literature Review (undertaken in Chapter 5)
2	Review findings from systematic review and validate for inclusion as key signs and symptoms, important in predicting maternal morbidity and mortality	Expert Committee	Group Discussion
3	Rate importance of list of signs and symptoms and suggest any new key signs and symptoms	Scientific Advisory Group	Delphi Survey
4	Review Findings from Round 2 and again rate importance of list of signs and symptoms and suggest any new key signs and symptoms	Scientific Advisory Group	Delphi Survey
5	Review this list of unresolved signs and symptoms and decide on inclusion and final consensus will be achieved.	Expert Committee	Group Discussion

Step 2- Expert committee reviewing literature review

An expert committee was formed and reviewed the list of signs and symptoms identified from the literature review as the first step in building consensus for the content of the ImPoWA tool.

Participants

As highlighted in Chapter 2, an initial expert committee of nine members was created and purposefully selected. The methods for creating an expert committee were adapted from the WHO regulations for expert advisory panels and committees.¹¹² Members were selected who had an extensive technical ability and working experience in iPNC. Diversity was ensured through ensuring that the expert committee involved multi-stakeholders e.g. academics, patient advocates, clinicians with lived experience of postnatal care in Uganda. They represented the most recent thinking in this area. Members included spanned a large range of disciplines to ensure a spread of opinion. Members were identified through prior participation in international and Ugandan national steering groups looking to optimise postnatal care provision. All members were approached for participation by email, and no members declined participation. No remuneration was made to the expert committee for their time and contribution to the study.

Methods

An expert committee meeting was convened where the results from the systematic literature review were presented for consideration. As noted, these items were arranged by condition category (Appendix 3.3).

When undertaking the literature review, it was noted that the guidance was not explicit for the initial 24 hours. At times, guidelines and guidance extended beyond the first 24 hours to the general postnatal period. There was a need therefore to focus the list of signs and symptoms to maternal conditions occurring within 24 hours of birth. Therefore, initially the expert committee reviewed the 12 condition categories to assess their content validity. This was based on a single driving question

- How likely are these conditions to occur in the first 24 hours following birth of baby?

Following review of the 12 condition categories, each individual sign and symptom included in each category was individually validated for inclusion in the ImPoWA tool as key signs and symptoms important in predicting maternal morbidity and mortality, through group discussion focussing on two driving questions. These signs and symptoms were evaluated against each condition category they were listed under. The methodology for this discussion was based on Lawshe's work on assessment of content validity through development of a content validity ratio:²¹⁹

- How essential or likely is the sign or symptom in predicting maternal morbidity and morbidity within 24 hours of birth by the condition category grouped under?
- Can the sign or symptom be easily assessed by a woman or her birth partner/companion without extensive training?

The expert committee were invited to suggest any additional signs and symptoms they deemed pertinent to be assessed within the immediate postnatal period.

As noted from international guidance, there were multiple ways of phrasing certain signs and symptoms which were similar. For ease ahead of the discussion with the expert committee, similar signs and symptoms were grouped together under each condition category to see the differences in wording. The grouping of similar signs and symptoms was based on clinical expertise by the lead researcher (TD) and primary supervisor (ADW). Any duplicates in wording within each category were removed.

Results

Following initial assessment of the condition categories by the expert committee (Table 14), Categories A-G highlighted in orange, are conditions reported to be most likely to occur in the first 24 hours following birth of baby. Categories H-L were excluded as deemed likely to occur more commonly beyond the first 24 hours of birth.

Table 14: List of condition categories and signs and symptoms recovered

	Condition	Number of included recommendations	Number of sign and symptom category
A	PET/Eclampsia/HELLP	18	50
B	Postpartum haemorrhage	16	49
C	Genital tract sepsis	11	40
D	Anaemia	11	47
E	Urinary dysfunction	6	24
F	Cardiovascular disease	4	23
G	Postpartum psychosis	2	11
H	Venous thromboembolism	11	18
I	Postnatal depression	8	47
J	Pulmonary embolism	8	19
K	Mastitis	6	15
L	Postpartum thyroiditis	1	8

A total of 244 signs and symptoms were reviewed from categories A-G and 125 signs and symptoms were excluded (Appendix 3.4). There were 45 signs and symptoms excluded as they were reported as not essential for predicting maternal morbidity and mortality in the first 24 hours following birth by the condition category grouped under. A total of 79 signs and symptoms were excluded by deeming them unsuitable to be assessed by a woman or her birth partner/companion with minimal training either through ability or through lack of clinical expertise or knowledge. One sign/symptom was noted to be a duplicate and thereby removed.

On review the panel noted that some signs and symptoms were unable to be monitored by the woman or birth partner due to complex wording or method of detecting the sign or symptom. However, the expert group reported that they were essential in predicting maternal morbidity and mortality in the first 24 hours following birth. Therefore, alternate phrasing for the sign/symptom was suggested. These were the following 6 signs and symptoms

- Fast heart rate (PPH)
- Not passed urine in 6 hours (PPH)
- Fast heart rate (Genital tract sepsis)
- Fast breathing (Genital tract sepsis)
- Upper right belly pain (PET)
- Not passed urine in 6 hours (PET)

Following discussion, the panel proposed adding the following nine signs and symptoms

- Passing a blood clot the size of or bigger than an egg (PPH) as was highlighted as a clear comparator used in clinical practise.
- Soaking through one pad per hour (PPH) as was highlighted as a clear comparator used in clinical practise.
- Tea/Coffee Coloured Urine (PET) as was highlighted as important as a sign of severe pre-eclampsia
- Anxiety/ impending doom (Genital Tract Sepsis) as was highlighted present in the MBACE report as being a sign for deterioration.
- Enlargement of wound (Genital Tract Sepsis) as was highlighted as important in mothers who have caesarean sections
- Sudden opening up of wound (Genital Tract Sepsis) as was highlighted as important in mothers who have caesarean sections
- Sudden leakage of blood (Genital Tract Sepsis) as was highlighted as important in mothers who have caesarean sections
- Bad smelling vaginal blood or discharge (Genital Tract sepsis) as was highlighted as a clear comparator used in clinical practise.
- Unable to urinate easily (Urinary dysfunction) as was highlighted as a clear comparator used in clinical practise.

Based on the discussions had during the expert committee meeting, amendments to the list were made. The outcome of the discussions resulted in the creation of a list of 134 signs and symptoms arranged in seven condition categories to be reviewed during the first round of the Delphi survey (Appendix 3.5).

Step 3- Delphi Survey Round 1

An anonymised electronic survey with a streamlined list of signs and symptoms was sent by e-mail to key multi-disciplinary stakeholders across the globe to gain consensus. Those who responded to the survey formed part of the scientific advisory group.

Participants

An initial stakeholder mapping was conducted by members of the research team to identify key stakeholders from a range of backgrounds who would have clinical expertise on signs and symptoms predictive of maternal morbidity and mortality and as such directly involved in the

management, delivery and receipt of immediate postnatal care. Four key stakeholders were identified as key to be included (Clinicians, Academics/Researchers, Public Health officers and programmers, Women's Representatives).

Members were selected to be worldwide including representatives from Uganda. Through global participant inclusion, it aimed to ensure provision of a global perspective. To ensure expertise of representatives, personal e-mail invitations to participate in the study including a link to the survey were sent to relevant contacts of the research team.

To encourage global responses, invitees were encouraged to share the survey with key stakeholders in their network which resulted in snowball recruitment. The survey was also advertised through social media to gain a global response. Following identification of new participants, personal e-mail invitations to participate in the study including a link to the survey were shared.

Those who agreed to respond to the Delphi survey were termed the scientific advisory group and provided multidisciplinary stakeholder input and an international perspective.

There are no clear guidelines on how to calculate the sample size required for a Delphi study.^{220,221} Our aim was to include as many participants as possible to try and increase validity of conclusions drawn. Previous models have suggested a minimum of five in each area of expertise would be sufficient to provide content validity and a sufficient, varied input to produce meaningful and generalisable results.^{220,221} However as many of the respondents were likely to cross numerous stakeholder groups due to multiple areas of expertise, the researchers aimed towards sample size of 50 participants. This figure would also account for possible attrition in round 2.

Methods

An anonymised, electronic Delphi survey was designed using JISC and reviewed by the expert committee. The survey presented the purpose of the study to establish consensus on the content for the ImPoWA tool for Ugandan women and their birth partners to assess their health following birth of their baby and the key research team involved were introduced. Detail was provided on confidentiality and data management. A tick box online consent form was provided requiring approval by the respondents before proceeding to the main survey

questions. Basic demographic data for the participants was requested including professional role, country of residence and length of employment.

The 134 signs and symptoms were arranged into the seven condition categories (Appendix 3.5). Participants completed the survey by rating how essential each sign and symptom included in the list were in predicting maternal morbidity and mortality in the immediate postnatal period.

In order to conduct the rating, a 7-point Likert scale was employed with the following parameters used; 1–2 being ‘not important’, 3–5 being ‘important but not critical’ and 6–7 being ‘critically important’ in predicting maternal morbidity and mortality in the immediate postnatal period. Participants also had the option to select “unable to comment”.

There is no consensus on the appropriate length of Likert scale to use for Delphi surveys, with existing studies using Likert scales of 5,7,9 points.^{222–224} Previous studies have noted the mean difference of 7-point Likert scales are more indicative of observed significance levels compared to 5-point Likert scales.²²² Additionally, a 7-point Likert scale would be more acceptable and user-friendly for the participant than completing longer scales. As a result, the 7-point Likert scale was chosen for use.

Finally, after completing each condition category, participants also had the opportunity to suggest further signs and symptoms that they reported were relevant to be assessed in the immediate maternal post-natal period as a free text.

The Delphi survey closing date was set for four weeks following the opening of the survey and reminder emails to all participants who had been identified but had not yet completed the survey, were sent on days 14, and 28 after commencement.

Data Analysis

The results from the first Delphi Survey round were analysed with simple descriptive statistics.

There are no strict parameters for a definition of consensus in Delphi Surveys and as such studies vary in the definitions provided.²²⁵ A review article by Diamond *et al* in 2014 revealed the median threshold for determining consensus in Delphi Surveys was 75%.²²⁵ However achieving true consensus, required not just items which the majority cite as important but also items where only a small minority consider them to have little or no importance.²²⁶ The

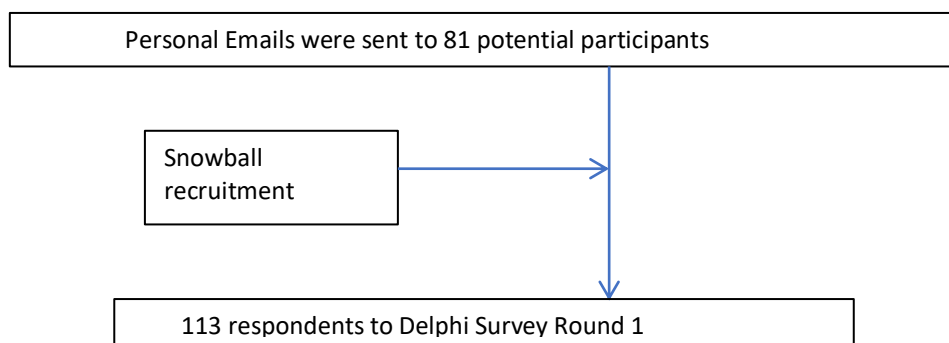
COMET handbook was developed to provide methodological advice those conducting Delphi Surveys to develop core outcome sets.²²⁷ They advise that for an item to be truly important, less than 15% of participants should score this item as not important.²²⁷ Therefore, in this study for an item to be confirmed as consensus, at least 75% of participants needed to score the item as 'critically important' with <15% of participants scoring the item as 'not important'. Items excluded require at least 75% of participants to score the item as not important and <15% to score the item as 'critical'.

Following analysis, any sign or symptom classed as not important was excluded and additional suggested signs or symptoms were added.

Results

Personal emails were sent to 81 contacts of the research team who would have clinical expertise on signs and symptoms predictive of maternal morbidity and mortality and as such directly involved in the management, delivery and receipt of immediate postnatal care. (Figure 12) Following this, snowball recruitment occurred resulting in a total of 113 respondents to Delphi Survey Round 1.

Figure 12: Delphi study round 1 participant flow chart



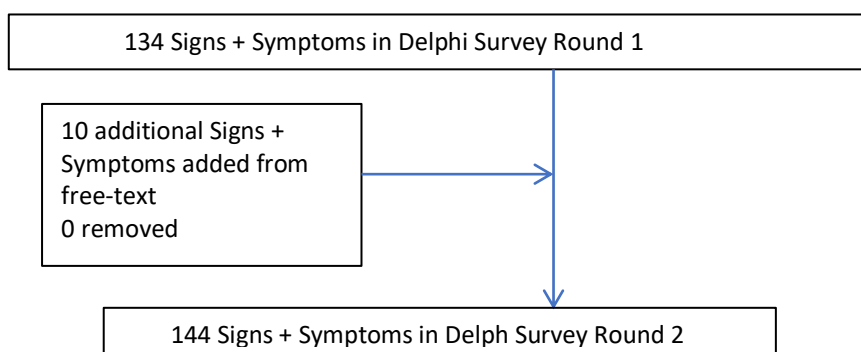
Following review of responses from the scientific advisory group, 0 signs and symptoms could be excluded as per the criteria (Figure 13). Review of the free text option recovered the following 10 additional sign and symptoms which were added to the next round of the survey.

These were:

- A soaked dressing at incision site (PPH)
- Uterine size above the level of the umbilicus (PPH)
- Excruciating pain in sutures or perineum (PPH)
- Redness and swelling of areas around wound (Genital Tract Sepsis)

- Shortness of breath at rest (cardiovascular disease)
- Orthopnoea (cardiovascular disease)
- Fainting when standing up (Anaemia)
- Thirsty (Anaemia)
- Rejection of baby (postpartum psychosis)
- Self-harm (postpartum psychosis)

Figure 13: Delphi study round 1 data flow chart



This resulted in the creation of a new questionnaire with 144 signs and symptoms for the second round of the Delphi survey.

Step 4- Delphi Survey

During round 2 of the Delphi Survey a revised questionnaire was created that removed signs and symptoms that were considered not important and added additional suggested signs and symptoms. This survey was re-sent to the existing scientific advisory group with results from round 1 of the Delphi Survey.

Participants

All participated in the Delphi survey round 1 formed the scientific advisory group. Members of the scientific advisory group were invited to participate in the second round of the Delphi survey. No new participants were invited to join the scientific advisory group and participate in round 2 of the Delphi survey. Non-responders in round 1 of the Delphi survey were not invited to participate in round 2.

Methods

The revised questionnaire containing the 144 signs and symptoms was emailed directly to the scientific advisory group who were again asked to rate how essential each sign and symptom is in predicting maternal morbidity and mortality in the immediate postnatal care. Within the survey, participants were provided with the results from round 1 which were the percentage of participants rating each sign or symptom as critically important. Providing the results of round 1 of the survey is a feature of the Delphi methodology and enables members of the scientific advisory group to reflect on the existing responses before completing round 2.

As with round 1, signs and symptoms were grouped by main condition category in the plain language taken directly from the guideline referred to. Again, participants were asked to utilise a 7-point Likert scale created from 0-7 to rate importance of each outcome.

The Delphi survey closing date was set 4 weeks after the start of round 2 and reminder emails were sent weekly on days 7,14, 21 and 28 until closure of the questionnaire.

Data Analysis

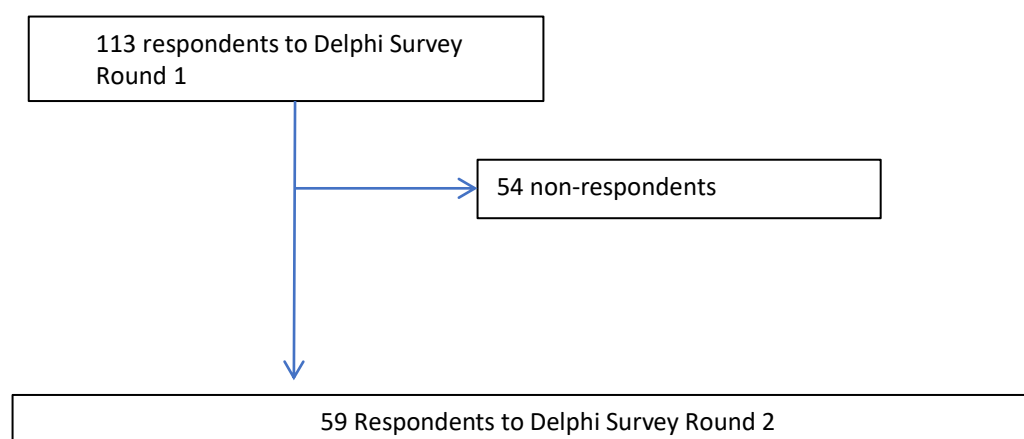
The results from the Delphi Survey round 2 were analysed with simple descriptive statistics. Outcomes not reported as essential were excluded.

The data analysis of the ratings for the signs and symptoms in round 2 of the Delphi Survey to a large extent followed that of round 1 of the survey. Signs and symptoms identified as most critical were selected for inclusion.

Results

Personal emails were sent to the 113 members of the scientific advisory group who had conducted round 1 of the Delphi survey (Figure 14). A total of 59 members responded and completed round 2 of the Delphi survey.

Figure 14: Delphi study round 2 participant flow chart



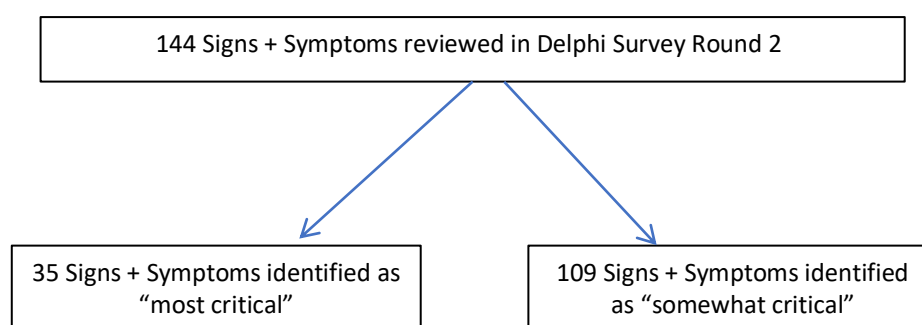
The majority of the respondents (93%) were active health care workers (Table 15). Respondents were generally experienced in their roles with 80% of respondents holding their role for at least 5 years. There was balance between respondents from high-income-settings (51%) and lower- to-middle-income settings (49%).

Table 15: Demographics of participants responding to Delphi round 2

		Frequency (n=59)	%
Role	Obstetrician	36	61
	Midwife	18	31
	Nurse	1	2
	Academics/Researcher	2	3
	Public Health officers and programmers	2	33
Length of Duty	>10 years	31	53
	5-10 years	16	27
	2-4 years	6	10
	1 year or less	6	10
Country	UK	28	48
	Nigeria	7	12
	Uganda	7	12
	Kenya	6	10
	Nepal	4	7
	Tanzania	2	3
	USA	2	3
	India	2	3
	Ghana	1	2

There were 35 signs and symptoms that were identified as most critical, 0 signs and symptoms were deemed not critical and for exclusion and 109 signs and symptoms were deemed somewhat critical for review by expert panel (Figure 15).

Figure 15: Delphi study round 2 data flow chart



A further sensitivity analysis was conducted to examine the 109 signs and symptoms identified as somewhat critical. Each of these signs and symptoms with similar phrasings were arranged under a specific sign/symptom category irrespective of condition. The highest score each respondent attributed to any of the signs and symptoms within that sign and symptom category was recorded. The same Likert parameters were used as noted in the round 1 analysis. Duplicates and individual signs + symptoms where there were no similar phrasings found, were excluded from this analysis. Thus, a total of 23 signs and symptom categories were included in the analysis (Table 16).

For each of the sign and symptom categories, the percentage of respondents who had scored at least one sign and symptom in the category as 6 or 7 “critically important” on the Likert scale, were recorded. Ten sign and symptom categories had >75% of respondents who had scored at least one sign or symptom in that category as “critically important”. These are highlighted in orange.

Table 16: Sensitivity analysis on “somewhat critical” signs and symptoms

Sign/Symptom categories	% of respondents deeming the sign and symptom category as most critical
Dizziness	96.6
Amount of blood loss	93.2
Foul smelling discharge	93.2
Hallucinations/delusions	98.3
Inability to pass urine	88.1
Depression	86.4
Rigors	83.1
Lethargy	83.1
Coloured urine	79.7
Uterus position	74.6
Cold	69.5
Abdominal pain	66.1
Change to wound size	61.0
Pain in perineum	59.3
Uterine pain	59.3
Sleep disturbance	59.3
Increased urination	57.6
Inflammation of wound	55.9
Anxiety	54.2
Incomplete emptying	50.8
Nausea and vomiting	45.8
Bladder pain	45.8
Thirsty	35.6

Step 5- Expert committee final review

During Step 5, the previously established expert committee conducted a final review of the results to determine final content of the ImPoWA tool.

Methods

An expert committee meeting was convened to enable discussion of the results of round 1 + 2 of the Delphi survey. Prior to the meeting, the expert committee were provided with the collated results from both rounds of the survey. Rationale for decisions and amendments were recorded in minutes.

First, the expert committee were asked to provide their initial reflections on the best approach to arrange the content included within the tool.

Second, the expert committee reviewed those signs and symptoms which were deemed most critical (>75% or above). The overall list of signs and symptoms was utilised for this consultation. Duplicates, those considered hard to assess for the mothers and birth partners and those occurring over 24 hours were removed from the list.

Third, the list of signs and symptoms deemed somewhat critical were reviewed. Both the overall list of signs and symptoms as well as the sensitivity analysis results were utilised for this consultation. Duplicates and those reported hard to assess for the mothers and birth partners were removed from the list.

Finally, the expert committee then reviewed all these results to form a final decision on the content of the tool.

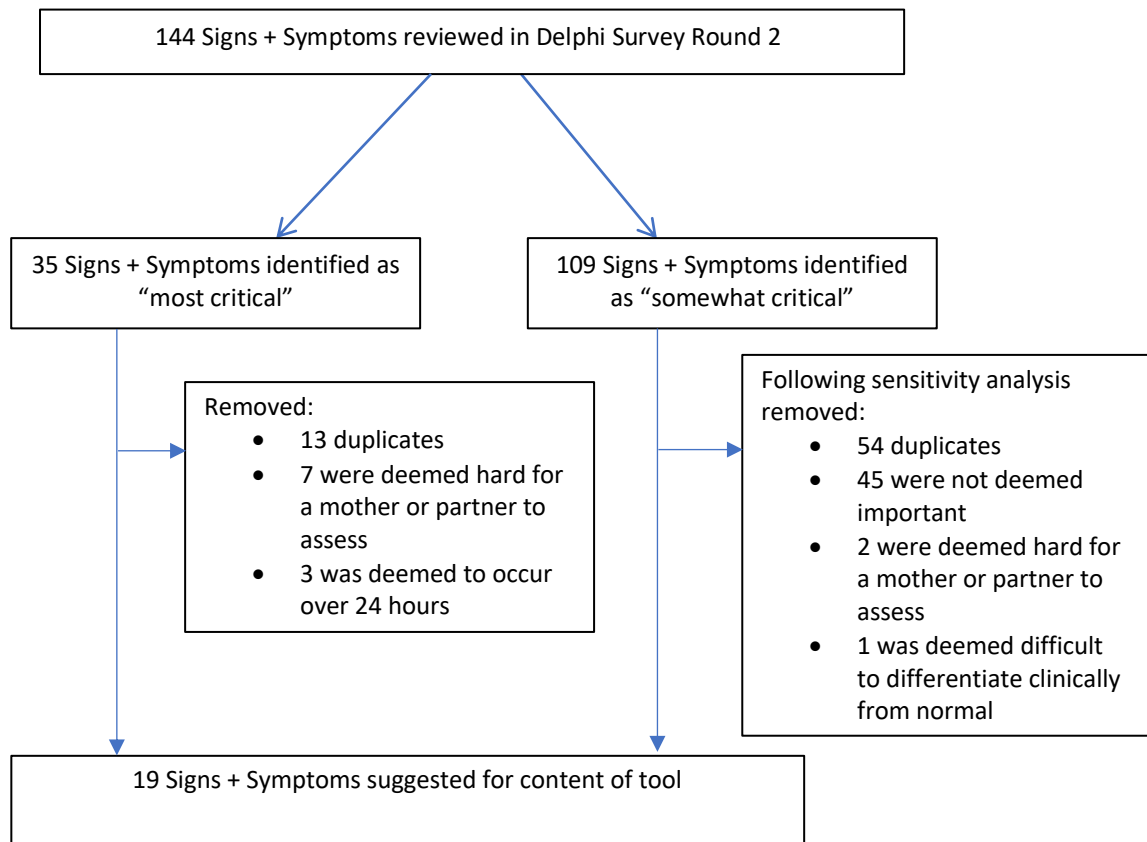
Results

Content Arrangement

When reviewing the results of round 1+2 of the Delphi survey, the expert committee commented that many of the signs and symptoms were duplicates across postnatal condition categories, and there were multiple ways of phrasing the same signs and symptoms, which would likely spread the vote. Given that many signs and symptoms span multiple conditions, the expert committee were keen for the development of an overall self-assessment tool that was not limited to specific conditions occurring in the postnatal period but could span across all conditions.

Assessment of critical signs and symptoms

Of the 144 signs and symptoms reviewed in round 2 of the Delphi survey, 35 (24%) signs and symptoms were identified as most critical and these were therefore deemed important to be included in the final ImPoWA tool (Figure 16). The expert committee noted 13 signs and symptoms were duplicates of each other and 10 signs and symptoms were deemed hard to assess by mother and birth partner without significant training or occurred in over 24 hours. These 23 signs and symptoms were removed. 12 signs and symptoms were therefore selected for inclusion in the tool. These were; change in consciousness, seizure, severe headache, persistent visual impairment, urinary incontinence, chest pain, shortness of breath, severe pallor, fast heartbeat, rejection of baby, suicidal/infanticidal, fever.

Figure 16: Data flow chart for expert committee discussion

Assessment of somewhat critical signs and symptoms

As noted, 109/144 (76%) signs and symptoms were rated as somewhat critical. Following review of the sensitivity analysis, which categorised the 109 signs and symptoms into sign/symptom categories, there were 10 signs and symptom categories that was deemed the most critical (Table 16). Within these categories, there were five signs and symptoms categories which had an individual sign or symptom in the category with a pooled estimate as critically important (>75%). These five signs and symptoms were selected for inclusion in the ImPoWA tool. These five signs were syncope/dizziness, soft flabby uterus, unable to urinate easily, foul smelling discharge, and rigors.

For, two of the signs and symptoms categories, the expert committee considered these categories were important to include but that they should have their name revised for ease of understanding by mothers and their birth partners. Coloured urine was suggested to be renamed to "abnormally coloured urine" and amount of blood loss was suggested to be renamed to be "heavy blood loss".

Three signs and symptoms categories were excluded as they were deemed hard to assess by mother and birth partner or deemed difficult to differentiate clinically from normal. These were “lethargy”, “hallucinations and delusions” and “depression”.

Fifty-four signs and symptoms were duplicates of existing signs and symptoms in the tool and removed. Forty-five were deemed not important as they had no other signs and symptoms found with similar phrasing across the category, or during the sensitivity analysis the proportion of participants rated the sign or symptom category as less than critically important.

[Final content of the ImPoWA tool](#)

Therefore, the proposed content for the tool were 19 signs and symptoms:

- Change in consciousness
- Seizure
- Severe Headache
- Persistent visual impairment
- Urinary incontinence
- Chest pain
- Shortness of breath
- Severe Pallor
- Fast Heartbeat
- Rejection of baby
- Suicidal/infanticidal
- Fever
- Heavy blood loss
- Soft flabby uterus
- Unable to urinate easily

- Foul smelling discharge
- Rigors
- Syncope/dizziness
- Abnormal Coloured Urine

Discussion

Consensus on key maternal signs and symptoms predictive of morbidity and mortality in the first 24 hours following birth was developed through a systematic review of the literature, expert panel discussion and through two rounds of a Delphi survey. Following this methodology, a list of 19 key signs and symptoms that span across 7 condition categories (postpartum haemorrhage, genital tract sepsis, cardiovascular disease, PET/eclampsia, urinary dysfunction, anaemia, postpartum psychosis) were selected and proposed for inclusion as the content for the ImPoWA tool. To the researcher's knowledge there is no existing published work presenting the development of the content for a checklist focused on the immediate postnatal period (first 24 hours following birth of baby), designated for the mother and her birth partner.

There is a paucity of literature on danger signs and symptoms specifically within the first 24 hours of birth. For example, the 2014 WHO postnatal care guidelines and the Ugandan Clinical Guidelines only mention danger signs and symptoms for ongoing counselling beyond the first 24 hours of birth.^{29 114} Within the WHO guidance for ongoing counselling, four conditions were mentioned (postpartum haemorrhage, PET/eclampsia, infection, and thromboembolism), and all except thromboembolism have been considered within the list of signs and symptoms. Thromboembolism was considered but disregarded by the expert committee as they were reported to be unlikely to occur in the first 24 hours after birth. From the three included categories, all signs and symptoms aligned with those described in the WHO signs and symptoms except epigastric abdominal pain. In the Delphi survey only 66% of participants ranked this symptom category as critically important and as such it was excluded during sensitivity analysis. The three conditions with the highest number of recommendations associated were postpartum haemorrhage, PET/eclampsia and genital tract sepsis which

makes sense, as global findings indicate that these three conditions together account for more than half of maternal deaths worldwide.²²

Additionally despite caesarean sections conferring approximately five times greater risk of maternal mortality and morbidity than vaginal births, there were no guidelines specific for signs and symptoms to be assessed following caesarean section birth.^{228–230} Only one sign/symptom mentioned caesarean sections and this was blood loss >1000mls for postpartum haemorrhage. Interestingly experts in postnatal care both during discussions with the expert committee and during the Delphi survey, highlighted the need for inclusion of signs and symptoms specific to caesarean section. Given the large morbidity and mortality associated with caesarean births, there is a need for specific guidelines and recommendations on the assessment of signs and symptoms specific to caesarean section births. For adequate focus and attention to be placed, it is imperative that these guidelines are not entangled with vaginal births.

When preparing for the Delphi surveys, there were often multiple ways to describe each sign and symptom based on differing country or setting. The need for careful attention of the language and phrasings used in a recommendation document is highlighted within the WHO handbook for guideline development.¹⁶⁴ Literature has reported on the pitfalls occurring particularly with patient reported tools, where poor language choices can lead to misinterpretation of signs and symptoms.²³¹ It is therefore imperative that beyond securing the signs and symptoms to be included in the tool, attention is taken to ensure the phrasing and language used for the signs and symptoms are context specific to the where the tool is employed.

Strengths

First, the methodology for the study was defined a priori. The Delphi method is a well-established and robust methodology utilised to develop consensus. The Delphi method is advantageous as researchers can involve large numbers of participants from geographically distant regions, across a range of stakeholder groups. Additionally, the methodology enables participants to review the views of other participants presented in round 3, and during round 4 participants have an opportunity to reconsider their opinion without being overly influenced by domineering individuals. Results were further refined at the face-to-face

meeting, which allowed for rich discussions as well as the ability to debate and persuade others.

Second, in the pool of signs of symptoms recovered during the systematic review, several signs and symptoms were noted to be duplicative. The expert committee advised creating an overall tool instead of individual recommendations to each condition category. This enabled the content of the ImPoWA tool to be expansive but not duplicative. A robust sensitivity analysis was conducted to manage the data systematically.

Third, signs and symptoms utilised in the Delphi Survey were expansive and from international and national clinical guidelines. To ensure that data included in the tool was robust an assessment of quality of the data were performed using the AGREE II tool to ensure only signs and symptoms from reputable guidelines were included.

Fourth, there was strong international participation in the survey with an equal spread of participants from higher income settings and lower to middle income settings.

Limitations

First, during the initial expert steering group meeting in Step 2, the expert committee removed six signs and symptoms which were then re-added following the first round of the Delphi Survey. These signs remained within the Delphi survey however were all ultimately removed during the sensitivity analysis (three for being not important and three were deemed hard to assess).

Second although there was a large participation in the survey, representation from each stakeholder group was not evenly distributed with 93% of respondents being health workers and there were no women representatives. During the survey, participants were asked to identify which stakeholder group they belonged to. Participants were only asked to identify one key stakeholder group to which they belonged. It is likely that some participants may have belonged to more than one stakeholder group but data is not available to explore this further.

Third, although purposive emails were sent to contacts with known expertise, in order to generate a global response, snowball recruitment utilising social media was encouraged. It was not possible to ensure all participants responding were experts. This is not likely to have impacted the results as the reach of information of the survey was limited to professionals,

verification of participant credentials was conducted where possible using online professional organisation biographies and ultimately over 90% of participants identified as having a minimum of two years professional experience.

Fourth, in the second round of the Delphi survey, the respondents were provided with the percentage of participants rating each sign or symptom as critically important. Each respondent was not provided with their individual responses taken from the round 1 of the Delphi survey. The reason for this, was to try not to overwhelm the respondents with too much information in order to ensure the responses provided by participants were well considered and meaningful. Additionally, upon completion of all rounds of the survey- each participant had the option to download a copy of their results which they could use for further reflection.

Finally, no signs and symptoms were able to be removed through the Delphi survey for being “not important”. This is unsurprising as all signs and symptoms were retrieved from international recommendations and as such will all be somewhat important at the very least. The limits for consensus were developed a priori and in line with existing Delphi studies.^{227,232} It might however have been prudent to have developed a limit for the somewhat important category too or utilised an alternate method for rating such as ranking of outcomes.

Conclusion

The content for the ImPoWA tool was developed through an international effort. A list of 19 key signs and symptoms that span across 6 condition categories were selected and proposed for inclusion as the content for a maternal immediate postnatal self-assessment tool. These were signs and symptoms which international experts agreed were important to be assessed in the immediate postnatal period and which they deemed that mothers and their birth partners would be able assess in the first 24 hours following birth of baby. This process has highlighted the importance of ensuring the tool is worded and phrased to be acceptable to the setting where the tool is to be employed and it is important for further work to ensure the tool is context specific to mothers in Mbale, Uganda.

Chapter 7- Contextualising the Immediate Postnatal Women's Assessment (ImPoWA) tool

Purpose of the chapter

In the previous Chapters 5 and 6 a total of 19 signs and symptoms were proposed to be included as the content for the ImPoWA tool. These were symptoms that experts agreed were important and that could be self-assessed by mothers and their birth companions in the immediate postnatal period.

A sequential exploratory approach has been taken to ensure that the tool is context specific to the mothers and birth companions in Uganda. Firstly, qualitative interviews were conducted with mothers, their birth companions, skilled and other healthcare workers. These explored their views on the acceptability, content, presentation, usability and training of the tool. The methods and results for this work are presented in this chapter. The data were then reviewed and used by the expert steering committee to create a draft tool. A quantitative survey was then conducted with mothers and birth companions to evaluate the acceptability, understanding of the content, presentation, usability and training of the draft tool. The methods and results of the expert review and quantitative work has been described in Chapter 8.

Objectives

The overall objective is to create a draft maternal self-assessment tool (ImPoWA) to be culturally and setting-specific for Ugandan mothers supported by their birth companions in the immediate postnatal period.

The sub-objectives are:

- To establish the content of the tool through:
 - identifying which key signs and symptoms are both important and can be assessed by women and their birth companions/companions; and
 - refining wording and phrasing of key signs and symptoms to be understandable to women and their birth companions/companions
- To understand the overall acceptability of the tool
- To establish the most appropriate presentation of the tool

- To explore the usability of the tool and training necessary to implement the tool effectively.

Methods

Study methods and findings are reported as per the established and widely used COREQ criteria to ensure robustness and high-quality reporting of qualitative work.¹³⁷

Eligibility Criteria

The study focussed on exploring perspectives from those directly involved in providing immediate postnatal care as well as those who have received immediate postnatal care in Mbale Regional Referral Hospital. As such, semi-structured interviews were conducted with women, their birth companions and skilled birth attendants and other health workers.

Women were asked to participate if they:

- Had birthed at Mbale regional referral hospital within the last 5 days; and
- Were 18 years old or older (or an emancipated minor); and
- Had the ability to provide informed consent.

Birth companions were asked to participate if they had remained as the primary birth companion for the first 24 hours postnatally. A birth companion included a spouse, family member or friend.

Skilled birth attendants and other health-workers were asked to participate if they were a current healthcare worker employee working on the postnatal ward at Mbale Regional Referral Hospital (MRRH).

Skilled birth attendants were defined in line with the World Health Organisation (WHO), International Confederation of Midwives (ICM), International Federation of Obstetricians and Gynaecologists (FIGO) joint statement definition as “an accredited health professional – such as a midwife, doctor or nurse – who has been educated and trained to proficiency in the skills needed to manage normal (uncomplicated) pregnancies, childbirth and the immediate postnatal period, and in the identification, management and referral of complications in women and newborns.”²³³ All other cadres were termed other healthcare worker and their role recorded.

Sampling and selection of participants

Semi-structured interviews with thirty mothers, their birth companions, skilled and other health-workers were conducted. The sampling of participants followed the methodology outlined in Chapter 4. In brief, participants were identified through maximum variation purposive sampling. Interviews were conducted until data saturation was reached, that is, when no new themes emerged.

All 30 participants approached consented to participating in the interview. No participants declined. One participant was only able to provide a partial interview related to the content of the tool and requested that the research assistant returned the next day to complete the interview. When the research assistant returned, the participant had already been discharged home.

Informed consent

Procedures to gain informed consent mostly followed methods described in Chapter 4. In brief, eligible mothers and their birth companions were identified by the head midwives on the labour ward and postnatal ward at MRRH who were best placed to identify and alert the research assistant (VM).

To identify relevant health care workers, VM observed which skilled birth attendants and other health care workers were working directly on the postnatal ward at MRRH. Following identification of eligible participants, the research assistant approached potential participants and provided each participant with an information leaflet and an explanation of the study.

Presence of non-participants was permitted at the discretion of the interviewee. However, the research assistant was clear that only responses from the interviewee would be recorded for analysis.

Copies of the participant information sheet and consent form were available in English and were translated into the three local languages in Mbale (Ateso, Lugwere, Lumasaba).

All participants that were approached agreed to participate in the study. Written informed consent was obtained from participants who were keen to participate in the study. All interviewed participants were provided with 10,000 UGX (approximately £2) to reimburse them for their time spent in the study.

Data Collection

A total of thirty semi-structured interviews were conducted by VM, a female research assistant in Mbale, Uganda. Interviews could be conducted in any of the four languages (English, Ateso, Lumasaba, Lugwere), as per the participants' request. The duration of each interview was determined based on the participant's willingness to talk. Length of interviews ranged from 18 to 80 minutes with a median of 45 minutes.

The methods for the data collection were outlined in Chapter 4. However, in brief, face-to-face interviews were conducted over a two-month period between 1st August 2021 - 30th September 2021. Careful consideration was taken to ensure the participants' privacy, comfort and safety was maintained.

For the participants' ease and to prevent unnecessary extra travel in view of the Covid-19 pandemic, interviews were conducted whilst the women and their birth companions were still in Mbale Regional Referral Hospital after they had given birth or, for the skilled birth attendants and other health professionals, when they were already present in the hospital working.

A semi-structured interview guide, reviewed by the core multi-speciality supervisory research team, was pre-created with questions seeking the respondent's views on the acceptability, content, presentation, usability and training for implementing the ImPoWA tool. An example of the interview guide for the qualitative interviews with mothers and birth companions can be found in Appendix 1.3.

At the beginning of each interview, participants provided their background demographics. Participants were then asked open-ended questions and were probed inductively as necessary to elaborate on answers. During the section on content of the postnatal tool, VM read aloud the list of 19 signs and symptoms to garner feedback. At the end of the interview, the researcher briefly summarised the main points to confirm interpretation with the participant. The non-verbal messages from the participants (such as tone, silence, emphasis, mannerisms) were also documented by the researcher as field notes to demonstrate the reality of the interview.

No repeat interviews were conducted and transcripts were not re-shared with participants.

Data management

Data management followed pre-used established methods as outlined in Chapter 4.¹⁵¹ Study data were anonymised. Participants were asked to suggest their own pseudonyms that could be used within the transcripts and for quotations used in publications of the work. Interviews were recorded and transcribed verbatim by VM in Uganda.

The anonymised MS Word transcript documents were securely saved and stored to the Liverpool Active Data Store in Uganda. Files in this data store could be accessed remotely by the lead researcher in UK (TD) using DataAnywhere to conduct the data analysis.

Data Analysis

The analysis of the data was conducted by TD, a female PhD student with clinical experience working as an Obstetrician and Gynaecologist. Questions within the interview guide on the content and presentation of the ImPoWA tool were utilised for analysis (Table 17).

Table 17: Theme of questions in semi-structured interview guide

QUESTION NUMBERS	THEME
Q3-Q5	Acceptability of the tool
Q6-Q8	What the content of the tool should be
Q9-Q10	How the tool is best presented
Q11-Q13	The logistics and usability of using the tool
Q14-Q15	The training required to use the tool

For the content of the tool (Q6-8), data were collected for each of the 19 signs and symptoms identified and agreed in Chapter 6. A quantitative analysis with simple descriptive statistics was initially undertaken for dichotomous outcomes based on two questions defined a priori:

- How important is each symptom for predicting postnatal maternal morbidity and mortality?
- What is the capability of mothers and birth companions to assess the various signs and symptoms?

Qualitative analysis of Q6-8 was then conducted to understand the rationale behind any discrepancies in responses. Any suggested refinements to the phrasing, or additional signs and symptoms for inclusion or removal, were analysed descriptively. Qualitative analysis of

Q3-5, Q9-15 was undertaken for the questions related to acceptability, presentation, logistics and training for the tool.

As outlined in Chapter 4, for the qualitative analysis, all data transcripts were prepared, explored, analysed and interpreted by TD using the framework analysis methods.^{152,153} To guide the analysis, a draft theoretical framework was developed (Table 18). The specific recurrent themes have been listed within the sub-themes. The themes that were determined a priori have been highlighted in bold.

Table 18: Draft theoretical framework for qualitative interviews

Initial Themes	Sub- Themes
Acceptability of tool	<ul style="list-style-type: none"> • Acceptability of tool • Strategies to improve acceptability of tool <ul style="list-style-type: none"> ○ Inclusion of families in use of tool ○ Guidance and education to mothers on purpose and value of tool for their health and wellbeing ○ Guidance and education to mothers on usability of tool ○ Consideration to approach e.g. privacy, ease of use, compulsion ○ Consideration of approach to provision of guidance on tool use e.g. by health care workers, multi-media approaches to raise awareness
Content of tool	<ul style="list-style-type: none"> • Signs and symptoms that are important for predicting postnatal maternal morbidity and mortality • Signs and symptoms that are unhelpful in the prediction of postnatal maternal morbidity and mortality • Signs and symptoms that can easily be assessed by mothers and birth companions • Signs and symptoms that cannot be easily assessed by mothers and birth companions
Presentation of tool	<ul style="list-style-type: none"> • Format of tool <ul style="list-style-type: none"> ○ <u>Ease of use e.g. limiting number of questions</u> ○ <u>Focus on inclusivity e.g. translation of languages,</u> • Format of questions. <ul style="list-style-type: none"> ○ <u>Focus on health literacy e.g. multiple mechanisms of present information</u> ○ <u>Content to be understandable and acceptable to local contexts</u>
Usability of tool	<ul style="list-style-type: none"> • Usability of tool • Strategies to improve usability of tool <ul style="list-style-type: none"> ○ Multi-stakeholder buy in e.g. governments ○ Incorporation to existing schemes e.g. mama kits,

	<ul style="list-style-type: none"> ○ Focus on mechanisms to improve memory to use tool e.g. charts, alarms, frequency of checks ○ Improve understanding on value and use of the tool beyond health benefits. ● Delivery of tool <ul style="list-style-type: none"> ○ Timing and best place for delivery of tool ○ Education and training provided ● Actions taken following use of tool <ul style="list-style-type: none"> ○ Clarity on onward referral ○ Linkages to health workers
Training of tool	<ul style="list-style-type: none"> ● Information/ training on using tool <ul style="list-style-type: none"> ○ Comparison of different modalities to use to provide training ○ Linkage to usability of tool ○ Value of health workers in providing training ○ Content of training packages and best approach ○ Optimum timing to provide guidance and training

As outlined in Chapter 4, rigor of the data in the study was maintained to ensure credibility, dependability, transferability, fittingness and conformability.^{157,158}

Results

Background of Respondents

A total of 19 semi-structured interviews were conducted with mothers and their birth companions (Table 19).

All participants were women, with health insurance, who were mainly married (16/19). All mothers had a basic level of education and three birth companions were unable to read or write. There was an even spread of respondents who had given birth or were supporting a mother who had given birth across vaginal and caesarean births. The majority of participants (15/19) had access to mass media through either a TV, internet or radio. Largely (18/19) participants had access to a mobile phone.

Table 19: Participant characteristics of the semi-structured interviews with mothers and birth companions

Pseudonym	Cadre	Age	Gender	Residence	Number of pregnancies	Marital status	Primary language	Education level	Job	Has a bank account	Has health insurance	Has access to radio	Has access to internet	Has access to TV	Mobile phone?	Mode of birth?
Mercy	Mother	25	Female	Urban	1	Single	Lumasaba	Completed secondary education	Farming-Home garden	No	No	No	Yes	Yes	Yes	Caesarean
Akol	Mother	34	Female	Rural	3	Married	Ateso	Can read and write	Farming	No	No	No	No	No	Yes	Caesarean
Donkey	Mother	32	Female	Urban	3	Married	Lugwere	Completed college and above	Health assistant	Yes	No	No	Yes	Yes	Yes	Caesarean
Brenda	Mother	20	Female	Rural	1	Married	Lugisu	Completed secondary education	Hair dressing	No	No	Yes	No	No	Yes	Caesarean
Saubu	Mother	28	Female	Rural	5	Married	Lugisu	Completed primary education	Farming	No	No	No	No	No	Yes	Vaginal
Joyce	Mother	33	Female	Rural	4	Married	Lugisu	Completed college and above	Nurse	Yes	No	Yes	No	Yes	Yes	Vaginal
Sofie	Mother	15	Female	Rural	1	Single	Lugisu	Can read and write	Self-employed	No	No	Yes	No	No	No	Vaginal
Peruth	Mother	36	Female	Urban	5	Married	Lusamia	Completed primary education	Self-employed	No	No	Yes	No	No	Yes	Vaginal
Scovia	Mother	27	Female	Rural	6	Married	Lumasaba	Can read and write	Self-employed	No	No	Yes	No	No	Yes	Vaginal
Catriona	Mother	32	Female	Urban	3	Married	Lugwere	Completed college and above	Stay at home Mum	Yes	No	Yes	Yes	Yes	Yes	Vaginal
Florance	Birth Companion	50	Female	Rural	3	Married	Ateso	Completed primary education	Farming-home garden	No	No	Yes	No	No	Yes	Caesarean
Vie	Birth Companion	28	Female	Urban	3	Single	Lugwere	Completed university	Professional laboratory technician	Yes	No	No	Yes	Yes	Yes	Caesarean
Scovia	Birth Companion	32	Female	Rural	1	Married	Lugisu	Completed secondary school	Farming	No	No	Yes	Yes	Yes	Yes	Caesarean
Hadijja	Birth Companion	31	Female	Rural	5	Married	Lugisu	Unable to read or write	Farming	No	No	No	No	No	Yes	Vaginal
Florence	Birth Companion	48	Female	Rural	6	Married	Lugwere	Unable to read or write	Farming	No	No	No	No	No	Yes	Caesarean
Jesca	Birth Companion	31	Female	Rural	1	Married	Lugwere	Unable to read or write	Farming	No	No	No	No	No	Yes	Vaginal
Sammy	Birth Companion	19	Female	Rural	6	Married	Lugisu	Completed secondary school	Student	No	No	Yes	No	No	Yes	Vaginal
Catherine	Birth Companion	25	Female	Rural	6	Married	Lugisu	Completed university	Teacher	No	No	Yes	No	No	Yes	Vaginal
Tina	Birth Companion	30	Female	Urban	6	Married	Lugisu	Completed primary education	Self-employed	No	No	Yes	No	Yes	Yes	Vaginal

A total of 11 semi-structured interviews were conducted with health care workers (Table 20). The majority of participants were women (9/11), who lived in an urban setting (10/11). All healthcare workers had a basic level of education. Out of the six skilled birth attendants, four were midwives and 2 were doctors. The five other health workers had a range of occupations including records assistant, guard, social worker and nurse. Over half of the health workers (7/11) had worked at MRRH for over 2 years.

Table 20: Participant characteristics of the semi-structured interviews with health care workers

Pseudonym	Cadre	Age	Gender	Residence	Religion	Primary language	Education level	Job	Years worked at MRRH
Doug	Skilled healthcare worker	26	Male	Urban	Catholic	Luganda	Completed college and higher	Doctor	1 year or less
Edith	Skilled healthcare worker	28	Female	Urban	Protestant	Luganda	Completed college and higher	Midwife	2-4 years
Deborah	Skilled healthcare worker	22	Female	Urban	Protestant	Kuosambiny	Completed Secondary education	Midwife	1 year or less
Akello Joyce	Skilled healthcare worker	38	Female	Urban	Other Christian-Born Again	Ateso	Completed college and higher	Midwife	2-4 years
Clare	Skilled healthcare worker	27	Female	Rural	Other Christian-Born Again	Lumasaba	Completed college and higher	Midwife	2-4 years
Allen	Skilled healthcare worker	25	Female	Urban	Protestant	Luganda	Completed college and higher	Doctor	5-10 years
Alice	Other healthcare worker	50	Female	Urban	Muslim	Munyole	Completed Secondary education	Records assistant	>10 years
Gracious	Other healthcare worker	25	Female	Urban	Other Christian-Born Again	Ateso	Completed Secondary education	Guard	1 year or less
Sumayah	Other healthcare worker	40	Female	Urban	Protestant	Lumasaba	Completed college and higher	Social worker	>10 years
Kabisa	Other healthcare worker	44	Male	Urban	Protestant	Lugwere	Completed college and higher	Social worker	>10 years
Grace	Other healthcare worker	23	Female	Urban	Catholic	Luganda	Completed college and higher	Nurse	1 year or less

Acceptability of tool

Almost all mothers, their birth companions and health care workers reported that the strategy of using a tool to self-assess their health during the immediate postnatal period would be acceptable to them. One birth companion reported it would be especially useful for mothers who were having their first baby. The majority of participants reported that the tool would provide them with the critical information necessary to understand the health of the mother and then seek help as needed. Most participants reported that families did not have an understanding of the importance of the postnatal period for a mother's health and wellbeing which can unfortunately lead to poorer outcomes.

"That will be good we need help after delivery and some people die silently so when you bring us such a thing, women can get help after delivery. We will use it when you give it to us."

[Jesca, Birth Companion]

In particular, mothers and birth companions reported that this knowledge was critically important to enable them to identify any risks or abnormalities in order to gain rapid treatment and the care required. Additionally, participants cited the value of identifying symptoms at an early stage to prevent complications and thereby protect the mothers' health and wellbeing.

"I would have helped her to know if she is fine or not. If we are fine, we can be discharged but if we are not fine, I would tell the doctor to help us and give her treatment."

[Florance, Birth companion]

Several mothers and their birth companions went on to report that the use of the tool would allow them to voice their concerns freely, without judgement and that the tool would be invaluable in allowing health-workers to listen to their concerns more seriously.

"I would feel good, it would help me to know if I am okay or not. Sometimes you can be in pain but if the doctor or nurse doesn't ask you how you feel, you don't say it because we think after birth, the doctors obviously know how we feel and they should just give us treatment...But now... I still have pain, but they think that I am already fine. They are just bypassing us. May be when you bring the chart, maybe they will give us more time. Some doctors are bad hearted and they don't care. All they want is money that is all."

[Akol, Mother]

All mothers and birth companions reported that they could accept the approach because they were confident they would be capable of using the tool. The reasons for this, as cited by the

mothers, included that they would know their own health and are motivated and keen to look after their own health. Moreover, several birth companions reported that they would be proud to have the knowledge to help their loved ones.

“It [the self-assessment chart] is good. I would be proud to be able to help her know what the problem is and check her and give her medication...Most importantly it is getting her helped after assessment. I would be happy.” [Florence, Birth Companion]

Largely, health-workers agreed that mothers would be capable of using the tool. They reported that the tool would enable mothers to understand their health, including maternal mental health with the potential to reduce maternal deaths, boost health and immunity. Furthermore, to highlight the capability of mothers, healthcare workers identified previous examples of mothers engaging in self-care practices in Uganda. These included for them monitoring their pulse rates, and utilising family planning booklets.

“[thinking] There is something of this kind from Busitema University where they are trained to measure the pulse rate by themselves, they even tell them about the normal pulse rate... if they see the abnormal pulse they ask them to seek for medical assistance.” [Edith, Healthcare worker]

Over half of the health-workers reported the value of the tool in relieving the workload from busy staff members. Respondents cited that the tool would protect their time by mothers being able to triage their own symptoms in a timely fashion so that health-workers can focus their attention on those that are unwell and needing immediate care. Additionally, one health worker reported that by mothers already conducting a preliminary review, it could reduce the time necessary for their assessments. Other health care workers found value of the tool for their own work as a prompter/reminder to review these signs and symptoms which could be forgotten due to their increasing workload. Interestingly one health care worker highlighted that the tool could be more useful for caesarean section births where complications are more frequent.

“I had suggested that we can mainly give the chart to only C-section deliverers because they are the ones mostly with complications.” [Edith, Healthcare worker]

There were several barriers reported by participants related to the acceptability of the tool. Respondents highlighted a lack of existing knowledge on the importance of the postnatal period. Signs and symptoms in the postnatal period are not often thought to be predictors of

poor health' meaning that mothers and birth companions will only seek care when very unwell. This was reported by participants as particularly relevant for those who have had a vaginal birth which was reported as "safer" than caesarean births. Respondents suggested that there is a chance that mothers might then fail to complete the tool. Respondents also reported that mothers are keen to go home following birth and this may make them less willing to use the tool, especially if it takes too long to use and could delay discharge.

"After birth, some people get mild issues it can be mild headache or the pain can be so much that women may not want to use the chart. They will be like "ah, these doctors are wasting my time, yet I am fine" and they just leave the hospital without self-assessment... Sometimes after birth we tell them to go to the other ward so you are discharged... but they don't... They just decide to leave because they think they are okay. Most importantly they have their children... They even used to escape, but like I said, it's hard because the guards don't let them out without discharge form." [Alice, Healthcare worker]

Several healthcare workers voiced concerns that women may expect postnatal assessments to come from a health care worker and therefore refuse to use the tool. Moreover, several health care workers reported that they would not feel comfortable task-shifting to mothers as they see it as their role to do these assessments.

"Some women may have a bad attitude about using the tool. They will say "instead of these doctors coming to check us, they are asking stupid questions" they might refuse to use the tool because they think it's time wasting." [Alice, Healthcare worker]

Cost to use the tool was reported as a key barrier with half of mothers and birth companions reporting concerns that charging for the tool would limit their ability to acquire and therefore use the tool. Respondents were therefore keen for the tool to be free of charge. Interestingly one mother was concerned that providing mothers with this information may worry or scare them. One birth companion highlighted the issue of privacy as depending on who their birth companion is, mothers may not be comfortable sharing their symptoms with them. Given this is a new tool, two mothers highlighted the importance of ensuring that mothers trust the tool in order to ensure its acceptability by mothers.

"I don't know if it holds water [thinking]... but confidentiality would be a barrier. If I gave in my information, I would want it to be between the doctor and myself... but not giving my information and sharing it with other people because I would not be comfortable... They [the

health care workers] can assure me of the confidentiality and ensure it...Health workers swear so many oaths and I really expect them to respect them.” [Donkey, Mother]

In view of these barriers, respondents suggested several strategies for improving acceptability. Almost all respondents emphasised the need for clear explanation and training of the tool with mothers and birth companions in order to counteract some of the barriers to mothers’ acceptance of the tool. This would provide the opportunity to highlight the importance of the postnatal period, explain the benefits of using the tool, highlight the robust methodology used to create the tool which could dispel any concerns. Mothers and birth companions would therefore have a greater interest in the tool and be more inclined to use it.

“If they [the mothers] are not well educated, they can refuse it. This is because they do not know how to use or interpret the chart....You have to teach her that this tool is used for this and that [pointing to paper] and you also convince her to use it. Tell her that it’s good and why it is good.” [Florance, Birth Companion 1]

Largely respondents suggested that it was critical for all health workers (including doctors and midwives) to be engaged with the work and to administer the training for the tool as they are most trusted by mothers and their loved ones. This would not only provide mothers with the re-assurance of the importance of the tool, but also ensure that any additional support is provided too. Additionally, several respondents cited that engaging with the healthcare workers at the facility for their buy-in could help mitigate any concerns the health workers may have.

“After birth, some women will just want to sleep. They will not want anything to do with anything. But if the doctors talk to them ...they will use it. The doctors should talk to them, tell them that this chart is good and can help you to know if you are sick and we give you treatment... and she will accept to use it.” [Sauba, Mother]

To foster ongoing acceptance of the tool, largely participants reported the need to disseminate knowledge about this tool at the community level. This included through media, village health attendants, community leaders, focus group sessions, pamphlets. Additionally, several participants reported the value of galvanising mothers to be conduits of information back to their community to testify to other women who trust them to use the tool. Several respondents highlighted that this would increase acceptance.

“They should not sell it [the chart]; it should be free. Also, for instance, if a woman who gives birth, uses this chart... and she is given help... women will tell other women about this chart ...and how they got help after using it... and that will motivate everyone to use it” **[Jesca, Birth Companion]**

Numerous respondents highlighted that embedding the tool in health system delivery would aid its acceptance. One mother highlighted that by making the tool compulsory to complete and preventing mothers from leaving hospital and only gaining discharge until they have completed the form could ensure its acceptance. Almost all respondents also highlighted that making the tool free of charge would in turn motivate mothers and birth companions to use the tool.

“Um... they should give it to us for free of charge, many of us do not have money so if they sell it, and we may not buy it.” **[Sofie, Mother]**

Content of tool

In one transcript, the mother did not want to answer questions on the importance of predicting maternal morbidity and mortality and whether the women and birth companions could assess this with training. Therefore, quantitative analysis was undertaken of the 29 transcripts of data provided from women, birth companions and healthcare workers.

The analysis focussed on understanding the participants views on the importance of the symptoms and the ability for the mother and birth companion to assess the symptoms (Table 21). Any discrepancies in responses were highlighted in orange.

Table 21: Quantitative analysis of women, birth companions and health care worker responses

Signs/ Symptoms	Important in predicting maternal morbidity and mortality			Reported that women and birth companions can assess with training		
	Mothers (%) n=9	Birth companions (%) n=9	HCW (%) n=11	Mothers (%) n=9	Birth companions (%) n=9	HCW (%) n=22
Change in consciousness	9, (100)	9, (100)	11, (100)	7, (78)	9, (100)	11, (100)
Seizure	9, (100)	9, (100)	11, (100)	7, (78)	9, (100)	11, (100)
Severe Headache	8, (89)	8, (89)	11, (100)	9, (100)	9, (100)	11, (100)
Persistent visual impairment	8, (89)	9, (100)	10, (100)*	9, (100)	8, (89)	11, (100)
Urinary incontinence	9, (100)	9, (100)	100%	9, (100)	9, (100)	11, (100)
Chest pain	8, (89)	9, (100)	7, (64)	9, (100)	9, (100)	11, (100)
Shortness of Breath	9, (100)	9, (100)	11, (100)	9, (100)	9, (100)	11, (100)
Severe Pallor	9, (100)	9, (100)	11, (100)	9, (100)	9, (100)	10, (91)
Fast Heartbeat	9, (100)	9, (100)	11, (100)	9, (100)	8, (100)**	11, (100)
Rejection of baby	7, (78)	9, (100)	11, (100)	6, (67)	5, (56)	10, (91)
Suicidal/ infanticidal	9, (100)	9, (100)	11, (100)	3, (33)	6, (67)	11, (100)
Syncope/ Dizziness	6, (67)	7, (78)	10, (91)	9, (100)	9, (100)	11, (100)
Amount of Blood Loss	7, (78)	9, (100)	11, (100)	8, (89)	9, (100)	6, (55)
Soft flabby uterus	8, (89)	7, (78)	11, (100)	7, (78)	5, (56)	4, (36)
Unable to urinate easily	7, (78)	7, (78)	11, (100)	9, (100)	9, (100)	11, (100)
Foul smelling discharge	7, (78)	4, (44)	11, (100)	9, (100)	9, (100)	10, (91)
Rigors	9, (100)	9, (100)	11, (100)	9, (100)	9, (100)	10, (91)
Fever	6, (67)	7, (78)	11, (100)	9, (100)	9, (100)	11, (100)
Abnormal coloured urine	7, (78)	8, (89)	11, (100)	9, (100)	9, (100)	10, (91)

*One healthcare worker did not respond to this question so n=10

** One birth companion did not respond to this question so n=8

Consensus on the importance and capability for mothers and their birth companions to assess the signs/symptoms was achieved by all women, birth companions and health workers for urinary incontinence, shortness of breath, and fast heartbeat.

Importance of signs and symptoms

Across all health care workers, mothers and their birth companions interviewed, consensus was achieved on the importance of the following eight signs and symptoms:

- Change in consciousness
- Seizure
- Urinary incontinence
- Shortness of breath
- Severe pallor
- Fast heartbeat
- Suicidal/Infanticidal
- Rigors

These eight signs and symptoms were deemed important as they were predictive of illness. Through their identification, respondents highlighted it could enable treatment and management to be commenced. Additionally, they were signs and symptoms that they had been witnessed or experienced directly by the participants first hand and they were therefore aware of their significance.

The importance of the 19 signs and symptoms identified from the Delphi survey were mostly supported by the healthcare workers. However, interestingly several healthcare workers reported chest pain was not important to be measured as it was mild, rare and not something to worry about.

“[The women] would find it normal probably because they would assume it would go with time. Africans don’t react to mild headache, chest pain, they would rather self-medicate...they pay more attention to things to do with the reproductive organs like abdomen, bleeding, difficulty in urination than chest pain.” [Doug, Healthcare worker]

Additionally, one health-worker reported that syncope and dizziness was not a predictor of significant pathology but to do with nutrition and the need for conservative measures to manage.

“[Dizziness] is a bit minor but it can be assessed... usually the cause is feeding and then they lack energy so we always advise them to eat and have enough fluid intake.” **[Edith, Healthcare worker]**

However, discrepancies on perceived importance of the symptoms by either mothers and/or birth companions were noted for 11 out of the 19 signs and symptoms.

Of the respondents, the majority of women and birth companions found it important to assess severe headaches so that a diagnosis of the cause of the headache can be found and the correct treatment provided to get relief from the pain. Additionally, respondents reported that “headaches” could be used as a predictor of underlying complication or health problem. They reported that headaches could be due to severe bleeding, dehydration, blood pressure, low blood levels and anaemia. Some of the consequences of severe headaches included low appetite, dizziness and madness.

“It’s very important [firmly], I know of a woman who gave birth and was complaining about headache, she was referred here but didn’t come because she was treating it using herbs because she thought the co-wife was bewitching her... she died just like that. So, it’s important to understand why you would be having the headache.” **[Akol, Mother]**

However, one woman and one birth companion reported severe headache was not important as it commonly affected all women following birth and as such was not as predictive of ill health. The treatment for headaches was noted as pain killers and as this is easily accessible over the counters, mothers would opt to buy these medications rather than going to the doctor to seek help.

“I would just go buy pain killers and take because it’s just pain... it can go by the painkillers. I would not wait for nurses to check that painkillers are not expensive.” **[Peruth, Mother]**

The majority of women and all birth companions reported it important to assess for visual disturbances in order to receive diagnosis and treatment and remedy their sight back to normal. The women reported it was caused by “over-bleeding”, as a side effect to medications that were administered in delivery, or blood pressure and therefore it required care.

“Because they can help you to see well. It happened to me before birth, but I am now okay.” **[Brenda, Mother]**

One woman did not find it important to assess visual disturbances as the ailment was fleeting and would often recover spontaneously without needing treatment.

“I think when you’re seeing blurry things. You can’t see well. It’s due to too much pain and over bleeding. I experienced it but after delivery... I regained my sight after a short while. I did nothing. I knew I would be okay. I did not have to do anything about it and wasn’t worried neither because it happens sometimes... and it goes away.” **[Peruth, Mother]**

Largely women reported that it was important to assess chest pain as it is not normal, and assessment is necessary to receive advice and management from health care workers and gain relief from pain. The reported causes of chest pain included due to positioning of the mother during labour.

“It would be important. It could be caused by the vigorous exercise during labour, or the weight on your stomach, position during delivery so to rule out the cause it would be better assessed.” **[Donkey, Mother]**

One mother did not find chest pain important to measure as the health workers do not assess it during their normal assessments.

“[The health workers] don’t check for chest pain. They just ask you to touch or show them where is pain.” **[Scovia, Mother]**

The majority of mothers and birth companions reported that rejection of the baby was important to assess as it is not normal and can be a sign of underlying mental health illnesses.

“Why not [shrugging]? That’s obviously not normal. Doctors would need to counsel this woman you can never know what’s causing this till its assessed.” **[Donkey, Mother]**

However, several mothers, did not find rejection of baby important to assess as they hadn’t heard of this symptom. Additionally, they reported the symptom was less to do with health of mother and more to do with family issues in the household.

“When [women] have problems with their husband and he’s not taking care of the baby and her. She can say, “Let me also throw the baby for him” and she dumps the baby for the man. Or she can leave the baby in the hospital after delivery and the midwives can take the baby to police to find the mother, but they don’t show up at all.” **[Scovia, Mother]**

Over half of the mothers and birth companions reported that dizziness was important to be assessed to ensure they received assistance with walking as well as diagnosis and subsequent

management. Causes of dizziness was reported to be dehydration, anaemia and exhaustion from labour.

“It would be good to understand the cause of that. It could be so many thoughts or worries of anything that would be stressing you, it could be anaemia it could also be due to dehydration due to loss of body fluids during labour. That is why it would be important to assess and know the exact cause of dizziness and address it.” [Joyce, Mother]

However, several mothers and one birth companions did not find dizziness important as it was normal following birth and occurs to every woman who gives birth with a quick and spontaneous recovery.

“Every woman who gives birth can easily get dizzy, it’s normal, all you need to do is put her to rest and it goes away by itself.” [Jesca, Birth companion]

The majority of mothers and all birth companions noted that the amount of blood loss was important to be assessed as if the flow is too heavy may cause the mother to experience symptoms e.g. dizziness and require treatment e.g. medications and blood transfusions. This was deemed as important as it can result in death.

“Yes, I would assess [blood loss], because I can easily lose my life if I don't assess it. There are people who bleed too much and some bleed mildly. If my flow is heavy then there would be need to get medication.” [Catriona, Mother]

However, several mothers did not feel it was important as it was normal to bleed following birth and they trusted the prevention medication provided by healthcare workers following birth.

“So much blood is lost at birth. They inject you some drug to prevent over bleeding so there is no need to assess since they have already injected us.” [Sauba, Mother]

The majority of mothers and birth companions reported that soft flabby uterus was important to be assessed as they understood that full recovery requires the uterus to be contracted back to its original position and to do this may require some medication from healthcare workers

“This is caused by a lot of force used to push a baby out. As you push, even the uterus moves so after delivery the doctors ensure the uterus is back in its position and they also insert some drug in the uterus so that it goes back to its position. It happened to me...so the doctors told me not worry and I got medication I got proper medication.” [Hadijja, Birth Companion]

However, several mothers and birth companions disagreed as their understanding was that it was normal to be soft following birth.

“No, it can only be hard when the baby is in the uterus. After delivery, it’s normal because it’s soft.” [Sauba, Mother]

Over half of the mothers and birth companions reported that unable to urinate easily was important to be assessed as it could be a sign of underlying pathology such as an infection e.g. Urinary tract infection, or pain from a tear following a vaginal birth or a blockage in the urinary system. The assessment was noted to be important as treatment could be provided e.g. relief with a catheter.

“This is very important. You have to understand why. Maybe they have stitched her badly or something is wrong. You have to talk to the doctors if she not able to urinate well.” [Florance, Birth Companion]

Of the respondents, several mothers and birth companions disagreed as in caesarean sections mothers will automatically be given a catheter due to the anaesthesia. Additionally, for vaginal births this can be normal due to positions of the baby in labour pressing on the bladder and will spontaneously resolve.

“No, that’s normal, if you are not able to urinate well it’s because the baby pressed the bladder, so urine starts coming out with pain and you urinate so often. You urinate after a short time and little urine comes out and yet you feel like the bladder is still full, but it eventually goes away after some days” [Sofie, Mother]

Only a few birth companions mentioned that foul smelling discharge was important to be assessed. Reasons for assessment included that it could signify underlying infection e.g. candida as well as from retained products. They report that through identification they can get help from healthcare workers for treatment and hygiene management.

“That’s not normal when a woman gives birth and gets water [fluids] coming out of her and it smells bad, but it disappears as time goes by. That is important.” [Akol, Mother]

Interestingly the majority of birth companions did not think foul smelling discharge was important as it is normal following birth and resolves spontaneously

“It would be not important. It’s normal. After birth... some liquid and even blood comes through the vagina. It goes away with time so you would not have to worry.” **[Florance, Birth Companion]**

Largely mothers and birth companions reported that fever was important to be assessed for mothers to receive treatment and prevent complications e.g. seizures. Women are therefore able to receive treatment. Causes of fever were discussed e.g. malaria, bacterial infection.

“It’s important to know, you can have body pain and temperature. I had fever too [gesticulating to herself], my body was hot, I was sweating, and my heart was beating so fast. They brought something and they put on my chest. I don’t know [what they put on my chest], I just did not ask anything because I trusted what they were doing to help me feel better and I am now fine.” **[Brenda, Mother]**

However, several participants related that fever was duplicative of rigors and as such should be removed.

“That’s one of the signs of rigors. Why do we have this as an independent sign and symptom? We may remove it.” **[Joyce, Mother]**

Finally, the majority of mothers and birth companions suggested that abnormal coloured urine was important to be assessed as it could signal infection or yellow fever. Without assessment it was highlighted appropriate treatment would not be possible and result in complications.

“I have seen people deliver with it. It’s common with women after delivery. You must seek medical attention because it’s deadly, if you don’t have money for treatment in hospital, there is local medicine for it, but we no longer want local medicine because it has killed us so much.”

[Hadijja, Birth Companion]

However, some mothers and birth companions disagreed as they reported it was normal to have urine that is bloody coloured especially post vaginal births. Participants reported that abnormal coloured urine could also be due to various medications that the mother may be taking.

“After birth, I can urinate urine with blood because I be bleeding, and it becomes normal after a week so it’s normal.” **[Sauba, Mother]**

Ability to assess signs and symptoms

Women and birth companions reported being generally confident to be able to assess the proposed 19 signs and symptoms with training. Reasons for this included, mothers understanding they are in control of their body and would be able to feel and understand their body.

“It’s my body. I can know how I would feel.” [Akol, Mother]

If equipped, they would have the capacity to regularly assess their signs and symptoms. For example, the mothers and birth companions suggested that they could assess PPH through how often they had to change their pads. Similarly, they reported that they could easily assess symptoms such as headache, fever, skin colour changes.

“When I am not bleeding too much like [thinking]...I can change pads like once a day and when the pad is not even full but when the flow is high, you can change the pads even like three times a day. [Too much blood is] when blood is flowing too much and am changing pads all the time.” [Peruth, Mother]

The birth companions were identified by most of participants as having a unique role in being able to check on the mother even if the mother was not able to. Already, participants reported health care workers utilising birth companions for roles for example to check the colour of patients’ skin to assess for severe pallor. Equally they would then have the capacity to call for help as needed.

“The woman herself may not assess because she will be unconscious... but my caretaker can help and tell the midwife about my situation.” [Catriona, Mother]

Several women and birth companions suggested that sometimes women may not be lucid enough to assess signs following labour, for example if they had suffered seizures. Additionally, some mothers and birth companions relayed that the overall assessment of their signs and symptoms were more a job for the doctors and health professionals. Particularly for non-physical conditions where mothers may conceal information from their loved ones preventing assessment. This was true in the case of “rejection of baby”. They suggested that health workers may find it easier to assess these issues given their expertise and knowledge.

“No [shocked]. How would I know that she wants to kill the baby or herself? When someone wants to harm themselves, they don’t say it. Some may talk but it’s hard. They might tell their husbands that.” [Scovia, Mother]

Participants highlighted that a lack of knowledge may mean that mothers do not prioritise some signs and symptoms – for example they may not routinely pay any attention to their urine. They would therefore need guidance to know what normal urine is. Additionally, they may also think it is normal to have blood-stained urine and therefore not say anything.

“Because they don’t know the normal coloured urine and even if they know, they think it’s normal to have bloody urine.” [Grace, Healthcare worker]

Interestingly, several healthcare workers were protective of their role as providers of health and reported that mothers and birth companions would not be able to assess signs and symptoms. They stated that this was a role for health care professionals as only they would have the knowledge and expertise to distinguish between different signs and symptoms. As an example, one health- worker reported that mothers and birth companions would struggle to distinguish between seizures and severe pallor. In terms of blood loss, several healthcare workers reported that it would be unusual for the mothers and birth companions to know what is normal and they would not have access to diagnostic equipment such as blood tests and thermometers.

“No, they can’t. It’s the health worker who know and even check by a CBC [complete blood count]. That how they would check but even the mother or attendant can’t check that.” [Sumayah, Healthcare worker]

“NO [defiantly]. They can’t know what is normal or not. It’s us who keep monitoring the progress with the contracting if it’s not contracting, we can then try to stimulate it, and we rub the abdomen. They can’t check for what they don’t understand.” [Clare, Healthcare worker]

“When they are shivering, we would use the thermometer to know if the temperature is normal and or not. They could be shivering because it is cold so that’s how we would determine if its rigors or not just coldness.” [Deborah, Healthcare worker]

Revisions to content

During the interviews, participants were asked to provide suggested revisions to the content of the ImPoWA tool (Appendix 3.6). The revisions consisted of suggested alternate phrasings, proposed additional signs and symptoms, suggested removal of existing signs and symptoms

Presentation of tool

Largely respondents agreed the overall tool should be paper based. Reasons for this included that it would be easy to administer and repeatedly use, by both educated and non-educated mothers and their families. Some participants added that it aided usability and would also help mothers to remember to use the tool. Participants had mixed views on whether the tool should take a single side or booklet format. Some of the benefits for the single side format was that information could be presented succinctly for easy and quick scanning by mothers who post-labour may not have the time or energy to read large amounts of information. Respondents highlighted this would in turn make the tool easy to use and additionally motivate mothers to complete the tool regularly.

“It [the tool] should be a single paper... women don’t have time to read a lot of things on many papers.” [Edith, Health care worker]

In contrast some participants reported that a booklet form would be useful as it would be sturdier and more resistant to wear. In addition, this would enable the tool to be stored for use to be recycled not just for this pregnancy but future pregnancies too.

“Yes. It [The tool] should be like a book...because a book won’t easily be destroyed. It’s also easy to use. If you give me a phone, I might even fear to use it because I don’t know how to read.” [Hadijja, Birth Companion]

That said, several respondents reported providing a book format could suggest a large volume of information which could potentially deter mothers from using the tool.

A few participants cautioned the researchers from adopting a digital format for the presentation of the tool. Reasons for this included that not all mothers and birth companions have access to technology and this would therefore limit their ability to engage with the tool as well as prevent them from having continuous access to the information in the tool. Additionally, several respondents reported not being comfortable with use of technology and were fearful of “spoiling” any device that would ultimately be used.

“They should put the tool on a paper...paper is easy to use, using a phone may be hard, and what if I spoil it? It should be on a paper.” [Sofie, Mother]

One health worker reported that this lack of comfortability with using digital devices may then prevent mothers from being able to effectively engage with the tool and provide

responses. Another respondent suggested that considerable investment in training of the mothers in the use of the tool would be required if a digital technology format was used.

Several participants highlighted the value of having an overall wall chart in the postnatal ward as an adjunct to the tool to advertise the tool and help remind health workers to provide the tool as well as mothers and companions to complete the tool.

“You can provide it on phone inform of an audio for the caesareans but again they [the mothers and birth companions] will disappear with your phones. Maybe you should make big charts and display the tool on the walls of the ward. Women can look at them and assess their health and then they can give verbal responses.” **[Clare, Healthcare worker]**

One health worker highlighted this approach could be especially valuable for mothers who have just arrived on the postnatal ward having been transferred from labour ward. Having this adjunct would ensure a fall-back option should the tool not be available. One health worker suggested digitising the chart into a video format, whereby a television was installed that could be used to provide these messages on loop.

Largely participants agreed on the importance of limiting the total number of signs and symptoms in the tool to those most critical, to not over burden the user. Respondents highlighted that the postnatal period mothers do not have a large amount of time and may be too tired from labour to read large amounts of information. Respondents therefore emphasised the importance of keeping the tool lean and effective.

There were mixed views from participants on which approach would be best to present the content (the signs and symptoms) within the tool. Several participants highlighted that pictures could be an effective way of translating the information into easily accessible, bite size packages of information. Participants also suggested that pictures would be especially useful for illiterate participants or those that don't speak the same language.

“They [the tool] should be pictures and maybe for those who don't see, the tool should be put as an audio ... but the way I see it, pictures are good... Because I can understand them easily. I may not know how to read some things.” **[Sofie, Mother]**

However, several participants stated that they could be prone to misinterpretation and tampering. The written word was highlighted as an important approach and one mother reported that using the specific medical term would be invaluable to enable a proper follow

up with health care professionals. Audio descriptions of symptoms were highlighted as useful to aid those who were illiterate.

“We should use audios on either phone or recorder and at the same time you [the health worker] should be recording the responses... Because we have people who don’t know how to read or write but can listen and talk. If there’s anyone who cannot talk they would write down the questions in the book and get a translator who will also help and write the responses down. Responses can be in yes or no format.” **[Joyce, Mother]**

Given the varying approaches, several mothers highlighted that the different approaches could be used together and complement each other. Participants reported that a multi-modal approach would then appeal to different women based on their preferences and education level.

Language was highlighted as an important consideration in the presentation of the tool. The majority of the participants highlighted the importance of translating the tool in the main local languages. Participants reported that this would improve understanding of the key messages and would ensure that the tool is as inclusive as possible.

“The tool should be in different languages like Lugisu, Lugwere, Ateso, Luganda among others...You can’t only put it in English. Some people will be left out who don’t understand English. When they make it in local languages people will understand it easily because everything will be in their local languages on the tool.” **[Gracious, Healthcare worker]**

Several healthcare workers did caution that given the large number of tribes surrounding the Mbale area, there are lots of languages to use. However, most participants cited Ateso, Lumasaba and Lugwere as the key languages spoken in Mbale.

Participants provided their view-points on the best approach for mothers and their birth companions to respond to the tool. The majority of participants highlighted the value of adopting a binary “Yes/No” response as this would be easy to do even for those who are less educated. Largely, respondents highlighted that a written response would be feasible for mothers and birth companions to provide.

“Colours would confuse us. It is easier to tick in the box against the question. That’s very easy, even to [those of] us who did not go to school.” **[Akol, Mother]**

Participants suggested this could be conducted by respondents “ticking” or “shading” or “drawing lines” in a table that applies to the particular sign or symptom they have and leaving blank those that they don’t have. One birth companion suggested the use of a colour gradient system would be useful to alert mothers when they needed to seek health care. However, a few participants suggested that the users of the tool could provide verbal responses and this would aid those participants who are unable to write.

“That [feedback] should be verbally reported. It saves time instead of having to write the responses. Not everyone can write so it will have saved them the burden of having to write. The caretaker or the mother herself can report.” **[Catherine, Birth companion]**

Usability of tool

The respondents provided feedback on the usability of the tool. Respondents flagged key practical considerations that would impact usability of the tool. Most participants reported that following birth, mothers may need to rest and therefore not feel well enough to use the tool or indeed may forget to use the tool.

“Um...I don’t know whether this point works out but there is a bit of carelessness. Mothers tend to be a bit careless while in the postnatal wards because they are fatigued so they would not want to pay attention to any else thing other than their babies. They could easily tear papers even lose it. There is always that reluctance after birth and sometimes including their newborn, they would not want anything to bother them. They would let attendant take care of their babies. They would just want to rest.” **[Vie, Birth Companion]**

Birth companions were reported as a useful resource to utilise in using the tool as even if the mother is resting or sleeping they could be encouraged to assess the mother and complete the tool as needed.

Additionally, respondents discussed the most appropriate strategy to use to remind mothers to use the tool which included: asking the health care worker to ring a bell or physically remind mothers and their birth companions at regular intervals, provision of timings for assessments on the tool, asking mothers or their birth companions to set timers on their phones/watches.

“You should just set for me the time. I have [high blood] pressure so they set for me the time when I can take my medicine. I take it around 10:00am and then after super, I take more. They set the time for me so they can also set the time for the women.” **[Florance, Birth Companion]**

One birth companion highlighted that with these aids, it would not be difficult for mothers to remember to use the tool as they already do monitor their health for other conditions e.g. diabetes.

Largely respondents flagged the importance of ensuring the tool adopts an approach that could be understandable for mothers who are less educated, illiterate or don't speak the local language. Furthermore, respondents highlighted the importance of ensuring multiple forms of the tool in difference languages that are culturally sensitive to local practices and religious groups.

Several respondents were concerned about the sustainability of the tool, and how it could be ensured that the tool was available in the long term. Several respondents cited concerns that without sufficient resources, health workers may be inclined to withhold providing the tool to all mothers or indeed charge users for the use of the tool. Suggested solutions included ensuring buy in and investment from governmental bodies including the Ministry of Health, as well as its integration into existing initiatives. Examples provided of existing initiatives included the Uganda Patient Passport and Mama Kits.

“They should put that chart in the mama kits so that women get used to knowing about it. Also, they should not sell those charts to women. They should be free.

They should just put them in the Mama kits that they give women before delivery or else they should give the chart during antenatal visits. When a woman comes for antenatal, they should teach them how to use that chart and what it is used for.” [Hadijja, Birth Companion]

Several respondents highlighted that use of the tool could impact the growing overcrowding and bed pressures in facilities. One respondent highlighted that the tool may not be feasible to use as there may be insufficient space within facilities to allow mothers to be monitored as intended. As a potential solution one respondent suggested that those who use the tool in a facility or out of a facility could be determined by the mode of birth. Those who had a vaginal birth could go home and those with caesarean births could remain in the facility. Conversely, several respondents highlighted that this approach could be beneficial in freeing up bed space through allowing early discharge for those who have had a normal vaginal birth.

“You may need money to pay the midwives or health workers who help you do the training and also the local council. So you should prepare that money.

Also do you know that the moment a woman gives birth, she is asked to leave that same day because there are many mothers who come to give birth and the beds are few... So it may be hard for some women to use this thing while in the hospital. So maybe the normal deliveries can go with it at home.” [Tina, Birth companion]

Additionally, another health worker suggested that the tool could be used to determine whether a woman was fit for discharge, and this would also aid staff with bed pressures.

Respondents generally agreed that using the tool could prompt women and birth companions to seek review from a health care worker. The majority of participants suggested this could be done either by the mother herself or her birth companion if she is not strong enough to.

Respondents were agreed that it would be rare for a woman to attend a facility without a birth companion. However, should this be the case, several mothers suggested they would feel comfortable asking mothers and their birth companions from neighbouring beds for help. One respondent suggested that the person who seeks help should be determined by the mode of birth. As for vaginal births, the mother is likely to be more mobile and could ask for help herself. However, for caesarean births this would likely need to be a birth companion who calls for help.

Respondents largely agreed that the mothers and birth companions would feel comfortable and able to seek help as needed to ensure the mother is well. Additionally, birth companions and mothers generally reported that if need be they would be able to find health workers to conduct a health assessment in facilities. In general mothers and birth companions mentioned that health workers were mostly present on the unit or if not physically available, could be contacted easily by telephone.

“I could request my caretaker to help and look for them [the staff]. I would ask caretaker to still look around or if anyone had a phone number of any of the staff members, I would ask for it so you can call them.” [Akol, Mother]

Conversely, some respondents suggested that they would need to wait for a health worker to pass by them before gaining help. A key concern for mothers and birth companions was ensuring health workers respond to their calls for help when issues were identified on the tool. Key reasons cited for why a health worker may not respond included that they may be too busy or that they don't believe the report from the mothers. Respondents were therefore keen for health care workers to be aware of the tool and buy into the tool too.

“Time [firmly]. The doctors and women may be too busy, they may not even use this tool. The woman may be caring about the baby and forget about herself and then the health workers may have so many women to help deliver so it might be hard.” [Brenda, Mother]

Training of tool

The majority of respondents highlighted the importance of providing training and education on use of the tool. Largely respondents were keen for training to be provided to mothers and birth companions alike. The reason provided is that should the mother be resting or not well enough to complete the tool, the birth companion would be able to step in. Furthermore, respondents highlighted that anyone could be a birth companion and as such it would be important that training is provided to the whole community.

“Anyone can be a caretaker of a woman after delivery. It may be a sister, mother or my husband so we should all be trained on the use of the chart and also the benefits.” [Joyce, Mother]

Skilled birth attendants and in particular midwives were identified as the key individuals who should provide the training as respondents highlighted they are more trusted in community than other healthcare workers. As such, mothers would be more likely to believe that the information shared by the health workers is important. Several healthcare workers reported concerns that providing education for the tool could add an additional burden to existing health care workers who are busy and may forget. Several health care workers suggested additional remuneration would be necessary for health workers to provide this additional service.

“You may need money to pay the midwives or health workers who help you do the training also the local council so you should prepare that money.” [Tina, Birth Companion]

Several health care workers highlighted an entry point for the training could be through integrating with existing health care services provided including childhood immunisation schemes. In addition, several respondents highlighted the importance of engaging with community leaders, Village Health Teams (VHT's) and local council leaders who are trusted by their communities and would know their community best and therefore could tailor the training including through using the most appropriate language and nuanced terms to be more purpose fit and effective.

“You can get someone or a group of people to train the chairpersons and VHTs and then these can go to villages and teach them...Those leaders can move door to door teaching everyone how to use the chart after delivery. These leaders know their people better... once you train they can pass on the training to other people. Also... community members believe so much in their leaders so they will do believe anything from their leaders if the intentions are well explained.” [Gracious, Healthcare worker]

Additionally, several respondents highlighted that this training could be integrated with existing community education initiatives and repeated across the year. Participants reported that this approach would allow effective spread of information.

Generally, respondents reported that training should be conducted in person and in a group setting. Reasons highlighted were that this format would save time by providing information to large groups at once. Community education talks and village meetings were repeatedly highlighted as a key space to engage with particularly as respondents highlighted it would enable inclusivity for all community members. Additionally, it would enable mothers and birth companions in community to pass on information especially it those who don't attend antenatal visits.

“It [training] can be group because it saves time and they will pass on the knowledge to those who didn't attend the meetings.” [Brenda, Mother]

Several respondents highlighted the value of engaging with media outlets including radio, TV and social media to provide training as again this would improve inclusivity and coverage of the training. One birth companion suggested going home to home to conduct training would also be invaluable.

Beyond the signs and symptoms of the tool, respondents suggested key information that should be included in the tool. Firstly, several health workers highlighted the need to educate mothers on the importance of the postnatal period. Secondly, respondents highlighted that the training and education should clearly distinguish the role of the mother and birth companion versus the health care worker. Respondents suggested that the objective of the tool is for mothers and birth companions to identify the problem and alert the healthcare worker to manage them.

“[thinking] there is something of this kind from Busitema University where they are trained to measure the pulse rate by themselves, they even tell them about the normal pulse rate... if

they see the abnormal they ask them to seek for medical assistance. I think the chart will help us save time because we don't have the time to keep moving around from mother to mother assessing their health because we are few staffs so when the mother or attendant discovers a problem she can approach the health worker after using the chart...We can tell them that when you use the chart you can then call the health worker for help. That's going to save time that we have been taking on moving around to check if they're fine and or not." **[Edith, Healthcare worker]**

Respondents were clear that for the tool to be successful it is critical for mothers and birth companions to understand how they would alert the health care worker. Two respondents reported it would be important to notify mothers that they don't need to have all the signs and symptoms in order to seek help.

Participants had mixed views on the timing of when education and training should be provided. Largely mothers suggested that training and education should be before birth and specifically within ANC

"It [training] should start during antenatal. They can tell them about the chart and teach them how it will be used. You can also use the media to advertise or inform people about the chart because some people don't attend ANC and may be when they listen to that it will give them the moral to come and attend the ANC visits" **[Clare, Healthcare worker]**

Reasons for this were that lots of mothers do attend their ANC appointment and so providing this information early will ensure strong motivation of mothers to use the tool. ANC was also highlighted as a great opportunity to reach first time mothers who would not have any previous knowledge. It would also provide an opportunity to engage with the mother and those accompanying. There was one birth companion that cited concerns with the number of women using antenatal care, however another birth companion highlighted that even if all mothers do not attend ANC, those that do could disseminate the information.

In contrast, several respondents highlighted that education and training of the tool could be provided following birth. Respondent suggested this approach could ensure training took place with the mother and their birth companion. However, one mother cited the need to wait a few hours before providing the training to ensure the mother is well rested. Interestingly, several respondents suggested that the timing after birth for which the information should be provided should differ between mode of birth. Reasons suggested

were that women who give birth vaginally have a quicker recovery than those who experience a caesarean birth who stay longer in hospital. Caesarean sections were also reported to be more likely to develop serious complications compared to vaginal births. Additionally, complications were reported as more likely to occur soon after vaginal birth compared with after a caesarean birth.

“I had suggested that we can mainly give the chart to only C-section deliverers because they are the ones mostly with complications however if we must give also the vaginal then we can give them the tool and set for them time to use the tool. Four hours for C-section because the drugs will have worn off her body within that time... If they [those with normal births] had complications they would show within a short period of time because they don't use anaesthesia on them. That [anaesthesia] sometimes disturbs the consciousness of the mother so she can't use the tool immediately after delivery.” [Edith, Healthcare worker]

The majority of participants reported that both approaches would be invaluable for training and should be provided repeatedly before and after birth at each health care intervention. Reasons for this were that there was too much information to provide at one time-point and mothers would easily forget or not take the information seriously if only provided once. It also would provide women with the opportunity to think about the information and come back to ask any questions or seek information missed. The mixed training approach may also offset the issue of mothers not attending antenatal care.

“You can train them during antenatal visits. This can go on till the last day of antenatal. When she comes to give birth, let the health worker give it to them after delivery. She can rest then she can be reminded to use it when she feels better.” [Brenda, Mother]

One health worker suggested that the content of information provided should shift depending on the time period where the training is provided e.g. Before birth should be more information about the tool and after birth should be information on how to use the tool. One respondent mentioned it would not be pertinent to repeat the training as could waste time for the mother and they would just call for help as needed.

Discussion

Thirty interviews with mothers, their birth companions and health care workers were undertaken. Overall, they were supportive of the development and implementation of a maternal self-assessment tool for mothers and birth companions to monitor their health in

the immediate postnatal period. In particular, mothers and birth companions mentioned they were keen to have an active role in their care and reported that they were capable to do so. Through the interviews, consensus on importance was achieved on eight signs and symptoms: change in consciousness, seizure, urinary incontinence, shortness of breath, severe pallor, fast heartbeat, suicidal/infanticidal and rigors.

Mothers, birth companions and health workers agreed on the 19 signs and symptoms that were important to be monitored in the immediate postnatal period. However, for over half (nine) of the symptoms, at least one mother reported that they weren't critically important in predicting mortality and morbidity. Furthermore for six symptoms, at least one birth companion reported that they weren't critically important. Key factors determining perceived importance of these signs and symptoms were the participants' prior lived experiences of complications resulting from specific signs and symptoms, whether intensive treatment is required beyond simple observations, and the magnitude of deviation from established norms of post birth physiology. Interestingly, all 19 signs and symptoms were noted to all be critical through the previous expert consensus achieved in Chapters 5 and 6. The mis-match in the findings could suggest difficulties for mothers and birth companions in differentiating normal physiological changes in pregnancy with those that are abnormal. Alternatively, these results could suggest a high rate of existing morbidity in the community. Either way, the findings highlight a gap in health literacy on iPNC that needs to be filled. The lack of health literacy in iPNC in Uganda aligns with existing work on antenatal danger signs. In one study of mothers admitted to Mulago Hospital, Uganda with antenatal complications, only one in three women were able to mention at least three of the five key danger signs requiring medical input.²³⁴ The consequences of lack of knowledge may be dire. A confidential enquiry into neonatal deaths in Uganda highlighted that the most common issue impacting preventable deaths was the failure of birth attendants or parents to recognise and act on symptoms or signs suggestive of serious illness.²³⁵ There is therefore a critical need for improvement in health literacy around iPNC

Participants in this study were supportive and accepting of the use of a self-care strategy to assess their postnatal health and most reported feeling mostly capable of doing so. They also reported wider health system benefits of this task-shifting in reducing the growing workload and burden on the insufficient health-care workers in resource-stretched settings. Emerging

evidence across the reproductive continuum has shown how critical and effective self-care strategies can be.^{236,237} When women are empowered to adopt healthy self-care practices, they can play a critical role in protecting their own health and preventing disease. Self-care interventions promote individuals' active participation in their own healthcare and are a push towards greater self-determination, self-efficacy, autonomy and engagement in health. Additionally, although it should not be a substitute to quality health care, it provides the opportunity to provide continuity of services in the face of emergencies including the Covid-19 pandemic and humanitarian crises.²³⁶ Within the post-natal period, existing self-care strategies have been found to be successful. A systematic review found that the task-shifting of third stage management to the woman herself was successful in reducing PPH rates. Moreover, 80-99.7% of women found managing their own third stage to be acceptable and would recommend it to other friends and family.⁹³ Furthermore, WHO have released specific guidelines on self-care strategies and highlight that recognising mothers as active agents to protect their own health and wellbeing provides an innovative and equitable way to strengthen coverage, usage and quality of key reproductive health services.⁸⁷ It is surprising therefore that few interventions within the guidelines focus on the postnatal period.

The data from this study provides unique experiential data from community members highlighting their acceptability of self-care for the postnatal period. A novel and striking feature of utilising a self-care strategy was its value in levelling a perceived power imbalance between health workers and communities. Several mothers expressed concerns that in practice their calls for help were not taken seriously, ignored or worse they could be reprimanded. Mothers reported that this left them fearful to approach health care providers for care. These concerns of powerlessness are well documented in the literature in Uganda and of great concern with respect to provision of respectful care.⁴³ Participants believed that one of the key benefits of adopting a self-assessment approach was that it provided mothers with the validation and confidence they needed that their requests of health workers were important, and this would encourage health workers to respond. In the long run mothers reported that this would help them feel safe in their care too.

This study highlighted the importance of ensuring that strategies are inclusive and equitable. There were several examples of approaches suggested to increase inclusivity, included creating the tool in multiple languages outside English, ensuring the tool was free of cost,

ensuring content could be understood by illiterate women through the use of pictures and audios, and ensuring that the tool would be quick and easy to do by creating simple binary tick box responses and adopting a paper format. Approaches that are inclusive and equitable have the power to increase utilisation and coverage of care. The literature supports this assertion with one study across four trial sites in India, Nepal, Bangladesh, and Malawi found that approaches to pregnancy that were inclusive and equitable improved health behaviours across socioeconomic strata in rural communities, around issues for which there was a knowledge deficit.²³⁸ There is therefore a broader need for contextualised approaches that are locally led and meaningful to respondents.

This study data highlighted the need to engage with different sectors and stakeholder groups in order to effectively implement the self-care approach. Participants generally highlighted the value of involving healthcare workers in this approach. First, healthcare workers were noted to be most cynical about the mothers' and birth companions' ability to self-assess their care. Yet, in comparison, mothers and birth companions reported feeling confident and capable to do so. This could reflect pragmatism from the health care workers in comparison to optimism from mothers and birth companions whereby health workers have lived experience of the complications understanding the difficulties in being able to assess these signs and symptoms accurately in comparison to the mothers who would be assessing the experience hypothetically. Conversely, as several respondents mentioned, it could more speak to fears from health care workers of losing their skills and responsibilities, by task-shifting away the role. Second, health care workers are mostly trusted by communities and could provide the necessary reassurance and support needed to mitigate any concerns had with the tool. For both examples, it is critical that healthcare workers are engaged in the work. Participants also cited the value of having communities including birth companions to be involved in this approach. Community leaders including VHT's have the unique value of being able to provide training and education that is trusted and accessible to the mothers. Furthermore, participants suggested that community networks were an invaluable entry point for the quick and easy spread of information that would increase usage of the tool. It is therefore critical that community members are engaged in the approach. Third, participants readily valued governmental institutions like the Ministry of Health as critical bodies to engage with to ensure the sustainability of the tool through integration with existing health

care initiatives and embedding the tool in their health programming. Finally, participants highlighted that the media had a unique role to provide training and education. Innovative approaches were suggested - for example the use of TV and radio to broadcast information about the tool. These findings highlight a critical need to move beyond vertical programming and harness the expertise and of stakeholders across sectors. These findings align with the MANIFEST study in Eastern Uganda which found that multiple strategies targeting women are needed to promote behaviour change for improved utilization of maternal and newborn services and care practices.^{239 240} It is clear that for true implementation of the tool a whole of system and multi-sectoral approach working in partnership is critical for success and sustainability of any initiative.

Mode of birth was repeatedly cited as a key factor affecting the implementation of the tool. The key reasons cited were that the mode of birth would affect the mothers' mobility influencing their ability to seek care, different modes of birth would have different lengths of recovery, the severity of symptoms could vary, and that the risk profile for complications was different. These findings link into work conducted in Chapter 3 which identified that a mothers' mode of birth was a key determinant for coverage of care. These reasons align with a recent global systematic review on women's preferences of mode of birth. Those mothers who preferred vaginal births highlighted their fears of caesarean section as it was associated with maternal and neonatal complications.²⁴¹ Given the reasons cited in this study, respondents suggested it would be prudent for training programmes and tools such as the post-natal tool to be tailored to mode of birth as the needs of the mothers may differ. Conversely, this may lend unwanted weight to the supposition that mothers are not at risk of complications if they have a vaginal birth compared to caesarean section and give rise to a lack of attention during this period.

Privacy, confidentiality and trust were also identified as important to mothers and birth companions. Participants identified that lack of trust in the tool would reduce usage of the tool. Moreover, if the tool contained key features to build trust then mothers would be more inclined to use the tool. Several trust-building approaches were suggested and included utilising the health care worker to provide the training for use of the tool as well as instilling mechanisms to keep the mothers information shared in the tool confidential and communicating this to the mothers. These findings align with those highlighted in a Cochrane

review of factors that influence the provision of intrapartum and postnatal care by skilled birth attendants in low- and middle-income countries.²⁴² The review found the presence of trust between mothers and health care provider could influence a mother's willingness to be referred if needed and moreover referral could be delayed when facilities lacked trusted health workers.²⁴² It is of great importance that the implementation of tool is cognisant of the users need for privacy and trust and builds this in to the training package and information provided.

Strengths

There were several strengths to this work. First, a broad, multi-cadre inclusion criteria was established to ensure that the critical opinions was sought of all potential users, including both mothers and their birth companions. In addition, interviews were also conducted with health care providers who are involved in the health care of mothers during their facility stay. Careful consideration was taken to ensure that viewpoints from both primary providers and allied health care workers were included too. Second, an expansive interview guide was developed that allowed a comprehensive and detailed exploration into the participants viewpoints on the content, acceptability, presentation of the tool as well as usability and training necessary to implement the tool effectively. This provided sufficient data to be able to create a draft tool that is context specific to its users. Third, the interview guide was established *a priori* with review and input from the core multi-speciality supervisory research team to mitigate against researcher bias.

Limitations

First, one key limitation is that the interviews were conducted within a single health care setting in Mbale. To try and increase depth and transferability it would have been beneficial to conduct the interviews on several sites including in community settings. Nevertheless, MRRH serves a broad rural wider community including tribal members able to provide diverse perspectives. As such, it was thought that this would provide a broad, diverse population base for the interviews. Second, an equal spread of participants across all demographics was not achieved. However, given the multi-cadre participants and need to generate diversity, there was an intention to ensure no strict parameters were provided. Third, although it would have been impossible to re-share transcripts with the mothers and birth companions, perhaps this could have been done with the health care workers who would remain working in MRRH.

Despite this, at the end of the interview, the research assistant provided a summary of the reflections to the participants to member-check that conclusions drawn were consistent and aligned with the participants true thoughts. Fourth, not all transcripts were fully completed and there was missing data for some transcripts on participants view-points on the content of the tool. Nevertheless, data saturation was achieved and at least five complete transcripts from each cadre (women, birth companion, skilled birth attendant, other health worker) were achieved. The rationale to not exclude the analysis completely was that whilst these participants may not have provided their viewpoints on content, they did provide responses to the other dimensions including acceptability, presentation, usability and training. Therefore, it was imperative to be inclusive and ensure their viewpoints were reflected in the analysis.

Conclusion

There is a critical need for improved knowledge and care in the immediate postnatal period. Thirty interviews with mothers, their birth companions and health care workers in Mbale, Uganda were undertaken to create a draft ImPoWA tool which is culturally and setting-specific for Ugandan women in the postnatal period. This study highlights that a postnatal self-care strategy is acceptable to health care users and providers in Mbale Uganda. Several themes were identified to explain the value of the tool including improving community health literacy, relieving growing health system pressures and in levelling a perceived power imbalance between health workers and communities. Moreover, mothers and their birth companions reported being confident and able to employ this strategy to better their health. Additional findings provide insights to refine the number, phrasing and format of key signs and symptoms in the tool to be most applicable to the setting. Finally, viewpoints have been sought on how best the tool can be utilised into clinical practice. Several themes were presented and included adopting a multisectoral and multi-stakeholder approach, focussing on ensuring equity and inclusivity, community engagement and maintaining privacy and confidentiality. These viewpoints are critical to ensure the draft ImPoWA tool creates is context specific to the mothers and birth companions in Mbale, Uganda.

Chapter 8- Evaluating the Immediate Postnatal Women's Assessment (ImPoWA) tool

Purpose of the chapter

It is important to ensure that the ImPoWA tool created is context specific to the mothers and their families in Uganda. In the previous chapter, qualitative interviews were undertaken with mothers, their birth companions, skilled and other healthcare workers to explore their views on the acceptability, content, presentation, usability and training of implementing the post-natal self-assessment tool.

The data were then reviewed and utilised by the expert steering committee to create a draft tool.

A quantitative survey was then conducted with mothers and birth companions to pre-test the draft ImPoWA tool and assess the understanding and acceptability of the content, usability, presentation, logistics, and training of the draft tool with mothers and birth companions. The methods and results of the expert steering committee and quantitative work has been described in this chapter. The final developed tool is then presented.

Objectives

The overall objective is to evaluate the understanding of the content of the ImPoWA tool and assess the presentation, usability and training of the tool for mothers and birth companions in the postnatal period in Uganda.

The sub-objectives were:

- To assess the mothers and birth companions understanding of the content of the tool
- To assess the acceptability, content and presentation of the iPNC by mothers and their birth companions
- To evaluate the usability of the tool by mothers and their birth companions
- To evaluate the training provided to use the ImPoWA tool.

Process of Methods

An iterative step-wise approach was undertaken to systematically garner feedback and develop the final tool to be truly context specific to the Ugandan mothers and their birth companions (Table 22). Viewpoints on the of the overall acceptability, content, presentation, usability, and training to use the tool were initially sought and collated from women, their birth companions and skilled birth attendants and other health workers (Chapter 7). These findings were reviewed by the expert committee in order to develop a draft tool.

The draft tool was then pre-tested quantitatively. The face validity of the tool was assessed to determine whether the tool and items appears to be measuring what they are intending to. As such this component was assessing true understanding of the content of the tool by the mothers and birth companions. Further evaluations were then undertaken to assess the overall acceptability of the tool, the acceptability of the content and presentation of the tool as well as the usability and training provided to use the draft tool.

Following analysis of the responses from the quantitative pre-test survey, further revisions to the tool could be made to ensure it was context specific. These revisions were also reviewed with an existing local patient-participant involvement (PPI) group in Mbale. The ImPoWA tool was then finalised.

Table 22: Outline of process for establishing final tool

Step	Aims	Participants	Methods
1	Collate and synthesize viewpoints on the overall acceptability, content, presentation, usability and training of the ImPoWA tool to ensure that it is culturally and setting-specific for mothers and their birth companions in the immediate postnatal period in Uganda.	Women, birth companions, skilled birth attendants and other health workers	Qualitative Interviews (undertaken in Chapter 7)
2	Review findings from qualitative analysis to develop draft ImPoWA tool	Expert Committee	Group Discussion
3	Assessing the draft tool for true understanding and evaluating the acceptability, presentation, content, usability and training to use the tool.	Women, birth companions,	Quantitative Survey
4	Review amendments to signs and symptoms not meeting true understanding with PPI group to develop final ImPoWA tool.	PPI group	Group Discussion

Step 2- Expert Committee Review

Participants

The existing expert committee consisted of nine members as introduced in Chapter 2. They comprised of multi-disciplinary experts with extensive technical knowledge and ability on immediate postnatal care or working experience in immediate postnatal care In Uganda. Following their review, they were able to advise on the development of the final draft tool to be assessed.

Methods

An expert committee meeting was convened where a summary of the results from the qualitative interviews was presented for consideration. Results were arranged into the following categories and shared with the expert committee ahead of the meeting:

- Acceptability of tool
- Content of tool
- Presentation of tool
- Usability of the tool
- Training of tool

During the meeting the expert committee were asked to provide suggestions on how the findings should be incorporated into the tool.

The agenda for the meeting was arranged to allow a full discussion on each results category. A group discussion format was utilised as it allowed collective and collaborative thought, where ideas could be bounced off each other, in a safe space.

Results

The following recommendations were advised by the expert committee:

Acceptability of tool

- Given the support for the development of the tool by the mothers and their birth companions, it would be important to continue with the development.
- Time should be taken to explain the importance of using the tool in order to ensure buy in by mothers and their birth companion.

Content of the tool

- To rename the following signs and symptoms using the alternate phrasing suggested during the qualitative interviews that would be more commonly understood by the local community in Uganda, but still retain the initial meaning:
 - Rename “change in consciousness” with “collapse”
 - Rename “seizure” with “convulsions”
 - Rename “fever” with “high temperature”
 - Rename “persistent visual disturbance” with “blurring of vision”
 - Rename “urinary incontinence” with “leakage of urine”
 - Rename “shortness of breath” with “difficulty in breathing”
 - Rename “fast heart beat” with “palpitations”
 - Rename “suicidal/infanticidal” with “harm to herself or baby”
 - Rename “rejection of baby” with “refusal of baby”
 - Rename “unable to urinate easily” with “difficulty passing urine”
- To reduce the total number of signs and symptoms from 19 symptoms to 16 symptoms to make the tool user-friendly. The following revisions were suggested with the reasons specified:
 - Remove “soft flabby uterus” as reported as non-specific and difficult for the mother to assess
 - Merge with “syncope/dizziness” with “collapse” as both symptoms are part of the same condition process and as such difficult for the mother or birth companion to differentiate and term this “collapse”
 - Merge “rigors” and “convulsions” together as it would be difficult for the mother or birth companion to differentiate and term this “convulsions”

Presentation of the tool

- Multiple modalities should be utilised to present the signs and symptoms in the tool. Modalities should include audio, pictorial and the written word. This would thereby appeal to the differing education levels of the women and birth companions in Mbale, Uganda.
- The printed content of the tool should be paper based with the name and picture of the sign and symptom displayed side by side.

- Copies of the tool with the written name and audio description of the sign and symptoms should be translated into the 3 local languages (Ateso, Lumasaba, Lugwere) to ensure inclusivity of the tool
- Graphics used for the pictures in the tool should be context specific to the women in Mbale, Uganda for example with regard to their dress, physical appearance and environment.
- Language used in the script for the audio description and title of the signs and symptoms in the tool could be extracted from the data gained during the qualitative interviews.
- Audio recordings of the script should be conducted in the local dialect.

Logistics of tool

- The tool should be free of cost.
- For ease, tick and cross boxes should be employed to aid participants in filling out the tool.
- The tool should aim to be employed for all mothers giving birth regardless of mode of birth.

Training of tool

- On distribution of the tool to participants, the researcher should provide a brief training of the tool. The training was suggested to be brief to be conscious of the mother's time during the postnatal period and to minimise any disruption to normal care. The suggested important points to include within the training were:
 - The benefit of the tool
 - How to use the tool
 - The importance for mothers to seek help from a health care worker if they notice any of the signs or symptoms
- The researcher providing the training should ideally employ the mother's primary language to foster rapport and enable understanding.

Incorporating the advice provided by the expert committee, the research team worked with a UK based graphic designer to create a draft tool of 16 signs and symptoms (Appendix 1.5).

The aim had been to recruit a local graphic designer in Mbale, however with Covid-19 restrictions this was difficult to achieve. A designer in the UK was therefore sourced whom the research team were familiar with having worked on previous projects for the host research unit. The zero-draft tool was then shared with the expert committee over email for their feedback and approval

Step 3 - Quantitative pre-test survey

The created draft tool was then pre-tested quantitatively using a survey format with mothers and birth companions. The aim was to assess the face validity and understanding of the content of the tool. The survey also evaluated the acceptability of the presentation and content of the tool as well as the usability and training for using the tool. This process acted as a litmus test to ensure the tool is truly context specific.

Eligibility Criteria

Postnatal women and their birth companions were asked to participate in the pre-test survey as these would be the target population who would use the tool.

Women were asked to participate if they:

- Had birthed at Mbale regional referral hospital within the last 5 days; and
- Were 18 years old or older (or an emancipated minor); and
- Had the ability to provide informed consent.

Birth companions and companions were asked to participate if they have remained as the primary birth companion for the first 24 hours following birth of baby. A birth companion may include a spouse, family member or friend.

As the pre-test survey aimed to confirm the findings synthesised through the qualitative interviews, careful attention was taken to ensure that the pre-test survey population was a different population to those participants involved in the qualitative interviews.

Sampling and selection of participants

There is a lack of guidance available surrounding pre-test survey sample sizes. Having too small a sample size will miss common problems. Perneger et al in 2015 suggested that a sample size of 30 for each group of participants in pre-tests would result in an 80% power to

detect a problem that occurs in 5% of the population and to detect a repeat occurrence of a problem that affects 10% of the respondents.²⁴³ As such it suggested that 30 participants are a reasonable default value or starting point for pre-tests of questionnaires. This view was shared by Sheatsley and Sudman in the Handbook of Survey Research.²⁴⁴ It was therefore determined that a sample of 30 postnatal mothers and 30 birth companions would be sufficient

To ensure a diverse representation within the sample, a pre-specified sample was pre-determined using purposive criterion sampling. This method is commonly used in implementation research where in depth follow up of quantitative testing can take place in a specified population group who would have knowledge or experience of the phenomenon of interest.¹³⁹ Reflecting on the findings from Chapter 3 and 4, cultural background, education background, and mode of birth were identified as key factors associated with provision of postnatal care. Thus, a pre-specified sample with equal spread for these characteristics was established from which purposive criterion sampling could be undertaken (Table 22). Language was thought to be the most appropriate proxy for cultural background given the interlinkages.

Table 23: Desired sample of participants for assessment of draft ImPoWA tool

	Cultural background	Education background	Mode of birth
Mothers	<ul style="list-style-type: none"> • 10 Lumasaba • 10 Lugwere • 10 Ateso or other 	<ul style="list-style-type: none"> • 15 unable to read/write • 15 some form of education 	<ul style="list-style-type: none"> • 15 Vaginal Birth • 15 Caesarean Birth
Birth companions	<ul style="list-style-type: none"> • 10 Lumasaba • 10 Lugwere • 10 Ateso or other 	<ul style="list-style-type: none"> • 15 unable to read/write • 15 some form of education 	<ul style="list-style-type: none"> • 15 Vaginal Birth • 15 Caesarean Birth

All 60 participants who were approached did consent to participating in the survey. No participants declined.

Informed consent

The pre-test surveys were conducted by a female research assistant (VM) based in Mbale, Uganda. VM is fluent in English and the three local languages in Mbale, Uganda which were

Ateso, Lumasaba and Lugwere. As such the pre-tests could be conducted in any of the four languages, as per the participants request.

VM liaised with the head midwives on the labour ward and postnatal ward at Mbale Regional Referral Hospital (MRRH), who were best placed to identify and alert the research assistant to eligible mothers and their birth companions. Following identification of eligible participants, the research assistant approached potential participants and provided each participant with an information leaflet and an explanation of the study. Copies of the participant information sheet and consent form were available in English and were translated into the three local languages in Mbale (Ateso, Lugwere, Lumasaba). The local languages were identified by the local research team and are in line with existing studies conducted in Mbale, Uganda.¹⁴⁵¹⁴⁶ Participants were allowed as much time as they needed to decide if they wanted to participate in the study before discharge.

All participants that were approached agreed to participate in the study. Written informed consent was obtained from participants who were keen to participate in the study. If the participant was unable to sign the consent form, they were offered the opportunity to place a finger/thumb print on the form to indicate their consent.

All participants were provided with 10,000 UGX (approximately £2) to reimburse them for their time spent in the study.

Data Collection

A total of 60 surveys were conducted by a research assistant (VM) based in Mbale, Uganda in English or any of the three local languages in Mbale, Uganda which were Ateso, Lumasaba and Lugwere. The research assistant was fluent in all three languages. The study method of a survey was selected as it is a quick and efficient mechanism to source large quantity of data from a large population.²⁴⁵ No other research method has the capacity to provide this broad capability.

The surveys were conducted over a space of two months between 1st December 2021 and 31st January 2022 in an environment which was agreeable to the participant. For the participants ease and to prevent unnecessary extra travel in view of Covid-19 pandemic, interviews were conducted whilst the woman and birth companions were still in Mbale Regional Referral Hospital. Surveys were conducted in the post-natal ward in an appropriate

space within the hospital. Spaces used included a private clinic office and a side room off the main ward. The research assistant (VM) ensured the space was private, safe, comfortable and acceptable to the participant. Only the researcher and participant were present. Depending on the participants request, companions were permitted during the interview, however VM highlighted that responses included in the analysis would only be taken from the main participant surveyed.

Survey data were collected individually from participants. A pre-developed survey based on the draft tool was developed a priori and reviewed by members of the core multi-speciality supervisory research team. The surveys were conducted by VM and were one-one-one with the participant, unless participants requested for a relation to be with them. Responses from the participants were hand-written verbatim on paper.

An initial pilot of three surveys were conducted with women, to ensure that the survey questions were simple and easy to follow with revisions to phrasing made as necessary. The survey questions were direct but allowed the opportunity for participants to add/explain their responses further. These were noted down verbatim by the research assistant during the survey.

At the beginning of each survey participants provided their background demographics verbally which was recorded by the researcher on the case report form.

Participants were initially asked to look only at the pictures in the tool and to describe the meaning of the pictures of each of the 16 signs and symptoms to the researcher. The researcher recorded these responses verbatim.

Participants were then asked to use the full tool to assess their current health. The researcher observed the participant using the tool and made note of how the participants used the tool and any problems that the participants appeared to be experiencing. The researcher summarised these reflections in handwritten notes.

Having used all three components of the tool (audio, written word and pictorial) the participants were then asked to rephrase each of the 16 signs and symptoms in their own words. The researcher recorded these responses verbatim.

Finally, the participants were asked to provide their overall feedback on the tool. Questions asked were direct, structured closed ended questions as noted in the case report form

(Appendix 1.6). There were additional probes used to elaborate on answers given. Participants were encouraged to write notes or suggestions on the chart itself. Closed questions were used as a large range of potential responses to the questions were not anticipated and this would minimise the potential of non-response and could discourage inappropriate responses.²⁴⁶ The researcher was also asked to provide their feedback on their experiences with providing the tool and their observations of the participant utilising the tool. The researcher summarised these reflections in handwritten notes, and specific quotes were written verbatim as appropriate.

Data Management

Data management followed pre-used established methods.¹⁵¹ Study data was anonymised on the case report forms and only identified by the participants study number. Anonymised numerical data from these case report forms was entered into a password protected MS Excel Document in Uganda. Anonymised hand-written non-numerical, verbal responses and field notes from these case report forms was entered into a password protected MS Word Document at the earliest opportunity in Uganda by VM. All personal details (name, address, date of birth) were removed and did not appear in the MS Excel document or MS Word document. The anonymised MS Excel document or MS Word document was securely saved and stored to the Liverpool Active Data Store. Files in this data store could be accessed remotely by the lead researcher in UK using DataAnywhere which is a secure platform enabling secure transfer of password protected digital files from the Liverpool Active Data Store. This enabled TD to access the documents and conduct data analysis whilst the data remained in the University of Liverpool's data secure environment.

Data Analysis

Content analysis was undertaken for the participants responses in section one and three of the survey. The responses were written verbatim and later coded into one of four categories as defined from pre-existing literature, from which quantitative analysis could occur.^{111,247}

- fully correct
- generally correct (no more than one part altered or omitted)
- partially wrong (but person understood the intent)
- completely wrong

Rephrasing is a strategy first suggested by Nuckols in 1953 as a way to assess understanding and meaning of questions by participants.²⁴⁸ Over time this strategy has been refined further and found to be a useful way of truly assessing an understanding of the presented questions.²⁴⁷ One key criticism of the strategy is that responses do remain subjective. To overcome this limitation, the responses were independently graded by two researchers: lead researcher Teesta Dey (TD) and a final year medical student Jemima Kelleher (JK) who had an interest in maternal health. Scores were reviewed and discussed to form consensus and where discrepancies occurred, additional input was taken from a third researcher (ADW). This aimed to increase the validity of responses provided.

Furthermore, the ImPoWA tool adopted a multi-modal approach, and so it was decided to assess the participants understanding of the pictures separately to the overall tool. The findings from this analysis enabled the researcher team to assess face validity of the tool. There is no established threshold in the literature to determine true understanding. The decision for the threshold was discussed and agreed on by the research team a priori. For a sign or symptom to be deemed fully understood, 90% of participants needed to have scored “fully correct” in their understanding of the sign/symptom.

Section two of the survey involved a synthesis of observations and notes made by the researcher and grouped inductively according to the key thematic areas in tool development:

- Content of the tool
- Acceptability of the tool
- Presentation of the tool
- Usability in employing the tool
- Training of the tool

In section four of the survey, individual questions were analysed using descriptive statistics. Specific questions within the survey was used to provide feedback on each of the key thematic areas as outlined in Table 24.

Table 24: Overview of survey questions relating to thematic areas

Thematic Area	Debrief Question
Content of tool	D01, D05
Acceptability of the tool	D06, D08
Presentation of the tool	D02
Usability in employing the tool	D04, RO1
Training of the tool	D03

Additionally, any non-categorical verbal responses were collated, synthesised and grouped inductively according to the key thematic areas as described above.

Results

Background Demographics

At the start of the survey, participants were asked a series of closed questions to identify their background demographics (Table 25).

Table 25: Demographics of survey respondents

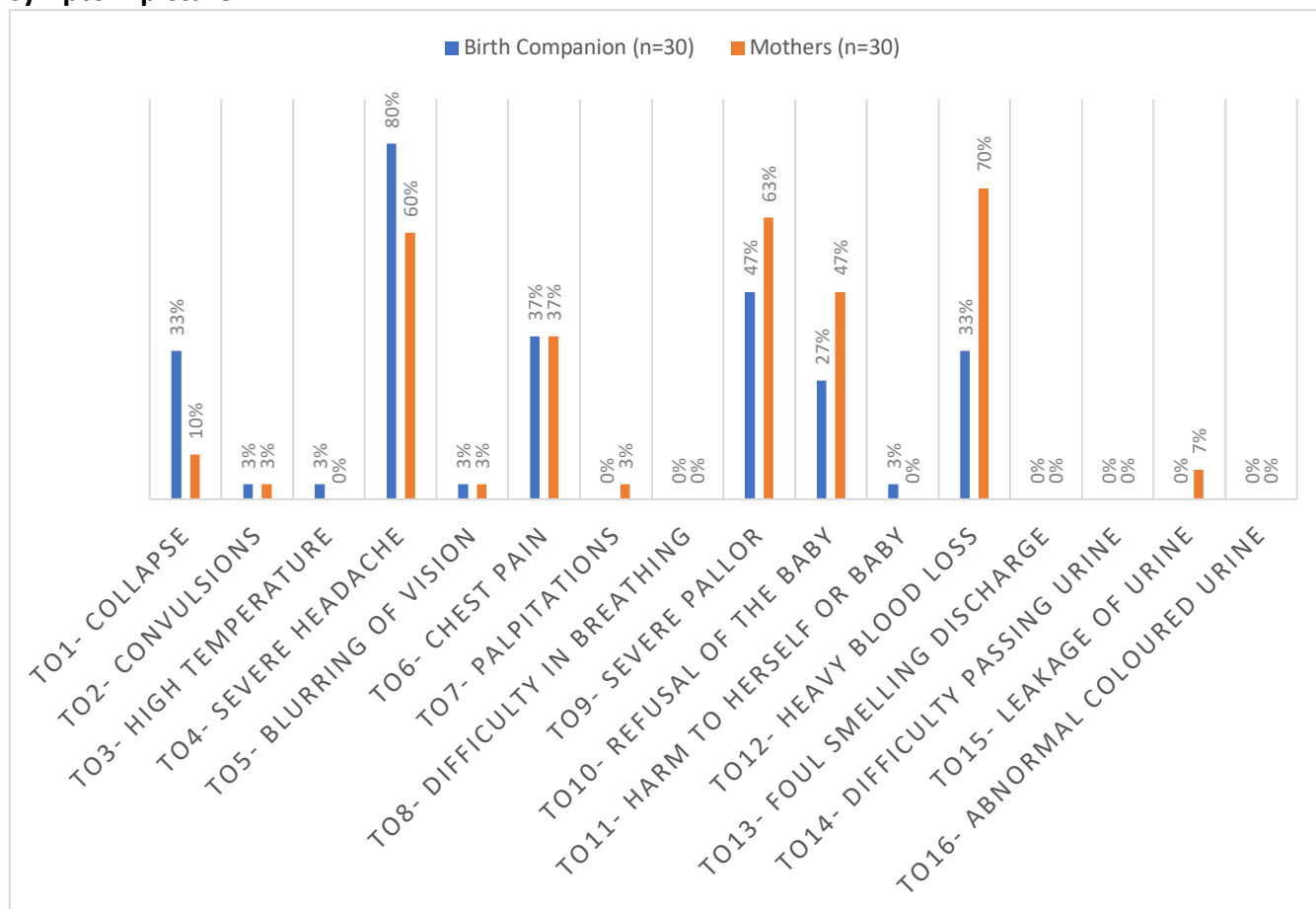
		Birth companions (n=30)	Mothers (n=30)
Gender	Male	3%	0%
	Female	97%	100%
Residence	Urban	23%	60%
	Rural	77%	40%
Parity*	Nulliparous	27%	30%
	Parous	73%	70%
Marital Status	Single	3%	7%
	Married	97%	93%
Religion	Protestant	60%	37%
	Muslim	20%	30%
	Catholic	13%	13%
	Other Christian	7%	20%
Primary Language	Lumasaba	27%	30%
	Lugwere	43%	30%
	Other	30%	40%
Education Level	Unable to read or write	57%	60%
	Some education	43%	40%
Job	Professional	3%	7%
	Business	3%	7%
	Office	0%	3%
	Labouring	3%	0%
	Farm labourer	3%	0%
	Farming-home Garden	57%	50%
	Housewife	0%	13%
	Unemployed	7%	10%
	Other	24%	10%
Bank account	Yes	13%	20%
	No	87%	80%
Health Insurance	Yes	3%	0%
	No	97%	100%
Exposure to mass media	Yes	70%	67%
	No	30%	33%
Mobile phone	Yes	50%	57%
	No	50%	43%
Mode of birth*	Vaginal	50%	53%
	Caesarean	50%	47%

*For birth companion participants, these demographics related to the woman they were accompanying.

Face validity

When shown just the pictures of the tool, no symptoms met the threshold of 90% of true understanding of the tool by either mothers or birth companions (Figure 17).

Figure 17: The percentage of respondents fully correctly understanding each sign and symptom picture

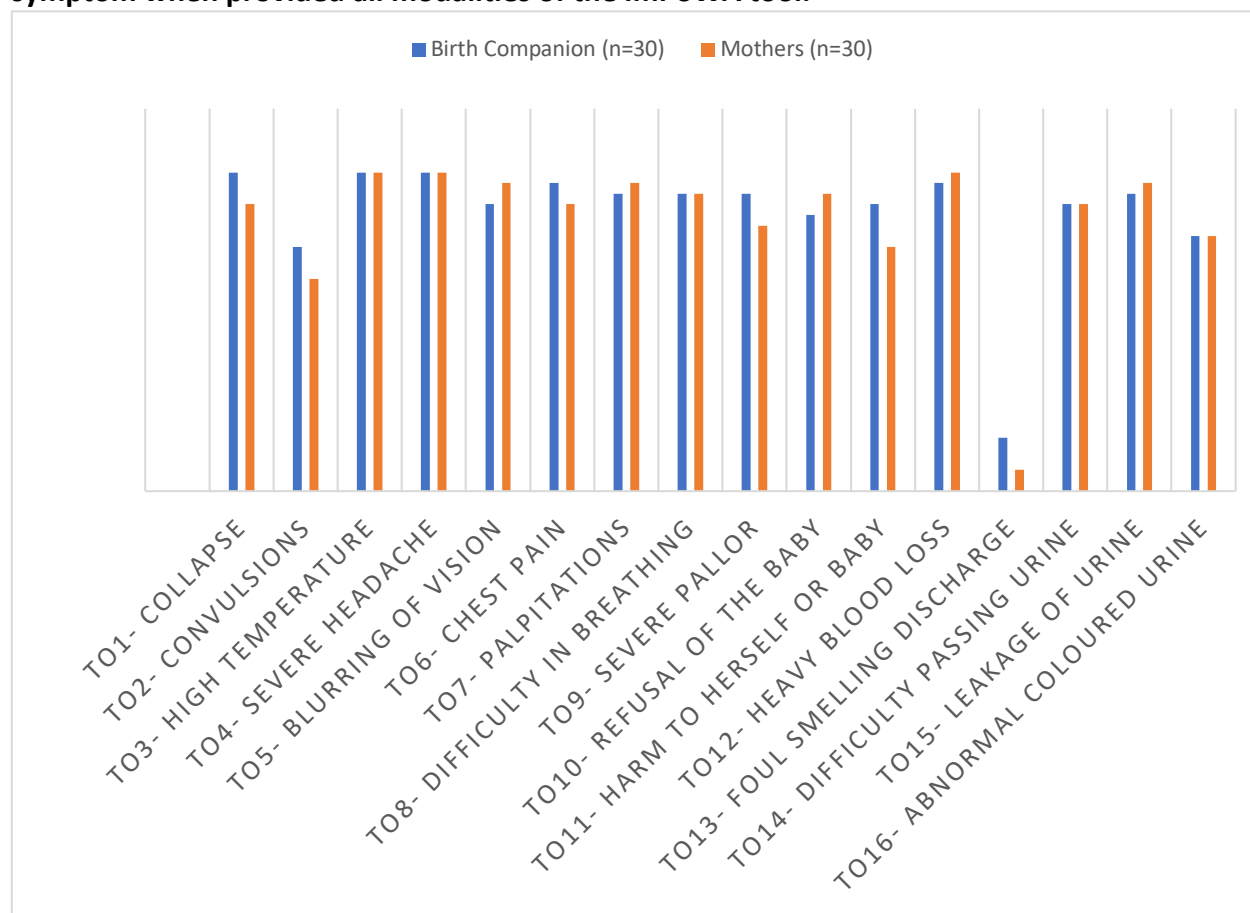


However, when all three versions of the tool were presented to mothers and birth companions, 12/16 symptoms met the threshold of 90% of true understanding (Figure 18).

The four symptoms that did not meet the threshold of true understanding were convulsions, harm to herself or baby, foul smelling discharge and abnormal coloured urine.

For birth companions, across all categories the increase in understanding ranged between 17-97% (severe headache-high temperature, palpitations) with a median of 84%. For mothers, across all categories the increase in understanding ranged between 7-100% (foul smelling discharge – high temperature, blurring of vision) with a median of 75%.

Figure 18: The percentage of respondents fully correctly understanding each sign and symptom when provided all modalities of the ImPoWA tool.



Overall feedback

Following use of the full tool, quantitative survey feedback was garnered on the content, acceptability, presentation, logistics and usability and training for the tool. Additionally, VM administering the tool was also asked to provide their feedback too (Table 26). When completing the survey, VM noted down any additional comments or reflections that participants had to add depth to the quantitative responses provided.

Table 26: Summary of survey feedback on tool

		Birth companions (n=30)	Mothers (n=30)
D01 "How well does the tool assess your health in the immediate postnatal period?"	Extremely Suitable	93%	83%
	Suitable	3%	17%
	Unsuitable	0%	0%
	Very Unsuitable	0%	0%
	Irrelevant	0%	0%
	NA	3%	0%
D02 "Did the tool look acceptable to you?"	Yes	100%	93%
	No	0%	7%
D03 "Was the information on how to use the questionnaire clear and easy to understand?"	Yes	90%	93%
	No	10%	7%
D04 " Was the tool itself easy to use?"	Yes	80%	83%
	No	20%	17%
D05 "Were there any words/ phrases that were not clear to you in the questions?"	Yes	47%	23%
	No	53%	77%
D06 "Were you comfortable answering these questions?"	Yes	80%	93%
	No	20%	7%
D07 "Do you have any further suggestions of how to make the tool useful for use for mothers and birth companions following birth of baby?"	Yes	7%	13%
	No	93%	87%
D08 "Overall, if this was amended as suggested, do you think that we should continue to develop this tool?"	Yes	100%	100%
	No	0%	0%
R01 "Were there any problems you identified in explanation of how to use the tool"	Yes	0%	0%
	No	100%	100%

Content of tool

During the survey, 97% of birth companions and 100% of mothers noted that the tool suitably assessed their health in the immediate postnatal period. Generally, participants reported they had found the tool a suitable assessment as the content of the tool was comprehensive and covered the key signs and symptoms that mothers experience during the postnatal period. Furthermore, participants reflected that they experienced or had witnessed many of the signs and symptoms mentioned. One mother suggested a further focus on the wider determinants of health could be important including hygiene and diet.

When asked to reflect on the clarity of the words or phrases used in the tool, 47% of birth companions and 23% of mothers reported that certain words/phrases were not clear and

would need refinement. Suggested revisions included simplifying words and phrasing to ensure better understanding especially for those illiterate as well as adding additional explanatory phrases to enhance the understanding of the audio descriptions in the tool. Participants were supportive of the use of local dialects and words within the tool that was specific to Uganda. Some participants also reflected that picture revisions were more critical than language revisions.

Acceptability of tool

A total of 80% of birth companions and 93% of mothers reported that they were comfortable answering or conducting the questions. Participants were confident that the tool was not harmful and reported not being scared to use it. However, one participant reported concerns that the tool could be inconvenient and prevent them from going home as quickly as possible.

During the feedback, 100% of birth companions and mothers mentioned that the tool should continue to be developed for use. Reasons for this included that it is beneficial for the health and wellbeing of mothers as it focusses on the period immediately after birth where complications are more likely to occur and could act to pre-empt sickness for mothers to receive the care and attention they would need.

Participants reflected that the tool was educational and informative and many reported learning new signs and symptoms that they were not aware of. Participants went on to reflect that through this additional knowledge, mothers and their companions were empowered to know what they were suffering from and have an active role in their care.

Participants also described that the tool would have benefits for the health workers too through relieving a pressure on them. Through use of the tool, participants noted that they were comfortable to use the tool independently and then seek help from a healthcare practitioner if need be. However, 2 respondents were concerned that even if they knew to seek help from the health workers, that someone wouldn't come

Some participants reported that it could be cost-saving and recommended for the tool to remain free. One birth companion suggested the need to create a tool for child health too. One mother wondered if the tool would be better employed for certain mothers e.g. for sicker mothers.

Presentation of tool

All birth companions and 93% of mothers found the presentation of the tool to be acceptable. Generally, participants were supportive for the tool to be on one sheet of paper for easy application and use. Participants were nervous of digital approaches.

The participants were supportive of the multi-language approach that adopted the key local languages in order to ensure inclusivity. Participants supported the use of the trimodal approach to the tool. The audio clips were generally reported as the most useful. Some participants reported that the audio clips helped to offset any difficulties they had with reading the names of the signs and symptoms and interpreting the pictures. The pictures were seen as the least relevant with some reporting them as funny.

One participant however did report the mixed modality as being quite cumbersome and therefore not as engaging to use.

Usability of tool

Eight percent of birth companions and 83% of mothers found the tool easy to use and the research assistant did not notice any issues in rolling out the tool.

The tool was reported as easy and quick to use and the tick boxes for responses were particularly highlighted as effective especially for those who were illiterate. Despite there being a box available, mothers and birth companions often elected to freely write their “tick or cross”.

Some of the illiterate participants highlighted a need for having a person by their side to guide and assist them with utilising the tool. The participants noted that this would ideally be a health worker who they would trust. However, some participants reflected this could be a companion who could provide that support.

A challenge highlighted was the need for reminders of when to use the tool. Given that the tool is intended for use during the postnatal period, which is notoriously busy, participants highlighted there was a risk of mothers and companions forgetting to use the conduct the tool.

Additionally, participants were keen for information on what to do next following the tool, who to consult and how best to do this.

Training of tool

Ninety percent of birth companions and 93% of mothers found the information on how to use the questionnaire clear and easy to understand

Some participants highlighted the importance of providing an explanation on how to use the tool and what mothers and birth companions should do next. Participants reported that effective training on the tool should start in the antenatal period and be provided at various points during the birth continuum, so that mothers and birth companions are well prepared ahead of the postnatal period. During the training, participants were keen for instruction on how to use the tool and information on the importance of using the tool to ensure adoption. Several mothers reported concerns that they would use the tool incorrectly and participants were conscious this could be alleviated with better training.

Careful consideration on the person providing the training was highlighted as critical in ensuring rapport and utility of the tool. Health care workers were generally identified as the best placed person to provide training as they would be on hand to provide support and are respected by the women and birth companions. However allied professionals, local community members and family members who would be known and trusted by the woman and birth companion.

However equally, some participants reported that the tool was self-explanatory and that there would be no need for training to use the tool as self-explanatory.

Step 4- Patient and Public Involvement (PPI) Group

The feedback from step 3 was reviewed and minor amendments were made to the pictures and audio descriptions for each of the 16 signs and symptoms.

Four signs and symptoms did not meet the threshold for true understanding. These were; convulsions, harm to herself or baby, foul smelling discharge and abnormally coloured urine. Reviewing the feedback provided, significant amendments were to these 4 signs and symptoms.

A revised tool was created (Appendix 1.7). An existing patient and public involvement (PPI) group of local mothers in Mbale Uganda was approached to review these amendments to help finalise the tool.

Participants

A PPI group was established of 6 local mothers aged between 18-36 living in Mbale Uganda. Participants were identified through their participation in the ongoing BabyGel study in Uganda.

Methods

Participants were shown the original 4 pictures and audio descriptions and then the revised pictures and audio descriptions:

- Convulsions
- Harm to herself or baby
- Foul smelling discharge
- Abnormally coloured urine

Participants were then asked to provide their feedback (Figure 19) which was written down by the local research assistant (VM). Their feedback was provided back to the mothers to check for understanding. The feedback was then summarised by the research assistant.

Figure 19: Picture of research assistant (VM) showing the ImPoWA tool to the PPI group



Results

All participants reported the revised images and audio clips were an improvement to the original images and audio clips.

For “convulsions”, participants reported that the revised image highlighted the vigour of the mother’s stiff movements more than the original image where the mother appeared more peaceful and sleeping.

For “harm to herself or baby”, participants reported that the revised image and revised audio clip worked better together and conveyed the severity of the mothers worry more. Additionally, the revised image was noted to be more representative of a woman as the previous image had looked like a man.

For “foul smelling discharge, the revised images enabled participants to identify that it was a woman in the picture and additionally where the discharge/fluid is coming from. The previous image had been unclear on whether it was even a mother in the picture and where the fluid had come from.

For “abnormal coloured urine”, the inclusion of the mother and the toilet sign in the revised images enabled participants to understand that the image was related to the mother’s urine. In the previous image, mothers were confused what liquid was in the test-tubes. Some participants had reported that the liquid could be juice, or blood. Additionally, the previous image was unclear that the symptom was related to the mother.

Given the approval from the PPI group meeting the tool was finalised.

Discussion

A postnatal self-assessment tool, that is context specific to mothers and their birth companions in Uganda was developed through a five-step approach. The methodology culminated in the pre-test of the tool assessing the face validity and understanding as well as the overall acceptability, content, presentation, usability and training of using the tool. When shown the pictures alone, no women or birth companions were able to fully understand any of the signs and symptoms included in the tool. However, when all three modalities of the tool were presented to mothers and birth companions, 12/16 symptoms met the threshold of true understanding. Median face validity results were comparable for both mothers and

birth companions. Almost all participants reported that the tool suitably assessed their health in the immediate postnatal period and that the presentation of the tool was acceptable yet a third of participants had mentioned that some of the phrasing and words required refinement. Whilst the majority of participants were comfortable answering questions, women were noted to be more comfortable than their birth companions. A total of 80% of birth companions and 83% of mothers found the tool easy to use and the research assistant did not notice any issues in rolling out the tool. A total of 90% of birth companions and 93% of women found the information on how to use the questionnaire clear and easy to understand. All participants were keen for the continued development of the tool.

The content of the tool was acceptable to mothers and birth companions. A total of 12 out of the 16 symptoms were fully understood. A considered approach was taken to develop the content of the tool to ensure that it was culturally adapted to the mothers and birth companions in the Ugandan setting. Specific contextualising methods conducted included ensuring that the pictorial images within the tool were centred on Ugandan women, ensuring the language used in the audio description were phrasings proposed by the mothers and birth companions and having the audio clips spoken in the local dialect. These mechanisms were important to ensure that the tool was purpose fit to the mothers in their Ugandan setting and is likely to have contributed to the success in achieving understanding for those 12 symptoms. Cultural adaptation is vital in ensuring that health information is more acceptable, relevant, useful and effective.²⁴⁹ In addition, cultural adaptation practises are noted to be likely to increase the efficacy, reach and sustainability of interventions.²⁵⁰ Traditionally language translations have been commonly used in practice to increase understanding of health information. However emergent literature has highlighted that cultural adaptation of patient information material provides benefits over high quality translations.²⁵¹ As such it is prudent that future interventions for development of patient information especially in diverse populations are cognisant of the value of cultural adaptation to improve outcomes and implement mechanisms to achieve it.

However, although a robust methodology was utilised to seek user perspectives and refine the wording of the tool, 4/16 were not fully understood and a third of participants still reported that some of the phrasings and words required improvement. This finding highlights the importance of involving the target audience in the development and testing of health

information. The recommendation is supported by the existing literature including in Uganda where it was noted that involvement of end users in developing and formulating the mHealth intervention allowed researchers to tailor an mHealth intervention characteristics to the women's preferences.²⁵² Additionally, it highlights the importance of ensuring repeated user testing when developing health information strategies. This approach would allow for iterative changes to ensure the chosen approach is clearly understood by the target audience.

The study highlighted the value that a tri-modal approach to health literacy has in improving understanding and inclusivity. Reflections from participants emphasised that the audio component was especially useful and helped to offset any difficulties that participants may have had with reading the names of the signs and symptoms and interpreting the pictures as well as increase inclusivity to those who don't read or write. Additionally, the provision of audio was also noted to enable the utilisation of local and regional dialects which was highlighted by participants as especially important in increasing understanding and usability. To the researcher's knowledge, this is the first self-assessment tool focussed for Ugandan mothers to use in the postnatal period. Other global self-assessment tools have focussed on the value of pictures to effectively convey information display information in pregnancy. When looking at wider health literacy mechanisms, a previous study in Uganda looking at consenting practises identified the value of a multi-modal approach to health delivery.²⁵³ Our study confirms these findings in the context of a self-assessment tool and demonstrates the need for additional modes of communication, beyond pictorial, in order to ensure the information is understood as it is intended.

The majority of participants found that the information and training provided to use the tool was acceptable and sufficient. That said, several participants still did not feel fully confident to use it independently and requested support of the research assistant when completing the tool. Several respondents also reported being fearful of using the tool incorrectly and in practice they mentioned that they would be ill-equipped to remember to use the tool repeatedly. This finding suggests that whilst the content of the training may be sufficient, there is need to provide the training at repeated intervals in order to build confidence in the user's ability to use the tool. As demonstrated in the findings from the previous chapter, there are several opportunities across the maternal health spectrum which could be utilised. Integration of the training on use of the tool within other aspects of maternal care including

the antenatal period could be invaluable to build knowledge and confidence. The WHO guidelines on positive experiences for antenatal care has highlighted how important utilising the antenatal visits are to provide whole-of-health information and counselling including on postnatal care.⁴⁸ Future initiatives should be conscious to take a life course and holistic approach and integrate where possible to increase coverage.

One key feature highlighted that was missing within the training provided was providing information on what the ongoing referral pathway would be. There is a great call for the maternal and newborn research community to move beyond development of innovations to understand the implementation factors that could contribute to effective adoption, usage and scale up.²⁵⁴ Implementation factors such as these should be explored systematically in future work conducted to ensure that innovations are effective in practice.

Strengths

There were several strengths to this study. First, it adopted an iterative approach that was systematised to ensure feedback could be incorporated at every level. Second, through adopting a mixed methods approach it ensured the utilisation of mixed data sources including expert opinion to inform the findings. This ensured an in-depth exploration of the issue and ensure that conclusions formed were robust and meaningful. Finally, data were sought comprehensively from all the target users of the tool, mothers and their birth companions. Careful consideration was taken on sample size to ensure conclusions drawn were meaningful.

Limitations

There were several limitations to this study. First, it would have been useful to investigate all three modalities; audio, pictorial and written word, independently for understanding. Second, the methodology to assess true understanding is difficult to achieve and highly subjective. As such an established approach by Nuckols was selected as it was widely used in the literature. The parameters for understanding were agreed on a priori. Additionally, as this was a subjective assessment and to mitigate any bias and validate the findings, the analysis was conducted by two independent researchers to score the findings.

Conclusion

The Immediate Postnatal Women's Assessment (ImPoWA) tool was developed to be utilised by mothers supported by their birth companions to self-assess their health. The strategy was largely accepted by mothers and birth companions. A multi-modal approach for the tool which incorporates audio, pictorial and written word components was noted to be the most successful approach to provide true understanding and health literacy on iPNC. The value of cultural adaptation and inclusivity was highlighted. Training and education for the tool should also be ideally provided repeatedly for the mothers and birth companions to have confidence in utilising the tool. There is now a need to validate the tool against the gold standard clinical opinion to assess if mothers and birth companions are able to accurately identify their signs and symptoms. In addition, a wider assessment of the implementation factors surrounding use of the tool would be important to consider.

Chapter 9- Discussion and Future Work

Purpose of the chapter

The research findings of this thesis have been presented and discussed within Chapters 3-8. This chapter presents the overarching findings, explores the overall strengths and limitations of the thesis and highlights the implications of the studies on clinical practice, research and policy. Future research recommendations have also been provided to advise the next steps following this work.

Synthesis of principal findings

A flowchart of the summary of key findings has been provided (Figure 20). A sequential mixed methods approach has been utilised to develop and evaluate the Immediate Postnatal Women's Assessment (ImPoWA) tool. Coverage of iPNC in Uganda between 2006 and 2016, increased from 35.7% (95% CI 33.4% to 38.1%) to 65.0% (95% CI: 63.2% to 66.7%). Factors associated with receipt of immediate postnatal care included women having a caesarean section birth (aOR) 2.93 (95% CI: 2.28 to 3.75), mass media aOR 1.38 (95% CI: 1.15 to 1.65), baby being weighed at birth aOR 1.84 (95% CI: 1.58 to 2.14) and receipt of antenatal care with 4+Antenatal visits aOR 2.34 (95% CI: 1.50 to 3.64).

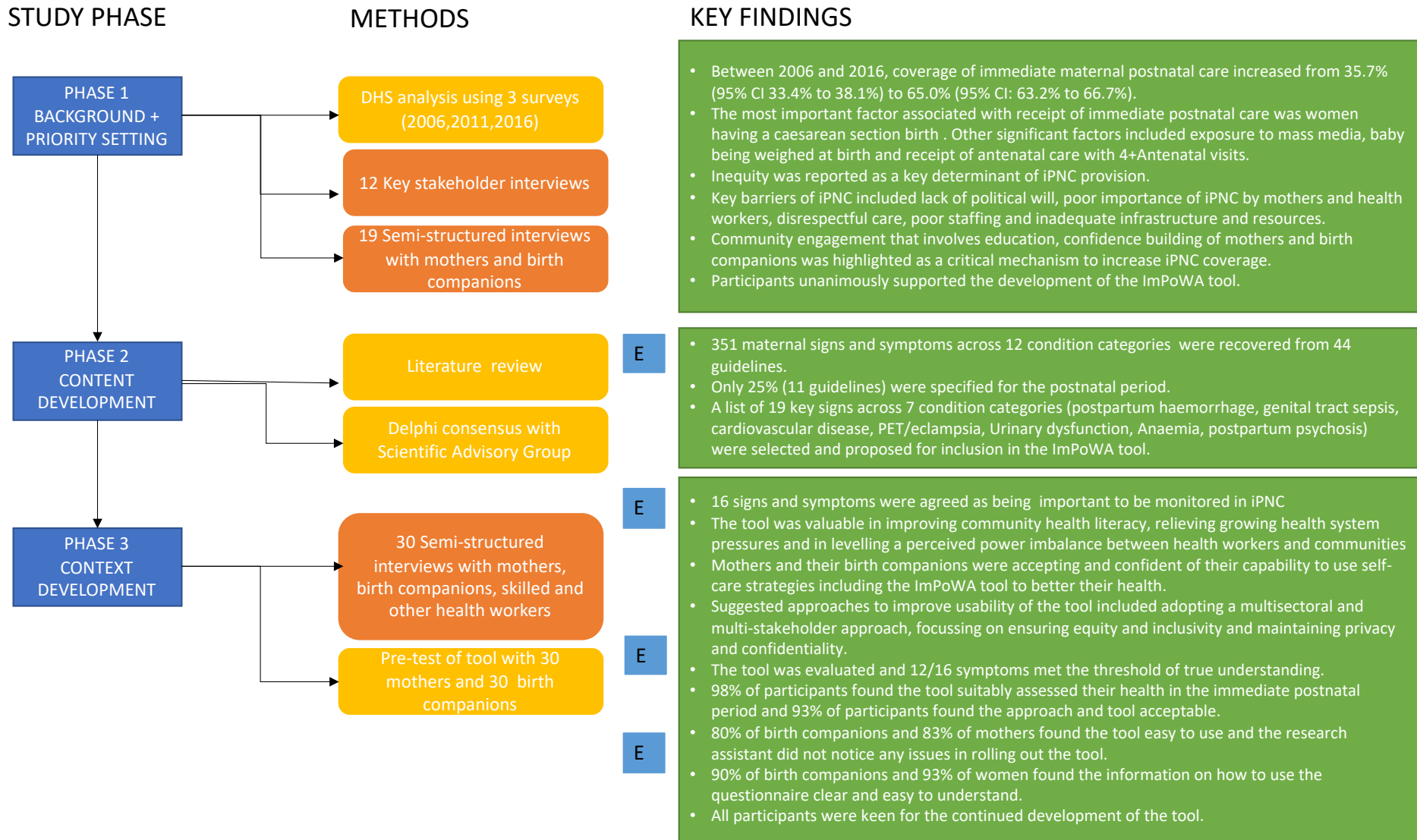
Inequity was reported as a key determinant of iPNC provision. Key barriers of iPNC included lack of political will, poor importance of iPNC by mothers and health workers, disrespectful care, poor staffing and inadequate infrastructure and resources. Community engagement that involves education, confidence building of mothers and birth companions was highlighted as a critical mechanism to increase iPNC coverage. Participants were unanimously supportive of the development of the ImPoWA tool.

A total of 351 maternal signs and symptoms across 12 condition categories pertaining to the immediate postnatal period were recovered from 44 guidelines. Expert consensus was achieved for a list of 19 key signs and symptoms that span across seven condition categories (postpartum haemorrhage, genital tract sepsis, cardiovascular disease, PET/eclampsia, Urinary dysfunction, Anaemia, postpartum psychosis). Engagement with local mothers, birth companions and health workers, provided invaluable input to refine the list to 16 signs and symptoms that were perceived as important and possible to be self-monitored in the

immediate postnatal period. The tool was perceived to be valuable in improving community health literacy, relieving growing health system pressures and in levelling a perceived power imbalance between health workers and communities. Mothers and their birth companions were accepting and confident of their capability to use self-care strategies including the ImPoWA tool to better their health. Strategies cited to improve utility of the tool in clinical practice included adopting a multisectoral and multi-stakeholder approach, focussing on ensuring equity and inclusivity and maintaining privacy and confidentiality.

A draft tool was subsequently created and evaluated. When shown the pictures alone, no women nor birth companions were able to truly understand any of the signs and symptoms. However, when all three versions (audio, pictorial and written word) of the tool were presented to mothers and birth companions, 12/16 symptoms met the threshold of true understanding. 98% of participants found the tool suitably assessed their health in the immediate postnatal period and 93% of participants found the approach and tool acceptable. All participants were keen for the continued development of the tool.

Figure 20: Summary of results flowchart



Strengths and weaknesses

In comparison to the literature, the following strengths and limitations of this overall thesis have been identified and categorised by methodological component.

Study Design

A mixed methods approach was adopted which, through its methodology, enabled a comprehensive investigation of the issue of immediate postnatal care in Mbale, Uganda. The sequential approach was useful for the tool development purpose whereby previous studies informed the study design of subsequent studies. This also enabled iterative improvements.

Focus was taken to ensure the thesis was responding to the needs of Ugandan people and co-production of the thesis with researchers in Uganda. Firstly, a scoping visit was conducted in Uganda in Kampala and Mbale to understand what the needs were before embarking on the work. This visit also provided the opportunity to build trust and mutual respect which were essential to ensure a strong research collaboration. Secondly, a steering group of global experts with working knowledge of iPNC in Uganda were convened. Careful consideration was taken to ensure Ugandan stakeholders were included across health system cadres. Thirdly, within the thesis a specific component on priority setting was included through DHS analysis, key informant interviews and qualitative interviews with mothers and birth companions.

Importantly, the thesis allocated an equal priority to content and context development to ensure the tool was truly reflective and met the needs of the community in Mbale Uganda. Community input and participation was instilled right from the outset to inform the development of the tool. As such the content and presentation of the tool was centred upon the lived reality of postnatal mothers in Uganda.

A key limitation to this work is that it focussed only on maternal signs and symptoms. Emerging research in low resources settings is highlighting the value of integration of maternal and newborn services for increased coverage of care.^{255–257} The postnatal period is a unique period where that integration can be fully realised. Since the commencement of this work, global guidelines have been updated as such highlighting the importance that future tools and strategies do adopt this integrated approach.^{27,258} It would have been useful to have therefore included newborn signs and symptoms in this work. Nevertheless, the value of this

work extended beyond content development. The thesis also examined the acceptability of self-care strategies in the immediate postnatal period, the value of engagement with communities in development of tool interventions and the best approaches to health literacy. These findings therefore remain critical regardless of the content of the tool. In future work it would be useful to widen the content of the tool to include newborn features too.

Another key limitation of the work is it only focussed on one country and setting which limits the global application of the tool and transferability of the results generated. The country and region selection was based on existing literature on coverage of iPNC as well as the DHS analysis in Chapter 3 which highlighted that progress in eastern and central regions of Uganda had stalled and reversed respectively. It also reflected areas of current collaboration of the research unit. Going forward it would be prudent to assess the tool in several sites within the central/eastern Ugandan region and in other countries where iPNC coverage is poor. That said, the selected site was a referral institute in a rural district of Uganda which receives mothers from diverse backgrounds including tribal communities to ensure diverse participation in the study.

Following testing of the tool 12/16 symptoms were fully understood by participants. Based on the feedback obtained, revisions were made to the remaining four symptoms for both their pictures and description wording. Although a small PPI group were encouraged to review the revised four symptoms, it would have been useful to test these new revisions in the tool using the pre-used and established testing methodology to fully assess and check for understanding. In future work it would be imperative to ensure multiple opportunities for re-testing for understanding are in place to ensure edits can be made.

Finally, the recent 2022 WHO recommendations on maternal and newborn care for a positive postnatal experience was published after the cessation of data collection for the thesis. Therefore largely the thesis refers to and utilises the prior 2014 WHO recommendations for postnatal care. That said, the specific 2014 recommendations referred to and utilised in this thesis have remained consistent within the new updated guidelines and as such this would not have appeared to impact the work.

Participants

Careful consideration of samples sizes in all studies was taken to ensure sufficient participants were included to ensure any conclusion and findings generated had enough power to be meaningful. Where no consensus on approach for sample size estimation was established a pragmatic approach was taken with careful review of pre-existing methods used in the literature. As such, enough participants were included to achieve analytical saturation.

Care was taken to ensure a range of participants were included across the thesis. The diversity in participants enabled understanding of view-points and perspectives across multiple vantage points. Stakeholders across health system cadres and at different levels were involved. When developing the tool careful consideration was also taken to involve the wider users and providers of iPNC including family through the birth companions and allied health professionals. In addition, when evaluating the tool during the pre-test, a purposive selection strategy was utilised to ensure that viewpoints were taken across education level, language and mode of birth to ensure diversity. This approach enabled a comprehensive investigation into iPNC. Furthermore, the involvement of a range of different stakeholders, ensured maximal transferability of the data. However, although factors such as education level, language and mode of birth were utilised, comprehensive stratification across all the determinants identified in Chapter 3 was not undertaken. In the future, this would be important to be done systematically to ensure the tool is tested across a range of populations, including rural or urban setting and wealth status.

Participants were provided with payment to reimburse their time for participation in the study. Interestingly during the qualitative interviews and pre-test survey, no participant approached declined participation in the studies. Payment for participation is a well-established practice within the literature. However, when involving participants from impoverished or poorer backgrounds, it poses a risk of creating a power imbalance whereby participants feel forced to participate purely due to the money it would provide.^{259,260} Alternate mechanisms for re-imbusement could be explored or improvement to consenting procedures could be provided to mitigate for this.

Data collection

Data that informed the context development of the tool including the qualitative interviews and pre-test survey was conducted by a local researcher. The opportunity of engaging with a local research team was critical in being able to build the necessary rapport and trust needed to garner high quality and meaningful responses and data. Additionally, it provided an opportunity to strengthen the capacity of a local research team which has wider importance in ensuring future research agendas are borne at local level and sustainability of future work.

The thesis had a clear output of the development of the ImPoWA tool. There was therefore a significant risk of confirmation bias from the researcher that findings would lend to an acceptability for continuity of tool development. To mitigate against this bias, an objective research assistant (VM) was employed so that the lead researcher was minimally involved in primary data collection. Additionally, during analysis, transcripts were re-reviewed repeatedly with a clear unbiased mind to ensure assertions generated were accurate and meaningful. Where subjective assessments could be made, second and third researchers (NB, JK) were also involved to validate findings. Conclusions generated were also discussed with the lead researcher's wider supervision team to minimise further bias through group discussion.

Careful consideration was taken to ensure that all study components were conducted privately to provide comfort and security to participants. This endeavour helped to mitigate against social acceptability bias whereby participants respond inaccurately to fit with social norms.

Within the individual studies there was a risk of acquiescence bias from respondents whereby participants have a tendency to agree with research questions or statements even if it not a true reflection of their own opinion. This risk is especially heightened in low resourced settings including Uganda where culturally there is a willingness to want to please those around them.²⁶¹⁻²⁶³ Reasons for this bias could be due to cultural norms or practical reasons where the participants are keen to finish the interview in order to resume their normal activity. To mitigate against this bias, non-leading, open questions were used as much as possible during the qualitative interviews to allow participants to speak freely without a perceived expectation. For the pre-test additional supplementary probing questions were asked to try and encourage participants to provide truthful responses. If the study were

repeated, the answering of the questions could have been reversed so that the default option was to disagree.

Data interpretation

Using a mixed-method approach to data collection and analysis enabled the methodological triangulation of the quantitative and qualitative findings to answer the specific research questions. The DHS analysis, for example, provided quantitative data on what the coverage and key determinants are for iPNC. Qualitative interviews with key stakeholders, mothers and birth companions were then employed to try and explain and understand these findings more. The triangulation of data enabled a comprehensiveness and depth of understanding not possible with a single method approach.

One limitation to the interpretation is that the study was conducted during the Covid-19 pandemic. This was an emergency environment and may not be reflective of the day-to-day reality of health care provision in Uganda. During interpretation it was therefore important to consider the context in which the findings were obtained and how they could inform the results.

Importantly, whilst usability and training for the tool were explored, there was not a comprehensive assessment of all the pertinent implementation factors surrounding the use of the tool in clinical practice. This would perhaps be better assessed during subsequent validation work. Going forward, it would also be useful to systematically look at implementation outcomes and several frameworks exist to aid with this. As recommended by the MRC, the RE-AIM framework which provides a step-by-step guide to evaluate the implementation of interventions and tools.²⁶⁴ This framework builds on work conducted by Proctor et al.²⁶⁵ Utilising a systemised approach would ensure that the implementation of the tool is rigorously evaluated. This would also ensure the barriers and enablers to the intervention in practice are better understood and described.

Additionally it is important to consider that the lead researcher (TD)'s theoretical perspective may have had an impact on the analysis of the qualitative data and conclusions drawn. To mitigate against this, the interview transcripts from each sub-study were repeatedly reviewed to ensure a comprehensive understanding of the data. Furthermore the preliminary conclusions drawn from the analysis were co-reviewed by the core multi-speciality

supervisory research team. The team were formed across disciplines and therefore likely to have differing theoretical perspectives to ensure a well-rounded perspective on the analysis.

Ethical Considerations

Avoiding harm

Careful consideration was taken to avoid harm to participants. All members of the research team undertook GCP training and had experience in conducting clinical studies prior to participation in this study. The lead researcher (TD) was also supervised by leading experts in maternal health research with expertise in qualitative and quantitative methodology. In addition, as the qualitative interviews were regarding experiences of clinical care, there was cognisance that questioning could evoke strong emotional responses or distress. A distress policy was therefore created to manage such a scenario. In addition, contact details were also provided for the lead researcher (TD) and primary supervisor (ADW) who had a clinical background and were available to offer support as needed.

All participants were also provided the opportunity to have a companion with them during the interview to ensure their comfort.

Consent

Stringent informed consent processes were adhered to throughout the study. Potential participants were provided verbal and written information about the research study. The information provided aimed to promote participant understanding of the clinical study and how the information they provide would be shared and used. Participation in the study was highlighted as being entirely voluntary and that participants were able to withdraw from the study at any point without penalty. Cognisant of the different languages in Uganda, all participant forms including consent forms, information leaflets and case report forms were translated into the four key languages used locally in Mbale (English, Lugwere, Lumasaba, Ateso). The research assistant (VM) was fluent in all three local languages to be able to discuss the study comprehensively. Participants were also provided as much time as they needed to consider their participation. The research team were keen to provide remuneration to the participants for their time spent in the study however they were conscious that this could inadvertently coerce participation especially for those from poorer backgrounds. As such, the

research team worked closely with the local ethics committee to use the established remuneration amount used in existing clinical studies in the Mbale setting.

Thought was taken to ensure that only participants who had the capacity to provide informed consent and were included and this was stipulated within the inclusion criteria. Minors aged below 18 years old were excluded from participation unless they had proof of emancipation.

Only after signing of the consent form could the participant participate in the study. The research team were conscious that some participants may be illiterate and therefore unable to provide a signature. To ensure their participation, all consent forms had the opportunity for participants to use a thumb print instead of a signature as needed.

Confidentiality

Confidentiality was maintained throughout the study and the participant information leaflet clearly outlined how the data would be obtained and measured to protect confidentiality. Data collection was conducted in a private and secure setting to allow participants to share their information freely.

In addition, robust data management processes were in place so that participant data was fully anonymised to ensure that individuals participating in the study could not be identified. In addition, as described in the thesis, careful consideration was taken to both digital and paper copies of data securely and safely with a fixed storage time in accordance with the Data Protection Act. Additionally, thought was taken on the best approach to dispose of data safely and securely.

Confidentiality of data was also maintained during the analysis, write up and presentation and publication of the findings to ensure that privacy and identity of participants was protected. Participants were asked to suggest their own pseudonyms that could be used within the transcripts and for quotations used in publications of the work.

Original contribution of the study and meaning of the study findings for clinical practice, research and policy

Implications for clinical practice

The study has resulted in the development of the ImPoWA tool. To the researcher's knowledge a maternal self-assessment tool specified for the immediate postnatal period has

not been developed or researched before. The tool can be utilised in clinical practice to ensure mothers and their communities have an active role in their care through assessing their symptoms in the immediate postnatal period. In addition, through task-shifting the assessment of these signs and symptoms to the mothers and their birth companions, the tool provides a unique opportunity to support and enable prioritisation of care thereby reducing the burden on health care providers who can focus their attentions on those most critical. The tool was widely accepted by mothers, birth companions and health workers and was noted to increase understanding by mothers and their birth companions of key signs and symptoms in the immediate postnatal period.

The study has highlighted that coverage of iPNC is not universal and explored the key factors behind this. A key determinant noted of this lack of coverage is the lack of importance and prioritisation placed on iPNC by users and providers. From a health worker perspective, although providers did note the importance of iPNC, respondents cited that poor staff to user ratios, increasing burnout and lack of resources had impacted their ability to provide the intended care. From a community perspective, participants did understand that care immediately after birth is important, however would likely prioritise competing family needs over the receipt of care. It is therefore imperative that appropriate guidelines, training and tools are provided for healthcare providers and community members that highlight the importance and need for prioritisation of iPNC. Specifically focus must be taken to effectively communicate the impact of lack of iPNC on maternal health and wellbeing to incentivise health workers to provide all components of iPNC and mothers to utilise iPNC in the face of competing priorities and needs. As the ImPoWA tool is implemented into clinical practice-careful focus and attention will be taken to ensure the content of the training provided to communities and health care providers highlights the importance of iPNC.

This study highlighted that not only was there poor coverage of iPNC, but even when it was provided, there was also a lack of quality iPNC care. De-prioritisation of certain components of care was reported frequently by health-workers and examples of disrespectful and non-comprehensive receipt of care was reported by the mothers. Focus and attention must be taken to ensure clinical practice for iPNC is consistent, respectful and mother-centred. Education and training for health care workers must not only focus on providing knowledge of components of care but provide guidance to demonstrate respectful care too. Utilising the

ImPoWA tool provides a unique opportunity to ensure that there is a comprehensive assessment of key symptoms that are critical to the immediate postnatal period. Utilising the tool in clinical practice is a mechanism to ensure active participation of community members in their care – a factor reported as instrumental in levelling power dynamics between provider and user and ensure respectful care.

The thesis has centred upon exploring the best approach for community health literacy where little literature exists particularly in low-and-middle income settings. A key unique finding from this study highlights that building community health literacy requires a multi-pronged approach. Commonly, pictorial approaches have been used to provide health information within maternal health services.^{266–268} However, this study has exemplified the value of human voice as a key mechanism required to improve understanding. In Uganda with over 40 different languages, many exist in the oral form and are not written.²⁶⁹ For example, even the Bible has only been translated into 21 local Ugandan languages.²⁷⁰ In parallel primary local language use correlates with poorer education status.²⁶⁹ As such, in order for health information approaches to reach those illiterate, they must have audio components and not be solely written. Healthcare providers must be cognisant in this when developing and providing health information resources. Additionally, improving health literacy requires an iterative approach whereby training and education is provided at multiple points across the reproductive continuum including antenatal care. These findings have been adopted in the development of the ImPoWA tool. As the tool is validated and tested further in different settings, the researchers will ensure to instil the learnings gleaned regarding training and education into the implementation of the tool in clinical practice.

Implications for research practice

The approach taken for this thesis was uncommon whereby equal importance was placed on the content and context development of this tool. This enabled the tool to be truly setting specific to mothers in Uganda. The thesis provides a clear roadmap of the steps necessary to adapt the tool to individual settings. Future research activities could adopt this approach to contextualise the tool in other settings. Moreover, the approach provided for this tool could be extrapolated and guide other tool development projects, to improve the success of such projects.

This thesis has highlighted the value of involving of community members across a research process from topic prioritisation, content and context development. There is a growing trend in the research community to ensure community engagement and involvement in research studies including tool development especially for research surrounding health promotion interventions.^{271,272} Community engagement for maternal health research is expanding and a recent systematic review noted that 38% of global articles with community participation involved reproductive and child health and 13% were focussed on maternal health interventions.²⁷¹ However, when examining the extent of community participation in research, very few studies reported engaging communities in identifying or framing the problems to be addressed and relatively few engaged communities in managing resources or monitoring and evaluating interventions.²⁷¹ As such, research questions and interventions may not be built purposefully to respond to the priority needs of the community. Various frameworks have been developed to enhance community participation. The most common utilised is Rifkin's concept of the five stages of community participation in health.²⁷³ In Uganda, organisations such as the James Lind Alliance are supporting local initiatives to engage community voices in establishing maternal and newborn health research priorities.¹⁴⁵ It is critical that future research initiatives involve communities from the outset to ground research initiatives in the needs of the communities to ensure that strategies developed are most meaningful and useful.

Largely studies in maternal health focus on viewpoints from the mothers alone. This study uniquely aimed to take a whole-of-community approach through engaging with birth companions including men. It is imperative that these viewpoints are sought too especially given the community role adopted for pregnancy and childbirth.²⁷⁴ A recent review highlighted that interventions to engage men in maternal health services can increase care-seeking and support more equitable couple communication and decision-making for maternal health.²⁷⁵ The approach of involving view points from other community members ensured that the tool was inclusive and truly embedded and usable by the community at large. Future research projects would benefit from ensuring inputs from the wider community members if strategies are intended to be utilised by the wider communities.

Implications for Policy

The thesis has highlighted the acceptability and appetite by mothers and their birth companions to be actively involved in their care. This work complements the growing body of evidence highlighting the effectiveness of self-care strategies. In recent years self-care strategies have been increasingly used across the maternal health spectrum as an effective mechanism to improve coverage of essential services and support the ability of individuals, families and communities to promote and maintain health, prevent disease, and cope with illness and disability with or without the support of a health worker.^{87, 276} In particular, during the Covid-19 pandemic, self-care strategies were increasingly utilised to ensure the continued coverage of essential health services during emergencies.²⁷⁶ Cognisant of this, in 2022 WHO have updated policy and health system guidance on self-care interventions for health and well-being with a specific section highlighting the value of interventions for maternal and reproductive care.⁸⁷ However a large majority of the interventions focused on the antenatal and intrapartum phase. There is need for this guidance to be inclusive and widen its focus so as to also cover postnatal care strategies and interventions. In addition, whilst useful to have global guidance, there is a great need for self-care guidance to be contextualised and adopted within national and local policies for health system plans.

The thesis has also highlighted the need for strategies and interventions to focus on being inclusive and equity-enhancing. This approach is critical in order to reach the most vulnerable communities. Specific mechanisms highlighted included capacity strengthening community members to be engagement and involved in the development of strategies and utilising local dialects and languages when providing health information to ensure inclusivity. These learnings should be taken forward into policy action to ensure that approaches and interventions within policies are focussed upon those most at need.

A key finding within this thesis is the mis-alignment between coverage and quality of iPNC. The thesis highlighted that even if iPNC is provided it does not necessarily equate to it being of high quality or comprehensive. As such it is imperative that global and national monitoring and evaluation indicators acknowledge not only coverage of iPNC but quality of care too. There are no clear established quality of care metrics for iPNC in global guidance. These metrics are critical to hold health care providers and health systems accountable to ensure

their delivery of universal coverage of quality iPNC. These metrics need to be developed and in place with supporting accountability policies to hold nations to account.

Future research work

The study provides several avenues for future research.

Following the development of the tool, it would now be prudent to assess its validity. To do this an agreement prospective observational study is planned for 2023 as part of a post-doctoral role for the lead researcher. The study will involve postnatal mothers and birth companions in Uganda utilising the tool and comparing their responses with a skilled health workers response as the gold standard.

The mothers participating in the study will have given birth in the preceding 24 hours and will be purposively selected from four key pre-determined risk groups.

These groups are:

- 1) Well women who have had an uncomplicated emergency or elective caesarean section;
- 2) Women who have had an elective or emergency caesarean section and birth complications or maternal co-morbidities including PPH, pre-eclampsia, or asthma, sepsis or complications;
- 3) Well women who have had routine, uncomplicated normal vaginal birth; and
- 4) Women who have had a vaginal birth and birth complications or maternal co-morbidities including PPH, pre-eclampsia, third or fourth degree vaginal tears or asthma.

The study would enable assessment of concurrent criterion validity by comparing responses from women and birth partners/companions, with the existing gold standard (clinician assessment) for agreement. It would allow for the assessment of divergent construct validity by comparing the responses from women in different clinical risk populations at different times across the immediate postnatal time period. It would also assess for internal consistency to gauge the degree of homogeneity between items in the tool as well as inter-observer reliability of the tool by comparing responses between women and birth partners or companions. This study would provide the essential validity data required to explore if the tool could be integrated into everyday use.

One limitation of the tool is its lack of generalisability given that it was developed in the specific context of a government hospital in Mbale, Uganda. It would therefore be prudent to explore the adaptation and usability of the ImPoWA tool in different contexts and settings in Uganda and globally in other settings too. The output from the content development was the generation of international consensus on 19 signs and symptoms that are critical to be monitored within the first 24 hours of birth of baby. For the tool to be adapted to each setting it would therefore only require the final context development phase of the process. As such, a more streamlined, feasible and efficient process for the adaptation of the tool could be conducted in each setting.

Although the tool has been initially developed for health facilities use, It would also be useful to explore if the tool could be of benefit in the home birth and community birth setting. This is of particularly importance for mothers from LMIC's where mothers are more at risk of morbidity and mortality due to late recognition of complications as a result of weak and fragile referral pathways. Within the study, the rise of community health workers was repeatedly highlighted. Further research work could explore the value of utilising community health-workers in engaging with mothers and their communities to use the tool to improve their health. Additionally, given the global lack of iPNC coverage, it would also be useful to try and adapt the tool to countries where maternal mortality and morbidity is high and coverage of iPNC is poorest. The initial content backing the tool was developed with global guidelines and global consensus and thus would be applicable globally. However, the tool would need to be culturally adapted to each setting and population group to be context specific. Through this thesis a clear roadmap has been provided to guide the adaptation components of the tool which can be utilised for future research work.

Furthermore, it would be useful to adapt the ImPoWA tool to different populations. In Chapter 3 a range of key determinants were identified including wealth, education and literacy. This list of determinants could guide the populations with which the tool should be evaluated in and determine which populations would benefit the most from use of the tool. During this testing it would be invaluable to understand the sensitivity and specificity of each item within the tool to identify which items are better understood by different populations. This would guide efforts to ensure that focus and attention is placed on trying to optimise

understanding for particular signs and symptoms which may be more commonly misunderstood by certain populations.

This work adds to the evidence base on the most effective approaches for health literacy. Since the Covid-19 pandemic, the surge in telehealth has been exponential. During this study, participants were quite fearful and nervous about the use of a digital approach. However, with the increasing numbers of Ugandans having access to smart phones this may soon change. A recent study with 214 students in Kampala, Uganda reported that 94.9% of them had access to a smartphone at home.²⁷⁷ In addition, a recent qualitative study assessed the acceptability and feasibility of a mobile phone-based multimedia intervention to support antenatal maternal health.²⁷⁷ The study reported that the intervention, that included disseminating health information via a mobile application, was largely acceptable and received support in resource limited settings among rural Ugandan women with minimal education.²⁷⁷ Digital technology provides a capability to provide continuity to health service delivery in the face of global shocks and crises.³⁶ The mixed modal approach for the tool provides a unique ability for the tool to be repurposed into a new mobile application or indeed embed directly into existing applications or platforms. It will be important to explore the feasibility and acceptability of digital approaches for health with the ImPoWA tool as a model to use. The researchers are working with Gynuity Health Projects to do this.

Researcher reflections

Completing my PhD has been challenging but extremely rewarding too.

The Covid-19 pandemic had a dramatic impact on the work. First, due to the ensuing lockdown restrictions, there were delays to the regulatory approvals and study conduct. Second, the new regulations and safety measures in place meant there needed to be adaptations made to the study including recruitment of additional local staff and budget changes. These experiences have taught me the important balance required between ensuring careful preparation to prevent issues from occurring and the flexibility to establish innovative mitigation measures to any new issues that arise. I am certain, both these skills will stand me in good stead for a future academic career.

When developing the protocol, it impressed upon me the vast variety of approaches possible to conduct any given study and that there is no correct answer. Whilst this initially bothered

me, it encouraged me to ensure that every decision for any methodology or approach used was reasoned and based in a strong rationale. Taking the time to be considered in my approach has allowed me to learn more about the different methods available to answer a research question, weigh them up against each other and make an informed decision. This has significantly increased my learning and understanding of research methodologies. In addition it has provided me with a greater sense of satisfaction for the work conducted. Being fortunate to have had a strong supervisory support has allowed me the opportunity to brainstorm ideas with leading experts to challenge my ideas and ensure that my reasoning is robust. The importance of focusing on reasoning and rationale is invaluable for future academic work.

Conducting the study has also led me to think through wider issues surrounding global health including the importance of decolonisation and my role to be part of this movement and make a real change. With this work, I was proud to have had the opportunity to capacity strengthen a local research team in Uganda in key research methodologies and research governance. It is my hope that these skills will outlive this study and be useful to future work in Uganda to ensure that essential maternal health services reach all.

Conclusion

Following a three stage, sequential mixed methodology approach, *ImPoWA*, an evidence-based, context-specific self-assessment tool has been developed to improve community iPNC health literacy through mother and birth companion empowerment. The study has highlighted that an integrated multi-format approach including use of the human voice is the most effective approach. This study provides a roadmap for meaningfully engaging community members in tool development whilst the tool provides an opportunity to improve equitable coverage and quality of iPNC in all settings.

Appendix 1- Study Materials

Appendix 1.1: Ethics Committee Approval Letter Uganda



Plot 97-105
Bugwere Road
P.O Box 903,
Mbale- UGANDA
TEL: +256 454 435273/435356
MOB: +256782965217
ug.info@cchurec.org

Date: 03/03/2021

REC APPROVAL NOTICE

To: Andrew Weeks, Principal Investigator

Re: Application Number: CCHU-REC/06/020-Systematic development and validation of a Post-Natal Maternal Self-Assessment Tool for predicting post-natal morbidity in the immediate postpartum period following birth in healthcare facilities in Uganda

Type: Initial Review
 Protocol Amendment
 Letter of Amendment (LOA)
 Continuing Review
 Material Transfer Agreement
 Other, Specify: _____

I am pleased to inform you that the Research Ethics Committee of CURE Children's Hospital of Uganda (CCHU-REC) has done an initial review of your protocol and gives approval. This approval is for only phases 1-3.

Approval of the research is for the period of **03 March 2021 to 03 March 2022**.

As Principal Investigator of the research, you are responsible for fulfilling the following requirements of approval:

1. All co-investigators must be kept informed of the status of the research.
2. Changes, amendments, and addenda to the protocol must be submitted to the REC for re-review and approval **prior** to the activation of the changes. The REC application number assigned to the research should be cited in any correspondence.
3. Reports of unanticipated problems involving risks to participants or other must be submitted to the REC. New information that becomes available which could change the risk: benefit ratio must be submitted promptly for REC review.



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MOB: +256782965217
ug.info@schaarec.org

The following is the list of all documents approved in this application by CURE Children's Hospital of Uganda Research Ethics Committee:

#	NAME OF DOCUMENT	LANGUAGE	VERSION	VERSION DATE
1.	Protocol of study	English	Version-0.10	11/02/2021
2.	Key informant interview- Participant Information Sheet (Translated and Back translated)	English, Lumasaba, Lugwere, Ateso	Version-0.3	11/02/2021
3.	Key informant interview- Participant Consent Form (Translated and Back translated)	English, Lumasaba, Lugwere, Ateso	Version-0.3	11/02/2021
4.	Key informant interview- Case Report Form (Translated and Back translated)	English, Lumasaba, Lugwere, Ateso	Version- 0.2	09/10/2020
5.	Qualitative Interview (women + birth partner)- Participant information sheet (Translated and Back translated)	English, Lumasaba, Lugwere, Ateso	Version- 0.3	11/02/2021
6.	Qualitative Interview (women + birth partner)- Participant consent form (Translated and Back translated)	English, Lumasaba, Lugwere, Ateso	Version- 0.3	11/02/2021
7.	Qualitative Interview (women + birth partner)- Case Report Form (Translated and Back translated)	English, Lumasaba, Lugwere, Ateso	Version- 0.2	09/10/2020
8.	Qualitative Interview (Healthcare Worker)- Participant information sheet (Translated and Back translated)	English, Lumasaba, Lugwere, Ateso	Version- 0.3	11/02/2021
9.	Qualitative Interview (Healthcare Worker)- Participant consent form (Translated and Back translated)	English, Lumasaba, Lugwere, Ateso	Version- 0.3	11/02/2021
10.	Qualitative Interview (Healthcare Worker)- Case Report Form (Translated and Back translated)	English, Lumasaba, Lugwere, Ateso	Version- 0.2	09/10/2020
11.	Quantitative Pre-test Survey (Healthcare Worker)- Participant information sheet (Translated and Back translated)	English, Lumasaba, Lugwere, Ateso	Version- 0.3	11/02/2021
12.	Quantitative Pre-test Survey (Healthcare Worker)- Participant consent form (Translated and Back translated)	English, Lumasaba, Lugwere, Ateso	Version- 0.3	11/02/2021
13.	Quantitative Pre-test Survey (Healthcare Worker)- Case Report Form (Translated and Back translated)	English, Lumasaba, Lugwere, Ateso	Version- 0.1	03/07/2020



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4. Only this approved protocol should be used. All consent forms signed by subjects and/or witnesses should be retained on file. The REC may conduct audits of all study records, and consent documentation may be part of such audits.
5. Regulations require review of an approved study not less than once per 12-month period. Therefore, a continuing review application must be submitted to the REC eight weeks prior to the above expiration date of **03 March 2022** in order to continue the study beyond the approved period. Failure to submit a continuing review application in a timely fashion may result in suspension or termination of the study, at which point new participants may not be enrolled and currently enrolled participants must be taken off the study.
6. You are required to register the research protocol with the Uganda National Council for Science and Technology (UNCST) for final clearance to undertake the study in Uganda.

Signed,

for Chairperson
HUMPHREY OKECHI
REC Chairperson
CURE Children's Hospital of Uganda
+256779372445
humphrey.okechi@cureinternational.org

cc: CCHU-REC Office



Appendix 1.2: Ethics Committee approval UK

24/03/2022, 11:11

Research ethics amendment approved - Prof Andrew Weeks: 9743 ... - Dey, Teesta

Research ethics amendment approved - Prof Andrew Weeks: 9743 - Development of a Self-Assessment Tool for mothers to self-assess their health in the first 24 hours following birth of baby in healthcare facilities in Uganda

donotreply@infonetica.net

Wed 16/06/2021 09:14

To: Weeks, Andrew <aweeks@liverpool.ac.uk>; Dey, Teesta <Teesta.Dey@liverpool.ac.uk>;

Cc: Research ethics <research.ethics@liverpool.ac.uk>; Dey, Teesta <Teesta.Dey@liverpool.ac.uk>; Alfirevic, Zarko <zarko@liverpool.ac.uk>;

The answers within the form indicate this is a minor amendment, therefore we are pleased to inform you that the amendment to your study has been approved.

COVID-19 warning on the restrictions on research: The University's [Policy on research involving human participants in response to COVID-19](#) states that, wherever possible, research should be conducted via remote means which avoid the need for face to face contact with research participants during the pandemic.

For cases in which research cannot be conducted remotely, an [application can be made to request face to face data collection during the pandemic](#), and this should be submitted to ethics@liverpool.ac.uk for review.

Any research ethics approval granted will be subject to the above Policy - therefore, only applications which have been reviewed and approved through the [process for requesting face to face research data collection during the pandemic](#) will be permitted to conduct in-person research.

Conditions of the approval

- All serious adverse events must be reported to the Committee within 24 hours of their occurrence, via the Research Integrity and Ethics Officer (ethics@liverpool.ac.uk).
- If the named Principal Investigator or Supervisor leaves the employment of the University during the course of this approval, the approval will lapse. Therefore please contact the Committee (details below) in order to notify them of a change in Principal Investigator or Supervisor.

Kind regards,

Research Integrity and Ethics

Appendix 1.3: Qualitative Interviews with Mothers and Birth Companions Case Report Form



Case Report Form- Qualitative Interviews (Woman + Birth Partners)

[Introduce yourself, thank participant for taking part and confirm agrees to interview taking place. Ensure environment is comfortable. Discuss the following issues]:

- Review the nature and purpose of the research.
- No right or wrong answers, aim to understand experiences.
- Confidentiality, use of data.
- Explain the use of data recorder, transcription, use of pseudonym (invite to choose), use of verbatim quotes, will be taking field notes.
- Researcher aware that discussion might cause distress, explain can decline to answer any question or prompt; can ask to stop at any time if feels need to.
- Expected duration of interview.
- Check consent form signed, complete demographics questionnaire.
- Ask if any questions.

May I take a few details from you

IDENTIFICATION

I01	Participant Number	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
I02	Date of Interview	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
I03	Role in Birth	Woman	<input type="checkbox"/>			
		Birth Partner/ Companion	<input type="checkbox"/>			

N/B Birth Partner has to have remained as the primary birth partner/companion for the first 24 hours following birth of baby

May I record our conversation [Check Dictaphone works]I04 Consent to Record Conversation Yes No**What name would you like to be referred to in the study**

I05 Pseudo-name _____

May I ask a few questions about your background**BACKGROUND**

Q.No	Questions and Filters	Answers
B01	Place of Residence	1. Rural <input type="checkbox"/> 2. Urban <input type="checkbox"/>
B02	Age	1. 15-24 years <input type="checkbox"/> 2. 25-34 years <input type="checkbox"/> 3. 35-44 years <input type="checkbox"/> 4. 45-54 years <input type="checkbox"/> 5. ≥ 55 <input type="checkbox"/>
B03	Gender	1. Male <input type="checkbox"/> 2. Female <input type="checkbox"/>
B04	How many times have you (or the woman you are accompanying) given birth, including this pregnancy?	<input type="text"/> <input type="text"/>
B05	Current Marital status	1. Married <input type="checkbox"/> 2. Divorced <input type="checkbox"/> 3. Single <input type="checkbox"/> 4. Widowed <input type="checkbox"/>
B06	Religion	1. Protestant <input type="checkbox"/> 2. Catholic <input type="checkbox"/> 3. Other Christian <input type="checkbox"/> 4. Muslim <input type="checkbox"/> 5. Other (specify) <input type="checkbox"/>
B07	First Language Spoken (other than English)	1. Ateso <input type="checkbox"/> 2. Lumbasa <input type="checkbox"/> 3. Lugwere <input type="checkbox"/> 4. Other (specify) <input type="checkbox"/>

B08	Educational level	1. Unable to read and write <input type="checkbox"/> 2. Read and write only <input type="checkbox"/> 3. Completed Primary Education <input type="checkbox"/> 4. Completed Secondary Education <input type="checkbox"/> 5. Completed college and Above <input type="checkbox"/>
B09	What do you spend most of the time doing ? (Employment)	1. Farming- Home garden <input type="checkbox"/> 2. Farm Labourer <input type="checkbox"/> 3. Professional (teacher, medical, nurse) <input type="checkbox"/> 4. Labouring (construction, factory) <input type="checkbox"/> 5. Office job <input type="checkbox"/> 6. Business (employed or self-employed) <input type="checkbox"/> 7. Domestic work (paid) <input type="checkbox"/> 8. Housewife or looking after my own children <input type="checkbox"/> 9. Other (specify) <input type="checkbox"/>
B10	Do you have a bank account	1. Yes <input type="checkbox"/> 2. No <input type="checkbox"/>
B11	Do you have health insurance	1. Yes <input type="checkbox"/> 2. No <input type="checkbox"/>
B12	Do you have any radio/television/ internet in the household?	1. Yes <input type="checkbox"/> 2. No <input type="checkbox"/>
B13	Do you own a mobile phone?	1. Yes <input type="checkbox"/> 2. No <input type="checkbox"/>
B14	Mode of birth of baby?	1. Vaginal Birth <input type="checkbox"/> 2. Caesarean Section <input type="checkbox"/>

We have created a chart that women (and those that accompany women in birth) can use to assess the woman's health. This can be used for the first 24 hours following birth of baby.

Can I now ask your opinions on how acceptable a postnatal chart would be, how best the chart should be presented, and how to appropriately use the chart?

QUALITATIVE REPOSESES

Theme	Question Number	Questions	Field Notes Taken
Experience of postnatal care			
	Q01	<p><i>Tell me about your experience after the birth of your baby?</i></p> <p>Probes</p> <ul style="list-style-type: none"> • If positive, ask what made them happy • If negative, ask them to explain why and discuss what could make it better • Was this experience what you were expecting? 	
	Q02	<p><i>What are your views of the care women receive after they have had their baby, in Uganda?</i></p> <p>Probes</p> <ul style="list-style-type: none"> • Why do you say that? • If positive, explore what is good • If negative, explore what is important to them and what would make things better • What care should a woman receive after birth of baby? • Do you think this care is important? 	
Usability + Acceptability of Chart			
	Q03	<p><i>The post-natal self-assessment chart is a chart used by mothers and those accompanying them to assess their health following birth of baby. What are your views on a self-assessment chart for use in the postnatal period?</i></p> <p>Probes</p> <ul style="list-style-type: none"> • If useful, why would it be useful? • If not useful, why would it not be useful? • What barriers would prevent implementation of the chart? • What can we do to make the chart as acceptable as possible? 	
	Q04	<p><i>How would you feel about using a self-assessment chart to assess your (or the woman you are accompanying's) health?</i></p> <p>Probes</p> <ul style="list-style-type: none"> • Explore answer: • If positive why? • If negative, why? • Is there anything that would make you more willing/able to use the chart? 	

	Q05	<p>Are there any barriers and facilitators to using the self-assessment chart?</p> <p>Probes</p> <ul style="list-style-type: none"> • Explore opinion • For barriers ask how they can be overcome, if at all. • For facilitators ask how these can be optimised 																																																													
Content of Chart																																																															
	Q06	<p><i>If you were asked to measure the following signs and symptoms. Do you think they are <u>important</u> to be assessed following birth of baby?</i></p> <table border="1"> <thead> <tr> <th>Signs and Symptoms</th> <th>✓</th> <th>*</th> </tr> </thead> <tbody> <tr><td>Change in consciousness</td><td></td><td></td></tr> <tr><td>Seizure</td><td></td><td></td></tr> <tr><td>Severe Headache</td><td></td><td></td></tr> <tr><td>Persistent visual impairment</td><td></td><td></td></tr> <tr><td>Urinary incontinence</td><td></td><td></td></tr> <tr><td>Chest pain</td><td></td><td></td></tr> <tr><td>Shortness of breath</td><td></td><td></td></tr> <tr><td>Severe Pallor</td><td></td><td></td></tr> <tr><td>Suicidal/infanticidal</td><td></td><td></td></tr> <tr><td>Syncope/dizziness</td><td></td><td></td></tr> <tr><td>Fast Heartbeat</td><td></td><td></td></tr> <tr><td>Rejection of baby</td><td></td><td></td></tr> <tr><td>Heavy blood loss</td><td></td><td></td></tr> <tr><td>Soft flabby uterus</td><td></td><td></td></tr> <tr><td>Unable to urinate easily</td><td></td><td></td></tr> <tr><td>Foul smelling discharge</td><td></td><td></td></tr> <tr><td>Rigors</td><td></td><td></td></tr> <tr><td>Fever</td><td></td><td></td></tr> <tr><td>Abnormal Coloured Urine</td><td></td><td></td></tr> </tbody> </table> <p>Probes:</p> <ul style="list-style-type: none"> • Why do you agree? Why do you disagree? • Did any of these signs and symptoms surprise you and why? • Are the signs and symptoms appropriate? • Are there any missing signs and symptoms? • Are the signs and symptoms that are not necessary? 	Signs and Symptoms	✓	*	Change in consciousness			Seizure			Severe Headache			Persistent visual impairment			Urinary incontinence			Chest pain			Shortness of breath			Severe Pallor			Suicidal/infanticidal			Syncope/dizziness			Fast Heartbeat			Rejection of baby			Heavy blood loss			Soft flabby uterus			Unable to urinate easily			Foul smelling discharge			Rigors			Fever			Abnormal Coloured Urine			
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	Q07	<p><i>If you were asked to measure the following signs and symptoms. <u>Would you be able to check these yourself?</u></i></p> <table border="1"> <thead> <tr> <th>Signs and Symptoms</th> <th>✓</th> <th>*</th> </tr> </thead> <tbody> <tr><td>Change in consciousness</td><td></td><td></td></tr> <tr><td>Seizure</td><td></td><td></td></tr> <tr><td>Severe Headache</td><td></td><td></td></tr> <tr><td>Persistent visual impairment</td><td></td><td></td></tr> <tr><td>Urinary incontinence</td><td></td><td></td></tr> <tr><td>Chest pain</td><td></td><td></td></tr> <tr><td>Shortness of breath</td><td></td><td></td></tr> <tr><td>Severe Pallor</td><td></td><td></td></tr> <tr><td>Suicidal/infanticidal</td><td></td><td></td></tr> <tr><td>Syncope/dizziness</td><td></td><td></td></tr> <tr><td>Fast Heartbeat</td><td></td><td></td></tr> <tr><td>Rejection of baby</td><td></td><td></td></tr> <tr><td>Heavy blood loss</td><td></td><td></td></tr> <tr><td>Soft flabby uterus</td><td></td><td></td></tr> <tr><td>Unable to urinate easily</td><td></td><td></td></tr> <tr><td>Foul smelling discharge</td><td></td><td></td></tr> <tr><td>Rigors</td><td></td><td></td></tr> <tr><td>Fever</td><td></td><td></td></tr> <tr><td>Abnormal Coloured Urine</td><td></td><td></td></tr> </tbody> </table> <p>Probes:</p> <ul style="list-style-type: none"> • Why do you feel you could check this • Why do you feel you could not check this? • How could we help you check this? 	Signs and Symptoms	✓	*	Change in consciousness			Seizure			Severe Headache			Persistent visual impairment			Urinary incontinence			Chest pain			Shortness of breath			Severe Pallor			Suicidal/infanticidal			Syncope/dizziness			Fast Heartbeat			Rejection of baby			Heavy blood loss			Soft flabby uterus			Unable to urinate easily			Foul smelling discharge			Rigors			Fever			Abnormal Coloured Urine			
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	Q08	<p><i><u>Is there a better way to describe this sign or symptom and if so, using what words?</u></i></p> <div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center; margin-bottom: 5px;">+</div> <table border="1"> <thead> <tr> <th>Signs and Symptoms</th> <th>✓</th> <th>*</th> </tr> </thead> <tbody> <tr><td>Change in consciousness</td><td></td><td></td></tr> <tr><td>Seizure</td><td></td><td></td></tr> <tr><td>Severe Headache</td><td></td><td></td></tr> <tr><td>Persistent visual impairment</td><td></td><td></td></tr> <tr><td>Urinary incontinence</td><td></td><td></td></tr> <tr><td>Chest pain</td><td></td><td></td></tr> <tr><td>Shortness of breath</td><td></td><td></td></tr> <tr><td>Severe Pallor</td><td></td><td></td></tr> <tr><td>Suicidal/infanticidal</td><td></td><td></td></tr> <tr><td>Syncope/dizziness</td><td></td><td></td></tr> <tr><td>Fast Heartbeat</td><td></td><td></td></tr> <tr><td>Rejection of baby</td><td></td><td></td></tr> <tr><td>Heavy blood loss</td><td></td><td></td></tr> </tbody> </table>	Signs and Symptoms	✓	*	Change in consciousness			Seizure			Severe Headache			Persistent visual impairment			Urinary incontinence			Chest pain			Shortness of breath			Severe Pallor			Suicidal/infanticidal			Syncope/dizziness			Fast Heartbeat			Rejection of baby			Heavy blood loss																					
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		<table border="1"> <tr><td>Soft flabby uterus</td><td></td><td></td></tr> <tr><td>Unable to urinate easily</td><td></td><td></td></tr> <tr><td>Foul smelling discharge</td><td></td><td></td></tr> <tr><td>Rigors</td><td></td><td></td></tr> <tr><td>Fever</td><td></td><td></td></tr> <tr><td>Abnormal Coloured Urine</td><td></td><td></td></tr> </table>	Soft flabby uterus			Unable to urinate easily			Foul smelling discharge			Rigors			Fever			Abnormal Coloured Urine			
Soft flabby uterus																					
Unable to urinate easily																					
Foul smelling discharge																					
Rigors																					
Fever																					
Abnormal Coloured Urine																					
		<p>Probes:</p> <ul style="list-style-type: none"> • Are there any phrases that we should not use? • Are there any better phrases that we should use? 																			
Presentation of Chart																					
	Q09	<p><i>How should the overall chart best be presented to be acceptable and usable?</i></p> <p>Probe:</p> <ul style="list-style-type: none"> • What about other formats e.g. paper, audio, video, electronic (phone/ tablet/computer) • If on paper- should the chart be single paper use or wipeable 																			
	Q10	<p><i>How should the questions in the chart best be presented to be acceptable and usable?</i></p> <p>Probe:</p> <ul style="list-style-type: none"> • Should the questions be written down or in picture format or audio or visual? • How can you answer the questions e.g. tick box, scales, colour charts, 																			
Logistics of employing the chart																					
	Q11	<p><i>How can we best inform you of when you need to use the chart?</i></p> <p>Probe:</p> <ul style="list-style-type: none"> • Should we simply tell you timings from the start and you keep time? • Would you a beeper be useful as a reminder? • Are there any other ways you can think of to do this? 																			
	Q12	<p><i>What would be the best way for the chart to prompt you to seek a member of staff for professional help?</i></p> <p>Probe:</p> <ul style="list-style-type: none"> • Should it be an overall score or a colour? Smiley face or Sad face? 																			

	Q13	<p><i>If you needed to contact a member of staff for help, what do you think is the best way you can do this?</i></p> <p>Probe:</p> <ul style="list-style-type: none"> • How do you do it usually? • Who does it? • How do you call for help at night? 	
Training of the chart			
	Q14	<p><i>How best should we provide training to you on how to use the chart?</i></p> <p>Probe:</p> <ul style="list-style-type: none"> • How should training be provided? E.g. Face to face, group session, clinics, digitally • Should it be repeated or given in one go? • How much training would you require? 	
	Q15	<p><i>When should training for the chart be provided to you?</i></p> <p>Probe:</p> <ul style="list-style-type: none"> • When in pregnancy and childbirth should information and training for the chart be best given e.g. antenatal, intrapartum, postnatal • Should it be repeated or done once? 	

[At the close of the interview briefly summarise the main points to confirm interpretation with the participant]

[Ask if they wish to expand any responses or add anything else to the discussion]

[Ask how they feel after talking about these experiences and ascertain whether they want you to contact anyone (family, friend, health worker, counsellor)?]

[Ensure the participant has contact details for the local research team should they wish to discuss any aspect of the study]

[Thank them for participating]

[Complete field notes]

Appendix 1.4: Key Informant Interview Case Report Form



Case Report Form- KI interview

[Introduce yourself, thank participant for taking part and confirm agrees to interview taking place. Ensure environment is comfortable. Discuss the following issues]:

- Review the nature and purpose of the research.
- No right or wrong answers, aim to understand experiences.
- Confidentiality, use of data.
- Explain the use of data recorder, transcription, use of pseudonym (invite to choose), use of verbatim quotes, will be taking field notes.
- Researcher aware that discussion might cause distress, explain can decline to answer any question or prompt; can ask to stop at any time if feels need to.
- Expected duration of interview.
- Check consent form signed, complete demographics questionnaire.
- Ask if any questions.

May I take a few details from you?

IDENTIFICATION

I01 Participant Number

I02 Date of Interview

May I record our conversation? [Check Recorder Working]

I03 Consent to Record Conversation Yes No

What name would you like to be referred to in the study

I04 Pseudonym _____

BACKGROUND INSTITUTIONAL INFORMATION

May I ask you a few questions about your institution?

B01 Please describe your organization (tick the most appropriate response)

- Academic/research institution
- Donor
- Government/ministry
- Medical/health organization
- NGO/PVO (local and international)
- Private sector (for profit)
- United Nations System
- Other _____

B02 Please describe your current role within the organization (tick the most appropriate response)

- Administrator
- Researcher
- Senior leadership: Director etc.
- Program Manager
- Monitoring and evaluation officer
- Community health worker/officer
- Medical personnel
- Advisor _____
- Other _____

B03 Which role(s) does your organization play within the local, national, regional, or global maternal health sector? (Tick all that apply)

- Advocacy
- Health communication
- Health/medical service delivery
- Policymaking
- Program development/management
- Research/evaluation
- Teaching/training
- Other _____

B04 How long have you held this position?

Years Months

Can I now ask your opinion about immediate postnatal care provision and utilisation in Uganda. We have five minutes per question so please be succinct.

QUALITATIVE INTERVIEW

THEMES	QUESTION NUMBER	QUESTION	FIELD NOTES TAKEN
Existing coverage and utilisation of immediate postnatal care			
	Q01	<p><i>In your opinion, what care should be given to women in the first 24 hours following a facility birth?</i></p> <p>Probes:</p> <ul style="list-style-type: none"> • How long should they stay in the facility? • How often should they be seen by a healthcare professional? • What signs and symptoms should be assessed? 	
	Q02	<p><i>In your experience, what care do women receive in the first 24 hours following a facility birth?</i></p> <p>Probes:</p> <ul style="list-style-type: none"> • Explore why • If not optimum, ask for rationale and potential solutions- why don't they? 	
Barriers to the coverage and utilisation of immediate postnatal care			
	Q03	<p><i>Can you think of any barriers or facilitators to the coverage and utilisation of immediate postnatal care that exist?</i></p> <p>Probes:</p> <ul style="list-style-type: none"> • Why are they barriers? How can they be overcome if at all? • What do you see as a solution? How can these be optimised? 	

	Q04	<p>Using data taken from the 2016 DHS survey, we found that the following factors were associated with receiving immediate postnatal care:</p> <table border="1"> <thead> <tr> <th>Factor</th> </tr> </thead> <tbody> <tr><td>Private Sector Birth</td></tr> <tr><td>Richest Wealth Quintile</td></tr> <tr><td>Central zone residence</td></tr> <tr><td>Holding a secondary or higher education</td></tr> <tr><td>Married</td></tr> <tr><td>Having a Bank Account</td></tr> <tr><td>Having Health Insurance</td></tr> <tr><td>Receiving ante-natal care</td></tr> <tr><td>Reading a newspaper</td></tr> <tr><td>Listening to the radio</td></tr> <tr><td>Watching TV</td></tr> <tr><td>Using the internet</td></tr> <tr><td>Having a mobile phone</td></tr> <tr><td>Having a female baby</td></tr> <tr><td>Having a baby weighed at birth</td></tr> <tr><td>Having a caesarean section</td></tr> <tr><td>Having your birth conducted by a Doctor or NPC</td></tr> </tbody> </table> <p>What are your opinion on these?</p> <p>Probes:</p> <ul style="list-style-type: none"> • Are these what you would expect or are any unexpected? • Are there any other factors that you think may be important? • Why would these factors be associated with receiving postnatal care? 	Factor	Private Sector Birth	Richest Wealth Quintile	Central zone residence	Holding a secondary or higher education	Married	Having a Bank Account	Having Health Insurance	Receiving ante-natal care	Reading a newspaper	Listening to the radio	Watching TV	Using the internet	Having a mobile phone	Having a female baby	Having a baby weighed at birth	Having a caesarean section	Having your birth conducted by a Doctor or NPC	
Factor																					
Private Sector Birth																					
Richest Wealth Quintile																					
Central zone residence																					
Holding a secondary or higher education																					
Married																					
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Having Health Insurance																					
Receiving ante-natal care																					
Reading a newspaper																					
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Watching TV																					
Using the internet																					
Having a mobile phone																					
Having a female baby																					
Having a baby weighed at birth																					
Having a caesarean section																					
Having your birth conducted by a Doctor or NPC																					
	Q05	<p>What may impact on the provision and utilisation of immediate postnatal care? And how?</p> <p>Probe</p> <ul style="list-style-type: none"> • Resources • Training • Skill-mix • Attitudes • Environment 																			

	Q06	<p><i>Can Health care facilities and supplies affect provision and utilisation of Immediate postnatal care? And how?</i></p> <p>Probe</p> <ul style="list-style-type: none"> • Are facilities adequate to provide care e.g. electricity, clean private spaces, running water • Is there sufficient access to resources, drugs and equipment and supplied? 	
Strategies to improve utilisation of immediate postnatal care			
	Q07	<p><i>Can you describe any strategies you know of that have been used in Uganda to overcome any barriers and improve the coverage and utilisation of immediate postnatal care?</i></p>	
	Q08	<p><i>Do you think increasing facility based births has had an effect on immediate postnatal care coverage and utilisation?</i></p> <p>Probes</p> <ul style="list-style-type: none"> • If yes, in what way has it had this effect? • What factors would prevent this effect from happening? • What factors could enhance this effect happening? 	
	Q09	<p><i>You might have heard of task-shifting which is a process where certain tasks are delegated to less specialised health workers. Do you think using task-shifting could improve immediate postnatal care coverage and utilisation? If so How?</i></p> <p>Probes</p> <ul style="list-style-type: none"> • Why do you think it could have this effect? • What factors would prevent this effect from happening? • What factors could enhance this effect happening? 	
	Q10	<p><i>What do you think the effect of involving women or their birth partners in their care has on immediate postnatal care coverage and utilisation?</i></p> <p>Probes</p> <ul style="list-style-type: none"> • Why do you think it could have this effect? • What factors would prevent this effect from happening? • What factors could enhance this effect happening? 	

Post Natal Maternal Self-Assessment Tool			
	Q11	<p><i>You might have heard of a self-assessment chart which mothers can use to assess their own health. What do you think about mothers using a self-assessment tool to assess their health to increase coverage and utilisation of postnatal care?</i></p> <p>Probes</p> <ul style="list-style-type: none"> • If useful, why would it be useful? • If not useful, why would it not be useful? • What barriers would prevent implementation of the tool? • How can you make the tool most acceptable to be implemented? 	

[At the close of the interview briefly summarise the main points to confirm interpretation with the participant]

[Ask if they wish to expand any responses or add anything else to the discussion]




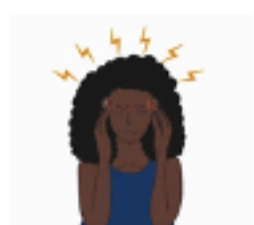



[Ask how they feel after talking about these experiences and ascertain whether they want you to contact anyone (family, friend, health worker, counsellor)?]




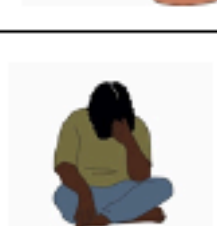


[Ensure the participant has contact details for the local research team should they wish to discuss any aspect of the study]



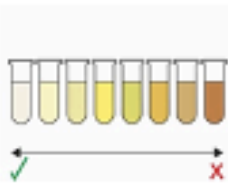
[Thank them for participating]

[Complete field notes]

Appendix 1.5: Draft ImPoWA tool for Pre-test

Q.No	Audio description	Sign/ Symptom	Tool Picture	Answers
T01	"Where the mother feels dizzy, weak or has a lack of energy to get out of bed and cannot walk on her own without support or collapses"	Collapse		1. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> 2. <input checked="" type="checkbox"/> No <input type="checkbox"/>
T02	"Where the mother experiences severe chills or is abnormally and uncontrollably shaking or shivering or has a seizure"	Convulsion		1. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> 2. <input checked="" type="checkbox"/> No <input type="checkbox"/>
T03	"When the mother has a high body temperature and is hot to touch like malaria"	High Temperature		1. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> 2. <input checked="" type="checkbox"/> No <input type="checkbox"/>
T04	"Where the mother feels a pain in the head that is the worst headache pain she's ever had"	Severe Headache		1. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> 2. <input checked="" type="checkbox"/> No <input type="checkbox"/>
T05	"Where the mother has new issues with her sight, where she is not seeing well or clearly, or she cannot see at all."	Blurring of vision		1. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> 2. <input checked="" type="checkbox"/> No <input type="checkbox"/>
T06	"Where the mother feels a pain in her chest or when taking a deep breath that is the worst pain she's ever had"	Chest Pain		1. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> 2. <input checked="" type="checkbox"/> No <input type="checkbox"/>
T07	"Where the mother feels her heart is beating fast"	Palpitations		1. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> 2. <input checked="" type="checkbox"/> No <input type="checkbox"/>

T08	"Where the mother feels she has difficulty breathing, is short of breath or is breathing very fast"	Difficulty in breathing		1. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> 2. <input checked="" type="checkbox"/> No <input type="checkbox"/>
T09	"Where the mother looks anaemic. For example there is a change in her skin colour, tongue or under her eye to become more pale, white or yellow"	Severe Pallor		1. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> 2. <input checked="" type="checkbox"/> No <input type="checkbox"/>
T10	"Where the mother acts strangely to the baby or does not want the baby near her or is refusing to breastfeed the baby"	Refusal of the baby		1. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> 2. <input checked="" type="checkbox"/> No <input type="checkbox"/>
T11	"Where the mother feels worried or stressed and has a feeling of harming or hurting herself or her baby, or has no love for herself or her baby, or is tired of living"	Harm to herself or baby		1. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> 2. <input checked="" type="checkbox"/> No <input type="checkbox"/>
T12	"Where the mother is bleeding excessively and uncontrollably. For example, in the first 30 minutes after birth, she may have a gush of blood so that more than 2 of her pads are soaked with blood or blood is overflowing and soaking her clothes. Or she may continue to trickle blood continuously needing her to change her pad very frequently- 1 pad every 5 minutes with her bleeding increasing instead of decreasing following birth"	Heavy blood loss		1. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> 2. <input checked="" type="checkbox"/> No <input type="checkbox"/>
T13	"Where the mother smells an unpleasant, foul smell coming from her vagina or a release of bad smelling discharge or pus from her vagina"	Foul smelling discharge		1. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> 2. <input checked="" type="checkbox"/> No <input type="checkbox"/>

T14	"Where the mother is unable to pass urine normally, or does not feel the urge to pass urine or has pain when passing urine"	Difficulty passing urine		1. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> 2. <input checked="" type="checkbox"/> No <input type="checkbox"/>
T15	"Where the mother is passing urine with no control and her bedding and clothes are wet with urine"	Leakage of urine		1. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> 2. <input checked="" type="checkbox"/> No <input type="checkbox"/>
T16	"Where the mother has urine that is not pale yellow or not clear"	Abnormal coloured urine		1. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> 2. <input checked="" type="checkbox"/> No <input type="checkbox"/>

Appendix 1.6: Pre-test Survey Case Report Form



Case Report Form- Quantitative Survey (Women+ Birth Partners)

[READ ALOUD]

Thank you for agreeing to take part in these key informant interviews. We have created a draft tool for women and their birth partners to use following birth of baby to check on their health. We would like you to use the tool to see if it makes sense to you and seek your advice on any improvements we should make.

Before we begin, do you have any questions?

May I take a few details from you

IDENTIFICATION

I01 Participant Number

I02 Date of Interview

I03 Role in Birth Woman

Birth Partner/Companion

N/B Birth Partner has to have remained as the primary birth partner/companion for the first 24 hours following birth of baby

What name would you like to be referred to in the study

I05 Pseudonym _____

May I ask a few questions about your background?**BACKGROUND**

Q.No	Questions and Filters	Answers
B01	Place of Residence	1. Rural <input type="checkbox"/> 2. Urban <input type="checkbox"/>
B02	Age of participant	1. 15-24 years <input type="checkbox"/> 2. 25-34 years <input type="checkbox"/> 3. 35-44 years <input type="checkbox"/> 4. 45-54 years <input type="checkbox"/> 5. \geq 55 <input type="checkbox"/>
B03	Gender of participant	1. Male <input type="checkbox"/> 2. Female <input type="checkbox"/>
B04	How many times have you (or the woman you are accompanying) given birth, including this pregnancy?	<input type="text"/> <input type="text"/>
B05	Current Marital status of the participant	1. Married <input type="checkbox"/> 2. Divorced <input type="checkbox"/> 3. Single <input type="checkbox"/> 4. Widowed <input type="checkbox"/>
B06	Religion of the participant	1. Protestant <input type="checkbox"/> 2. Catholic <input type="checkbox"/> 3. Other Christian <input type="checkbox"/> 4. Muslim <input type="checkbox"/> 5. Other (specify) <input type="checkbox"/>
B07	First Language Spoken (other than English)	1. Ateso <input type="checkbox"/> 2. Lumbasa <input type="checkbox"/> 3. Lugwere <input type="checkbox"/> 4. Other (specify) <input type="checkbox"/>
B08	Educational level of the participant	1. Unable to read and write <input type="checkbox"/> 2. Read and write <input type="checkbox"/> 3. Completed Primary Education <input type="checkbox"/> 4. Completed Secondary Education <input type="checkbox"/> 5. Completed College and Above <input type="checkbox"/>
B09	What do you spend most of the time doing ? (Employment)	1. Farming- Home garden <input type="checkbox"/> 2. Farm Labourer <input type="checkbox"/> 3. Professional (teacher, medical, nurse) <input type="checkbox"/> 4. Labouring (construction, factory) <input type="checkbox"/> 5. Office job <input type="checkbox"/> 6. Business (employed or self-employed) <input type="checkbox"/> 7. Domestic work (paid) <input type="checkbox"/> 8. Housewife or looking after my own children <input type="checkbox"/> 9. Other (specify) <input type="checkbox"/>





B10	Do you have a bank account	1. Yes <input type="checkbox"/> 2. No <input type="checkbox"/>
B11	Do you have health insurance	1. Yes <input type="checkbox"/> 2. No <input type="checkbox"/>
B12	Do you have any radio/television/ internet in the household?	1. Yes <input type="checkbox"/> 2. No <input type="checkbox"/>
B13	Do you own a mobile phone?	1. Yes <input type="checkbox"/> 2. No <input type="checkbox"/>
B14	Mode of birth of baby?	1. Vaginal Birth <input type="checkbox"/> 2. Caesarean Section <input type="checkbox"/>










I am firstly going to show you the pictures in the tool.




[Show only the pictures within the draft tool]

Please could you tell me what each one means to you

MEANING OF PICTURES

Q.No	Tool Question	Answers	Outcome	FIELD NOTES TAKEN
T01			1. Fully Correct <input type="checkbox"/> 2. Generally Correct <input type="checkbox"/> 3. Partially Wrong <input type="checkbox"/> 4. Completely Wrong <input type="checkbox"/>	
T02			1. Fully Correct <input type="checkbox"/> 2. Generally Correct <input type="checkbox"/> 3. Partially Wrong <input type="checkbox"/> 4. Completely Wrong <input type="checkbox"/>	
T03			1. Fully Correct <input type="checkbox"/> 2. Generally Correct <input type="checkbox"/> 3. Partially Wrong <input type="checkbox"/> 4. Completely Wrong <input type="checkbox"/>	
T04			1. Fully Correct <input type="checkbox"/> 2. Generally Correct <input type="checkbox"/> 3. Partially Wrong <input type="checkbox"/> 4. Completely Wrong <input type="checkbox"/>	

T05			1. Fully Correct <input type="checkbox"/> 2. Generally Correct <input type="checkbox"/> 3. Partially Wrong <input type="checkbox"/> 4. Completely Wrong <input type="checkbox"/>	
T06			1. Fully Correct <input type="checkbox"/> 2. Generally Correct <input type="checkbox"/> 3. Partially Wrong <input type="checkbox"/> 4. Completely Wrong <input type="checkbox"/>	
T07			1. Fully Correct <input type="checkbox"/> 2. Generally Correct <input type="checkbox"/> 3. Partially Wrong <input type="checkbox"/> 4. Completely Wrong <input type="checkbox"/>	
T08			1. Fully Correct <input type="checkbox"/> 2. Generally Correct <input type="checkbox"/> 3. Partially Wrong <input type="checkbox"/> 4. Completely Wrong <input type="checkbox"/>	
T09			1. Fully Correct <input type="checkbox"/> 2. Generally Correct <input type="checkbox"/> 3. Partially Wrong <input type="checkbox"/> 4. Completely Wrong <input type="checkbox"/>	
T10			1. Fully Correct <input type="checkbox"/> 2. Generally Correct <input type="checkbox"/> 3. Partially Wrong <input type="checkbox"/> 4. Completely Wrong <input type="checkbox"/>	
T11			1. Fully Correct <input type="checkbox"/> 2. Generally Correct <input type="checkbox"/> 3. Partially Wrong <input type="checkbox"/> 4. Completely Wrong <input type="checkbox"/>	
T12			1. Fully Correct <input type="checkbox"/> 2. Generally Correct <input type="checkbox"/> 3. Partially Wrong <input type="checkbox"/> 4. Completely Wrong <input type="checkbox"/>	
T13			1. Fully Correct <input type="checkbox"/> 2. Generally Correct <input type="checkbox"/> 3. Partially Wrong <input type="checkbox"/> 4. Completely Wrong <input type="checkbox"/>	

T14			1. Fully Correct <input type="checkbox"/> 2. Generally Correct <input type="checkbox"/> 3. Partially Wrong <input type="checkbox"/> 4. Completely Wrong <input type="checkbox"/>	
T15			1. Fully Correct <input type="checkbox"/> 2. Generally Correct <input type="checkbox"/> 3. Partially Wrong <input type="checkbox"/> 4. Completely Wrong <input type="checkbox"/>	
T16			1. Fully Correct <input type="checkbox"/> 2. Generally Correct <input type="checkbox"/> 3. Partially Wrong <input type="checkbox"/> 4. Completely Wrong <input type="checkbox"/>	

I am now going to show you the full tool and ask you to complete it.

This is a tool with a series of questions about certain health problems that can happen following birth of your baby. It is important to check on your health following birth of your baby to keep you safe.

For each health problem we ask you to answer if you or the woman you are accompanying are experiencing this health problem now.

[Provide the printed full draft tool and pen to complete]

The tool has pictures, words and an audio description which I will play for you.

If you are suffering with any of these symptoms you can write a "tick" or check the box on this form and please do alert an attendant or health-care worker.

Please do highlight any problems you have.

FILLING OUT TOOL

[Make notes on the participant using the tool]

Q.No	Tool Question	FIELD NOTES TAKEN
T01	Collapse	
T02	Convulsion	
T03	High Temperature	
T04	Severe Headache	
T05	Blurring of vision	
T06	Chest Pain	
T07	Palpitations	

T08	Difficulty in breathing	
T09	Severe Pallor	
T10	Refusal of the baby	
T11	Harm to herself or baby	
T12	Heavy blood loss	
T13	Foul smelling discharge	
T14	Difficulty passing urine	
T15	Leakage of urine	
T16	Abnormal coloured urine	

Can you now rephrase each question in your own words to try and keep the meaning as close to the original as possible

MEANING OF TOOL

Q.No	Tool Question	Answers	Outcome	FIELD NOTES TAKEN
M01	Collapse		1. Fully Correct <input type="checkbox"/> 2. Generally Correct <input type="checkbox"/> 3. Partially Wrong <input type="checkbox"/> 4. Completely Wrong <input type="checkbox"/>	
M02	Convulsion		1. Fully Correct <input type="checkbox"/> 2. Generally Correct <input type="checkbox"/> 3. Partially Wrong <input type="checkbox"/> 4. Completely Wrong <input type="checkbox"/>	
M03	High Temperature		1. Fully Correct <input type="checkbox"/> 2. Generally Correct <input type="checkbox"/> 3. Partially Wrong <input type="checkbox"/> 4. Completely Wrong <input type="checkbox"/>	
M04	Severe Headache		1. Fully Correct <input type="checkbox"/> 2. Generally Correct <input type="checkbox"/> 3. Partially Wrong <input type="checkbox"/> 4. Completely Wrong <input type="checkbox"/>	
M05	Blurring of vision		1. Fully Correct <input type="checkbox"/> 2. Generally Correct <input type="checkbox"/> 3. Partially Wrong <input type="checkbox"/> 4. Completely Wrong <input type="checkbox"/>	
M06	Chest Pain		1. Fully Correct <input type="checkbox"/> 2. Generally Correct <input type="checkbox"/> 3. Partially Wrong <input type="checkbox"/> 4. Completely Wrong <input type="checkbox"/>	

M07	Palpitations		1. Fully Correct <input type="checkbox"/> 2. Generally Correct <input type="checkbox"/> 3. Partially Wrong <input type="checkbox"/> 4. Completely Wrong <input type="checkbox"/>	
M08	Difficulty in breathing		1. Fully Correct <input type="checkbox"/> 2. Generally Correct <input type="checkbox"/> 3. Partially Wrong <input type="checkbox"/> 4. Completely Wrong <input type="checkbox"/>	
M09	Severe Pallor		1. Fully Correct <input type="checkbox"/> 2. Generally Correct <input type="checkbox"/> 3. Partially Wrong <input type="checkbox"/> 4. Completely Wrong <input type="checkbox"/>	
M10	Refusal of the baby		1. Fully Correct <input type="checkbox"/> 2. Generally Correct <input type="checkbox"/> 3. Partially Wrong <input type="checkbox"/> 4. Completely Wrong <input type="checkbox"/>	
M11	Harm to herself or baby		1. Fully Correct <input type="checkbox"/> 2. Generally Correct <input type="checkbox"/> 3. Partially Wrong <input type="checkbox"/> 4. Completely Wrong <input type="checkbox"/>	
M12	Heavy blood loss		1. Fully Correct <input type="checkbox"/> 2. Generally Correct <input type="checkbox"/> 3. Partially Wrong <input type="checkbox"/> 4. Completely Wrong <input type="checkbox"/>	
M13	Foul smelling discharge		1. Fully Correct <input type="checkbox"/> 2. Generally Correct <input type="checkbox"/> 3. Partially Wrong <input type="checkbox"/> 4. Completely Wrong <input type="checkbox"/>	
M14	Difficulty passing urine		1. Fully Correct <input type="checkbox"/> 2. Generally Correct <input type="checkbox"/> 3. Partially Wrong <input type="checkbox"/> 4. Completely Wrong <input type="checkbox"/>	
M15	Leakage of urine		1. Fully Correct <input type="checkbox"/> 2. Generally Correct <input type="checkbox"/> 3. Partially Wrong <input type="checkbox"/> 4. Completely Wrong <input type="checkbox"/>	
M16	Abnormal coloured urine		1. Fully Correct <input type="checkbox"/> 2. Generally Correct <input type="checkbox"/> 3. Partially Wrong <input type="checkbox"/> 4. Completely Wrong <input type="checkbox"/>	

I am now going to ask you some questions about how you found answering the tool. You can also write notes or suggestions on the chart itself.

DEBRIEF OF TOOL

Q.No	Questions and Filters	Answers	ANSWER	FIELD NOTES TAKEN
D01	How well does the tool assess your health in the immediate postnatal period?	1. Extremely suitable <input type="checkbox"/> 2. Suitable <input type="checkbox"/> 3. Unsuitable <input type="checkbox"/> 4. Very Unsuitable <input type="checkbox"/> 5. Irrelevant <input type="checkbox"/>		
D02	Did the tool look acceptable to you? Probe <ul style="list-style-type: none"> • how could we improve the format? Paper, digital • how could we make the tool more engaging? Colour, pictures, words 	1. Yes <input type="checkbox"/> 2. No <input type="checkbox"/>		
D03	Was the information on how to use the questionnaire clear and easy to understand? Probe <ul style="list-style-type: none"> • If not why was it not clear or easy to understand? • How can we make the explanation clearer? • Was the format of delivery of information E.g. digital, verbal, written appropriate? 	1. Yes <input type="checkbox"/> 2. No <input type="checkbox"/>		
D04	Was the tool itself easy to use? Probe <ul style="list-style-type: none"> • If not what could make the tool easier to use? 	1. Yes <input type="checkbox"/> 2. No <input type="checkbox"/>		

D05	<p>Were there any words/ phrases that were not clear to you in the questions?</p> <p>Probe</p> <ul style="list-style-type: none"> • If so which words? • Why were they unclear? Were they vague or ambiguous? • Was there too much jargon? • Which words/ phrases would you have preferred? 	<p>1. Yes <input type="checkbox"/></p> <p>2. No <input type="checkbox"/></p>		
D06	<p>Were you comfortable answering this question?</p> <p>Probe</p> <ul style="list-style-type: none"> • If not, why did you not feel comfortable? • If not, what would have made you more comfortable? 	<p>1. Yes <input type="checkbox"/></p> <p>2. No <input type="checkbox"/></p>		
D07	<p>Do you have any further suggestions of how to make the tool useful for use for mothers and birth partners following birth of baby?</p>			
D08	<p>Overall, if this was amended as suggested, do you think that we should continue to develop this tool?</p>	<p>1. Yes <input type="checkbox"/></p> <p>2. No <input type="checkbox"/></p>		

Those are all my questions. Do you have any further questions?

Thank you so much for participating in the interviews.

*******FOR RESEARCHER USE *******

Please answer the following questions:

Q.No	Questions and Filters	Answers	ANSWERS	FIELD NOTES TAKEN
R01	<p>Were there any problems you identified in explanation of how to use the tool</p> <p>Probe</p> <ul style="list-style-type: none"> • If so, what were the problems? • How did you overcome the problems? 	<p>1. Yes <input type="checkbox"/></p> <p>2. No <input type="checkbox"/></p>		

Appendix 1.7: Final Tool


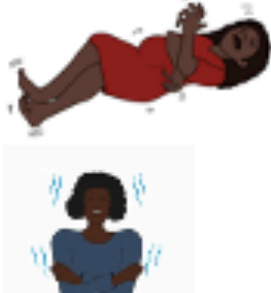


Congratulations on the birth of your baby.








Please use this tool to check on your health for the next 24 hours.





Please go through each question, looking at the words, picture and playing the audio recording.


If you are suffering with any of these symptoms you can write a "tick" or check the box on this form and please do alert an attendant or health-care worker.

If you do not experience any of the symptoms, please recheck in 2 hours.

Q.No	Sign/ Symptom	Audio Explanation*	Tool Picture	Answers
T01	Collapse	"Where the mother feels dizzy, weak or has a lack of energy to get out of bed and cannot walk on her own without support or collapses"		1. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> 2. <input checked="" type="checkbox"/> No <input type="checkbox"/>
T02	Convulsion	"Where the mother experiences severe chills or is moving abnormally and uncontrollably shaking or shivering or has a seizure"		1. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> 2. <input checked="" type="checkbox"/> No <input type="checkbox"/>
T03	High Temperature	"When the mother has a high body temperature and is hot to touch like malaria"		1. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> 2. <input checked="" type="checkbox"/> No <input type="checkbox"/>
T04	Severe Headache	"Where the mother feels a pain in the head that is the worst headache pain she's ever had"		1. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> 2. <input checked="" type="checkbox"/> No <input type="checkbox"/>

T05	Blurring of vision	"Where the mother has new issues with her sight, where she is not seeing well or clearly, losing her sight, or she cannot see at all."		1. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> 2. <input checked="" type="checkbox"/> No <input type="checkbox"/>
T06	Chest Pain	"Where the mother feels a pain in her chest or when taking a deep breath that is the worst pain she's ever had"		1. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> 2. <input checked="" type="checkbox"/> No <input type="checkbox"/>
T07	Palpitations	"Where the mother feels her heart is beating fast"		1. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> 2. <input checked="" type="checkbox"/> No <input type="checkbox"/>
T08	Difficulty in breathing	"Where the mother feels she has difficulty breathing, is short of breath or is breathing very fast"		1. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> 2. <input checked="" type="checkbox"/> No <input type="checkbox"/>
T09	Severe Pallor	"Where the mother looks anaemic and her body has not enough blood. For example there is a change in her skin colour, tongue or under her eye to become more pale, white or yellow"		1. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> 2. <input checked="" type="checkbox"/> No <input type="checkbox"/>
T10	Refusal of the baby	"Where the mother acts strangely to the baby or does not want the baby near her or is refusing to breastfeed the baby"		1. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> 2. <input checked="" type="checkbox"/> No <input type="checkbox"/>
T11	Harm to herself or baby	"Where has a feeling of harming or hurting herself or her baby, or has no love for herself or her baby, or is tired of living"		1. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> 2. <input checked="" type="checkbox"/> No <input type="checkbox"/>

T12	Heavy blood loss	<p>"Where the mother is bleeding excessively and uncontrollably. For example, in the first 30 minutes after birth, she may have a gush of blood so that more than 2 of her pads are soaked with blood or blood is overflowing and soaking her clothes. Or she may continue to trickle blood continuously needing her to change her pad very frequently- 1 pad every 5 minutes with her bleeding increasing instead of decreasing following birth"</p>		<p>1. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> 2. <input checked="" type="checkbox"/> No <input type="checkbox"/></p>
T13	Foul smelling discharge	<p>"Where the mother's private parts start to smell bad and she releases green or yellow thick fluid or discharge from her vagina that may look like pus;</p>		<p>1. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> 2. <input checked="" type="checkbox"/> No <input type="checkbox"/></p>
T14	Difficulty passing urine	<p>"Where the mother is unable to pass urine normally, or does not feel the urge to pass urine or has pain when passing urine"</p>		<p>1. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> 2. <input checked="" type="checkbox"/> No <input type="checkbox"/></p>
T15	Leakage of urine	<p>"Where the mother is passing urine with no control and her bedding and clothes are wet with urine"</p>		<p>1. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> 2. <input checked="" type="checkbox"/> No <input type="checkbox"/></p>

T16	Abnormal coloured urine	"Where the mother has urine that is not pale yellow or not clear"		1. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> 2. <input checked="" type="checkbox"/> No <input type="checkbox"/>
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Appendix 2- Study Methods Materials

Appendix 2.1: Searching strategy matrix

1. Guideline
2. Guidelin*
3. SoP*
4. Standard operating procedur*
5. Tool
6. Tool*
7. Toolkit
8. Tool-kit
9. Tool-kit*
10. Toolkit*
11. Checklist
12. Check list
13. Check list*
14. Checklist*
15. Standard
16. Standard*
17. Protocol
18. Protocol*
19. Policy
20. Polic*
21. Position Statement*
22. Job Aid*
23. Consensus*
24. Recommendation
25. Recommendation*
26. Screening
27. Assess
28. Assessment
29. Assessment*
30. Report*
31. Criteria
32. Criteri*
33. Care-plan
34. Careplan
35. Care plan
36. Process*
37. Postnatal
38. Post-natal
39. Post natal
40. Postpartum
41. Post partum
42. Post-partum
43. Intrapartum

44. Intra partum
45. Intra-partum
46. Pregnanc*
47. Maternal
48. Maternity
49. Matern*
50. Afterbirth
51. After birth
52. After-birth
53. Postbirth
54. Post birth
55. Post-birth
56. 1 OR 2 OR 3 OR 4 OR 5 OR 6 OR 7 OR 8 OR 9 OR 10 OR 11 OR 12 OR 13 OR 14 OR 15 OR 16 OR 17 OR 18 OR 19 OR 20 OR 21 OR 22 OR 23 OR 24 OR 25 OR 26 OR 27 OR 28 OR 29 OR 30 OR 31 OR 32 OR 33 OR 34 OR 35 OR 36 57. 37 OR 38 OR 39 OR 40 OR 41 OR 42 OR 43 OR 44 OR 46 OR 47 OR 48 OR 49 OR 50 OR 51 OR 51 OR 53 OR 54 OR 55 58. 56 AND 57

Appendix 2.2: Multi-stage search strategy

The following published literature data bases were searched:

- PubMed – Medline
- EMBASE
- Cochrane Library
- CINAHL
- Lilacs
- TRIP
- CMA (Canadian Medical Association Infobase)
- E-guidelines
- Geneva Foundation for Medical education and Research (GFMER)
- WHO Guideline Repository
- National guideline clearing house
- International Guideline library
- African Index Medicus
- African Journals Online
- Global Health Library

The following grey literature databases were searched

- Google scholar
- Scopus
- Grey Matters

Handsearching of the following Obstetrics and midwifery society web pages were conducted:

- Royal College of Obstetricians and Gynaecologists (RCOG)
- American College of Obstetricians and Gynaecologists (ACOG)
- The International Federation of Gynaecology and Obstetrics (FIGO)
- The Chinese Society of Obstetrics and Gynaecology (CSOG)

- National College of Gynaecologists and Obstetricians - France (CNGOF)
- The International Society of Ultrasound in Obstetrics and Gynaecology (ISUOG)
- Japan Society of Obstetrics and Gynaecology (JSOG)
- Society of Obstetricians and Gynaecologists of Canada (SOGC)
- Royal Australian and New Zealand College of Obstetrician and Gynaecologists (RANZCOG)
- European Board & College of Obstetrics and Gynaecology (EBCOG)
- Royal College of Midwives
- International Confederation of Midwives
- The Global Library of Women's medicine (GLOWM)
- The German Society for Gynaecology and Obstetrics (DGGG)
- Czech Gynaecological and Obstetrical society
- Nordic Societies of Obstetrics and Gynaecology
- Italian Society of Gynaecology and Obstetrics
- Association of the Hungarian Obstetricians and Gynaecologists
- Italian Association of hospital Obstetricians and Gynaecologists (AOGOI)
- Swedish Society of Obstetricians and Gynaecologists (SFOG)
- The neverlands society of obstetrics and gynaecology
- Nordic Federation of Obstetrics and Gynaecology (NFOG)
- Federation of Obstetric and Gynaecological Societies of India (FOGSI)
- European Network of Trainees in Obstetrics and Gynaecology (ENTOG)
- Russian Society of Obstetrics and Gynaecology (RSOG)
- Federation of Latin American Societies of Obstetrics and Gynaecology (FLAGSOG)
- Clinical Practice and Guidelines Societies
- Guidelines International Network Library
- Academy of Medicine of Malaysia
- New Zealand and Australian Clinical Practice Guidelines (NZA)
- Australian Clinical Practice Guidelines
- Guidelines International Network
- Centre for Reviews and Dissemination
- Campbell Collaboration
- EQUATOR Network National Health Organisations
- CDC
- ECRI
- Institute for Clinical Systems Improvement
- HAS- French National Authority for Health
- Belgium Healthcare Knowledge Centre
- Australian Government National Health and Medical Research Council (NHMRC)
- Canadian CPG Infobase
- The National Institute for Health and Care Excellence (NICE)
- Scottish Intercollegiate Guidelines Network (SIGN)
- Agency Healthcare Research and Quality (AHRQ)
- United States Agency for International Development (USAID)
- Institute for Clinical Systems Improvement (ICSI)
- Institute for healthcare improvement (IHI)

Hand searching of the following multilateral health organisations was conducted:

- World Health Organisation
- UNICEF
- UNFPA

Handsearching of the following non-governmental organisations was conducted:

- Johns Hopkins Program for International Education in Gynaecology and Obstetrics (JHPEIGO)
- Effective Public Health Practice Project
- Joanna Briggs Institute
- Women Deliver

Appendix 3- Additional Study Results

Appendix 3.1: BMJ Global Health Published Manuscript

Immediate postnatal care following childbirth in Ugandan health facilities: an analysis of Demographic and Health Surveys between 2001 and 2016

Teesta Dey ¹, Sam Ononge,² Andrew Weeks,¹ Lenka Benova³

To cite: Dey T, Ononge S, Weeks A, *et al*. Immediate postnatal care following childbirth in Ugandan health facilities: an analysis of Demographic and Health Surveys between 2001 and 2016. *BMJ Global Health* 2021;6:e004230. doi:10.1136/bmjgh-2020-004230

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¹Women's and Children's Health, University of Liverpool, Liverpool, UK

²Department of Obstetrics and Gynaecology, Makerere University, Kampala, Uganda

³Department of Public Health,

ABSTRACT

Introduction Progress in reducing maternal and neonatal mortality, particularly in sub-Saharan Africa, is insufficient to achieve the Sustainable Developmental Goals by 2030. The first 24 hours following childbirth (immediate postnatal period), where the majority of morbidity and mortality occurs, is critical for mothers and babies. In Uganda, <50% of women reported receiving such care. This paper describes the coverage, changes over time and determinants of immediate postnatal care in Uganda after facility births between 2001 and 2016.

Methods We analysed the 2006, 2011 and 2016 Ugandan Demographic and Health Surveys, including women 15–49 years with most recent live birth in a healthcare facility during the survey 5-year recall period. Immediate postnatal care coverage and changes over time were presented descriptively. Multivariable logistic regression was used to examine determinants of immediate postnatal care.

Results Data from 12 872 mothers were analysed. Between 2006 and 2016, births in healthcare facilities increased from 44.6% (95% CI: 41.9% to 47.3%) to 75.2% (95% CI: 73.4% to 77.0%) and coverage of immediate maternal postnatal care from 35.7% (95% CI 33.4% to 38.1%) to 65.0% (95% CI: 63.2% to 66.7%). The majority of first checks occurred between 1 and 4 hours post partum; the median time reduced from 4 hours to 1 hour. The most important factor associated with receipt of immediate postnatal care was women having a caesarean section birth adjusted OR (aOR) 2.93 (95% CI: 2.28 to 3.75). Other significant factors included exposure to mass media aOR 1.38 (95% CI: 1.15 to 1.65), baby being weighed at birth aOR 1.84 (95% CI: 1.58 to 2.14) and receipt of antenatal care with 4+Antenatal visits aOR 2.34 (95% CI: 1.50 to 3.64).

Conclusion In Uganda, a large gap in coverage remains and universal immediate postnatal care has not materialised through increasing facility-based births or longer length of stay. To ensure universal coverage of high-quality care during this critical time, we recommend that maternal and newborn services should be integrated and actively involve mothers and their partners.

Key questions

What is already known?

- Postnatal care has the poorest coverage levels in the obstetric continuum of care.
- The highest maternal and newborn morbidity and mortality occurs in the immediate postnatal period (within 24 hours of birth)

What are the new findings?

- Although there are increases in the proportion of births occurring in health facilities, and immediate postnatal care coverage after facility birth has doubled, coverage remains suboptimal over the time period examined.
- In facility births, the timing of the first postnatal check has shifted closer to the time of birth.
- Women/newborns with complications and those with higher social status are more likely to report receiving immediate postnatal checks.

What do the new findings imply?

- There is need to improve the coverage of immediate postnatal care checks
- It is important to establish guidance on the optimal timing for postnatal maternal checks.
- New strategies are needed to increase coverage of high-quality postnatal care, for example, integration of maternal and newborn care services, or active involvement of mothers and birth partners.

Although encouraging, this progress is insufficient to achieve the Sustainable Development Goals of 70 maternal deaths per 100 000 live births and 12 neonatal deaths per 1000 live births by 2030. Moreover, the majority of countries failing to reach these levels are in sub-Saharan Africa.^{3 4} Over the last 10 years, work has been done to improve



maternal and neonatal mortality rates.^{5 6} However, postnatal care is often neglected and overlooked.^{7 8}

Most maternal and newborn mortality occurs between the time of birth and the first 2 days post partum, and a focus on the immediate postnatal period is therefore important.^{9 30} Key causes of maternal mortality include postpartum haemorrhage, hypertensive disorders, pre-eclampsia and sepsis.¹¹ Key causes of newborn mortality include preterm birth complications, infection and intrapartum conditions such as asphyxia.¹² The vast majority of cases of maternal and newborn mortality are treatable and preventable but require quick recognition and good-quality care.^{13 14} As such, there has been a push to increase the number of women delivering in health-care facilities in low-resource settings in the hope that this will help increase coverage of care during birth and the ongoing postpartum period.¹⁴ Postnatal care is care provided to both mother and baby following childbirth, and is recommended to continue regularly for 6 weeks.¹⁵ Immediate postnatal care is the initial care provided by trained health workers to women in the first 24 hours following birth of baby and can be provided at home or within a health facility depending on place of birth. It is a critical time period in childbirth where maternal and newborn mortality and morbidity is the highest, particularly in sub-Saharan Africa.^{9 11}

Postnatal care for a newborn baby involves ensuring good feeding, assessing vital signs, examining the umbilical stump and checking for sepsis and jaundice. For mothers, these checks involve measuring vital signs, assessing and addressing any physical symptoms that the mother is experiencing which may indicate severe conditions, assessing uterine contraction, vaginal tears/discharge or caesarean incision sites, assessing their ability to urinate and defecate, screening for postnatal depression and conducting any other assessments based on existing conditions. Conducting this care is pertinent as it not only allows these assessments to occur and any treatment to be initiated, if needed, but provides an opportunity for health workers to provide advice and counselling on breastfeeding and newborn care. For facility-based births, WHO has advised that for at least 24 hours following vaginal delivery, women should be observed and cared for in the facility where they gave birth, to enable mothers and babies to receive this vital care.¹⁵ For home births, the first postnatal check should occur within 24 hours of birth. Thereafter, all mothers and newborns should receive at least three additional

widescale downsizing and decentralising of health services increasing access. Public health services are free allowing more women to access care.¹⁹ Additionally, strong political will, donor funding and a rise in non-profit facilities have been highlighted as key contributors to resource mobilisation maternal health prioritisation.^{20 21} As such, promising progress has been made to improve the percentage of births occurring in health facilities, from 37% in 2000 to 73% in 2016.⁵ This has coincided with a 30% decline in maternal mortality rates since 1988.⁵ However, despite these efforts, the maternal mortality rate in 2017 remained high at 336/100 000 live births and adequate postnatal care remains the poorest performing aspect of the obstetric continuum in Uganda.⁵ National guidance from the Ugandan Ministry of Health for postnatal care exists within the Uganda Clinical Guideline which were created adopting WHO recommendations.²² However, most recent estimates indicate that the provision of this vital care occurred in less than 50% of facility births making it the fifth worst performing country out of the 33 sub-Saharan African countries examined.¹⁷ It is clear that change is needed to enable equity in coverage of postnatal care.

Existing global research has often focused on postnatal care coverage among rural and home-based births or all births and there is little literature specific to care following facility births in Uganda.^{23–25} Additionally, the intersection between maternal and newborn postnatal care coverage has not been described in previous work. Given the lack of improvement to postnatal care coverage from healthcare facility births despite the large shift toward facility-based childbirth, we sought to understand the coverage, changes over time and determinants of immediate postnatal care in Uganda after facility births over the past 15 years.

In this manuscript, we look to describe the coverage and timing of immediate postnatal care for mothers following childbirth in healthcare facilities in Uganda using three Ugandan Demographic Health Surveys (2006, 2011, 2016). Additionally, we analysed the determinants of immediate maternal postnatal care following deliveries in healthcare facilities on the 2016 survey.

METHODS

Data

Household surveys are the main source of data used

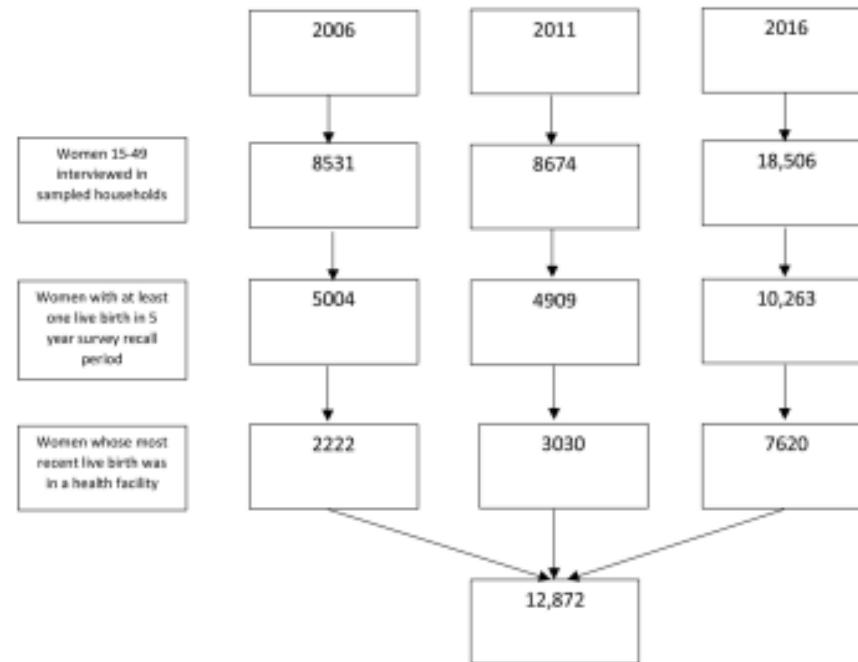


Figure 1 Study population flow diagram.

the elements of stratification and clustering are needed in analysis to adjust for this design and for non-response.

Population

The most recent live birth within a recall period of 5 years to women aged 15–49 at the time of survey, was included in the analysis, if the birth occurred in a health facility. Data from prior births or from those outside of a facility were excluded (figure 1). This resulted in a total of 12 872 eligible mothers included for analysis.

Definitions

Our main outcome is the women's report of receiving immediate postnatal health check by a healthcare professional within 24 hours of childbirth while still in the healthcare facility. This was a binary outcome (yes/no). This variable was created with a conceptual link to the WHO Postnatal care recommendations, which state that all women giving birth in healthcare facilities and their babies should remain in the health facility for a minimum of 24 hours following uncomplicated vaginal

There were no differences in the question wording used in the three surveys. Women who reported a stay in the facility of under 24 hours after childbirth needed to have received such a check before discharge. Among women who remained at the facility for 24 hours or more, we used the timing of the postnatal check variable to determine whether the first postnatal health check occurred within 24 hours of childbirth. We categorised health professionals as: doctor, nurse/midwife and medical assistant/clinical officer. To analyse the timing of the postnatal checks within 24 hours among those who received one, we used the women's response to the question on timing of the first postnatal check in the facility where birth took place and constructed the following categories: (1) <1 hours; (2) 1–4 hours; (3) 4–8 hours; (4) 8–12 hours and (5) 12–24 hours.

We were additionally interested in the women's report of whether babies delivered in health facilities received a postnatal health check by a health care professional within 24 hours of childbirth while still in the healthcare facility. This was done to examine missed opportu-

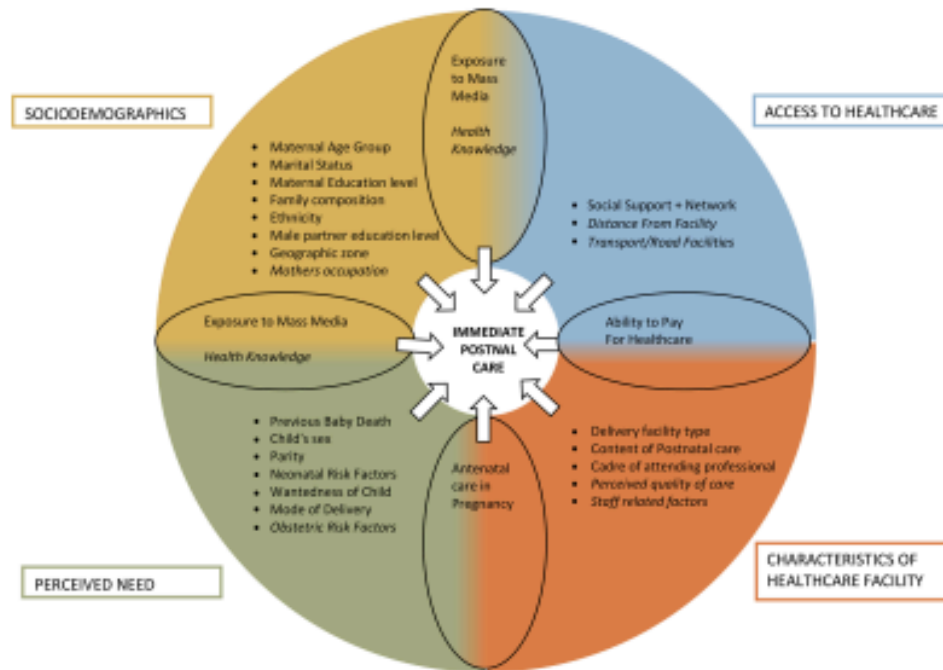


Figure 2 Conceptual framework displaying key factors thought to influence coverage of immediate postnatal care.

characteristics of healthcare facility). Some factors fell into multiple conceptual categories which have been highlighted in the shaded intersecting portions of the diagram. Unfortunately for certain factors, there were no matching questions asked in the DHS questionnaire and therefore these factors remained in our framework but were not examined in analysis (these are in italics).

Perceived need

Seven dimensions of perceived need for postnatal care were identified, including wantedness of child (wanted at the time of pregnancy or not), mode of delivery (vaginal or caesarean), and child sex (female, male). Parity was categorised as first birth, 2–3, 4–5 and 6+births. We were not able to include obstetric or neonatal risk factors (eg, maternal comorbidities and fetal abnormalities) because the DHS did not collect data pertaining to these dimensions. For obstetric risk factors, we considered using proxies such as maternal body mass index and anaemia,

variable was explored through sensitivity subgroup analysis of women with previous children (parity >1).

Antenatal care (ANC) in pregnancy was thought to reflect both perceived need and characteristics of healthcare facility. As those women who received facility based ANC were likely to give birth in that same facility. This dimension was examined by categorising the number of ANC visits during the pregnancy (no ANC, 1–3 visits, 4+visits).

Health knowledge and exposure to mass media were thought to reflect the perceived need and sociodemographic factors. There were no questions in the DHS that assessed health knowledge and this dimension could therefore not be analysed further. Exposure to mass media was explored through the variables; any use of television, internet, newspaper and radio (or not) at the time of the survey.

Sociodemographic factors

We considered eight sociodemographic factors for inclu-



Family composition was assessed by number of persons (<4, 4–5, 6+ persons) and number of children under the age of 5 years (0–1, 2–3, 4+) in the woman's household. Women's occupation was not examined, as data in DHS pertained to the time of the survey and not at the time of index birth. Household wealth quintile, place of residence (urban vs rural) and the woman's autonomy were thought to reflect both socio-demographic factors and access to healthcare factors. Household wealth quintiles were provided in the dataset and constructed using principal component analysis of household assets using an established method.⁶ The dimension of financial autonomy was explored with the binary variable of the woman having a bank account or not. Further exploration of autonomy to healthcare and finances was conducted in sensitivity analysis among married women through the variables who makes decisions about healthcare and finances (respondent alone, respondent and male partner, male partner alone, other). Male partner's highest education level (no education, primary education, secondary/higher education) was explored further in subgroup analysis among women married at the time of survey.

Characteristics of healthcare facility

We identified five dimensions related to characteristics of the healthcare facility where the birth occurred. We categorised the sector of the facility as public (government hospital, government health centre, other public sector) or private (private hospital/clinic, other private medical sector). Assistance with the birth was captured by considering the highest cadre listed (doctor/non-physician clinicians, nurse/midwife, other/none). Staff-related factors were conceptually important, but not available on DHS. The dimension patient perceived quality of care was not directly asked within the DHS and no proxies for this dimension could be found. There were no direct variables that asked women to recall the content of their postnatal care. We used the variable of whether the woman reported that the baby was weighed (or not) as a proxy for this dimension as it is reflective of the available staffing, procedures and resources.

Access to healthcare

We were able to assess one dimension—social support and network—for access to healthcare. This dimension was captured by the two created variables: number of persons (<4, 4–5, 6+ persons) and number of children under the age of 5 years (0–1, 2–3, 4+).

characteristics of women who gave birth in health facilities on all three surveys. Among women who gave birth in health facilities, we computed the percentage who reported receiving immediate maternal postnatal care. Among women with such a check, we described the distribution of the timing of the first check. We calculated the percentage of babies born in health facilities receiving a postnatal check within 24 hours, disaggregated by type of facility.

For the 2016 survey, we conducted an analysis of mother–baby dyads and calculated the percentage receiving immediate postnatal care within 24 hours while still in healthcare facilities for mother only, baby only, both and neither. Additionally, we used logistic regression to explore the crude associations between factors outlined in the conceptual framework and the woman's receipt of immediate postnatal care by a health professional in the facility. A multivariable logistic regression model was created by analysing each individual variable and excluding those that were collinear with existing variables. This enabled the multivariable model to be a reflection of the conceptual model.

Two sensitivity analyses using crude and multivariable logistic regression were conducted. First, among the subsample of women married/cohabiting at the time of survey, we additionally included highest level of male partner education, and autonomy with finances and healthcare. Among women with previous children, the model included previous baby death.

We used the survey set command to adjust all analyses for survey sampling design and non-response using individual sampling weights, stratification and clustering.

Missing data

There were low levels of missing data in the variables used. We describe how missing values were handled in online supplemental material 2.

It was not appropriate or possible to involve patients or the public in the design, or conduct, or reporting, or dissemination plans of our research.

RESULTS

Description of women delivering in healthcare facilities 2006–2016

The sample of women who gave birth in health facilities was 2222 (2006), 3030 (2011) and 7620 (2016). The percentage of most recent births in healthcare facilities



Table 1 Description of women who gave birth in healthcare facilities for most recent live birth in Uganda, DHS 2006, 2010, 2016

Factor	Categories	2006			2011			2016		
		n=2222	%	95% CI	n=3030	%	95% CI	n=7620	%	95% CI
Health facility	Public sector	1563	71.8	68.6 to 74.9	2296	76.1	73.3 to 78.8	6132	78.2	76.4 to 79.9
	Private sector	659	28.2	25.1 to 31.4	734	23.9	21.2 to 26.7	1488	21.8	20.1 to 23.6
Residence	Rural	1679	75.6	70.1 to 80.4	1960	75.6	70.4 to 80.2	5788	72.7	68.5 to 76.5
	Urban	543	24.4	19.6 to 29.9	1070	24.4	19.8 to 29.6	1832	27.3	23.5 to 31.5
Household wealth quintile	Poorest	327	13.9	11.7 to 16.5	476	15.5	13.2 to 18.1	1697	18.2	16.6 to 19.9
	Poorer	362	16.3	14.2 to 18.6	515	17.9	16.0 to 19.8	1457	17.9	16.5 to 19.3
	Middle	341	16.0	14.0 to 18.1	483	17.5	15.7 to 19.5	1389	18.1	16.7 to 19.5
	Richer	458	21.4	18.9 to 24.0	519	18.3	16.3 to 20.6	1392	19.3	17.9 to 21.0
	Richest	734	32.4	28.4 to 36.6	1037	30.8	27.0 to 34.9	1685	26.5	23.6 to 29.6
Geographic zone at survey	Central	784	34.6	31.2 to 38.2	1027	33.8	30.5 to 37.3	1801	30.0	27.4 to 32.7
	Eastern	579	26.5	23.3 to 30.0	682	26.5	23.4 to 29.8	1995	25.6	23.4 to 27.8
	Northern	488	17.7	14.8 to 21.2	767	16.6	14.4 to 19.1	1977	21.1	19.4 to 22.8
	Western	371	21.2	17.9 to 24.9	554	23.1	19.8 to 26.8	1847	23.3	21.8 to 25.1
Maternal age at birth	<20	409	18.5	16.8 to 20.4	493	15.9	14.4 to 17.4	1328	17.4	16.4 to 18.4
	20–24.9	635	29.1	26.9 to 31.4	870	28.7	27.0 to 30.5	2218	29.6	28.3 to 31.0
	25–29.9	566	25.1	23.2 to 27.0	739	24.7	22.9 to 26.6	1826	24.3	23.1 to 25.5
	30–34.9	331	14.8	13.2 to 16.6	482	15.5	14.0 to 17.2	1193	15.0	14.1 to 16.0
	35–49.9	281	12.5	11.1 to 14.0	446	15.2	13.8 to 16.8	1055	13.7	12.8 to 14.6
Highest level of maternal education at survey	No education	299	13.2	11.2 to 15.4	321	9.6	8.2 to 11.3	814	8.8	7.82 to 9.9
	Primary	1304	59.1	56.6 to 61.5	1680	57.7	55.0 to 60.4	4395	55.8	53.7 to 57.8
	Secondary+higher	619	27.7	25.1 to 30.5	1029	32.7	29.8 to 35.6	2411	35.4	33.3 to 37.6
Parity	1	514	23.7	21.8 to 25.7	623	19.4	17.7 to 21.3	1731	23.3	22.1 to 24.5
	2–3	666	29.7	27.6 to 32.0	992	32.3	30.2 to 34.5	2653	35.9	34.5 to 27.3
	4–5	487	21.8	19.9 to 23.7	654	21.3	19.5 to 23.1	1614	20.5	19.6 to 21.6
	6+	555	24.8	22.9 to 26.8	761	27.0	25.0 to 29.1	1822	20.3	19.0 to 21.6
	Mode of delivery for last birth	Caesarean birth	178	8.1	6.9 to 9.5	331	10.2	8.9 to 11.7	682	9.7
Vaginal birth		2044	91.9	90.5 to 93.1	2699	89.8	88.3 to 91.1	6938	90.3	89.4 to 91.1
Highest cadre of health professional at birth	Doctor/NPC	292	13.1	11.5 to 14.8	486	15.3	13.6 to 17.0	1166	15.8	14.7 to 16.9
	Nurse/midwife	1895	85.5	83.6 to 87.1	2480	82.2	80.4 to 84.0	6321	82.5	81.3 to 83.6
	Non-skilled/other/none	35	1.4	1.0 to 2.2	64	2.50	1.8 to 3.6	133	1.7	1.4 to 2.2

NPC, non-physician clinician (includes medical assistant, clinical officer).

Among women who gave birth in healthcare facilities, the percentage that reported receiving an immediate postnatal check increased from 35.7% (95% CI 33.4% to 38.1%) in 2006 to 45.6% (95% CI 43.3% to 47.9%) in 2011 to 55.0% (95% CI 52.9% to 57.1%) in 2016.

care, in 25.4% neither the mother nor the baby received immediate postnatal care, in 7.1% only the mother and in 9.6% only the baby received immediate postnatal care.



Table 2 Percentage of women delivering in healthcare facilities who reported receiving immediate postnatal care in Uganda DHS 2006, 2011, 2016

Factor	Categories	2006			2011			2016		
		n	%	95% CI	n	%	95% CI	n	%	95% CI
Overall		805	35.7	33.4 to 38.1	1456	46.6	44.0 to 49.3	4997	65.0	63.2 to 66.7
Health facility	Public sector	555	35.3	32.7 to 38.0	1110	47.0	44.1 to 49.9	4005	64.4	62.6 to 66.2
	Private sector	250	36.6	32.2 to 41.3	734	45.5	40.2 to 50.9	992	66.9	63.4 to 70.2
Residence	Rural	574	33.9	31.3 to 36.6	8731	44.0	40.9 to 47.1	3720	63.0	60.9 to 65.1
	Urban	231	41.2	35.7 to 46.9	585	54.7	48.9 to 60.4	1277	70.2	66.9 to 73.3
Household wealth quintile	Poorest	111	32.9	26.3 to 40.2	234	47.5	41.7 to 53.3	1151	65.7	61.6 to 69.6
	Poorer	104	28.8	23.5 to 34.8	203	39.3	34.2 to 44.6	926	61.6	58.1 to 64.9
	Middle	103	29.9	24.7 to 35.8	199	38.3	33.2 to 43.7	842	59.8	56.4 to 63.0
	Richer	155	32.7	28.3 to 37.4	238	45.5	40.7 to 50.4	854	61.7	58.2 to 65.1
	Richest	332	45.2	41.1 to 49.4	582	55.9	51.1 to 60.1	1224	72.7	65.0 to 75.6
Geographic zone at survey	Central	329	42.1	38.4 to 45.9	581	56.4	52.1 to 60.6	1268	69.9	66.5 to 73.1
	Eastern	222	40.1	35.7 to 44.8	306	46.7	42.0 to 51.4	1413	69.0	65.1 to 72.6
	Northern	168	31.1	25.2 to 37.6	374	46.3	41.6 to 51.1	1378	68.6	64.6 to 72.4
	Western	86	23.5	19.4 to 28.1	195	32.5	27.5 to 37.9	938	50.9	47.9 to 53.9
Maternal age at birth	<20	133	34.3	29.4 to 39.5	238	45.7	40.8 to 50.7	822	61.0	57.9 to 64.1
	20–24.9	221	32.8	29.0 to 36.9	425	46.8	42.4 to 51.3	1440	64.9	62.0 to 67.7
	25–29.9	203	35.1	30.9 to 39.5	341	45.2	40.5 to 49.9	1224	65.7	62.9 to 68.4
	30–34.9	136	40.3	34.9 to 45.9	232	47.6	42.6 to 52.7	815	67.5	63.9 to 70.9
	35–49.9	112	40.1	34.0 to 38.1	220	48.7	43.1 to 54.3	696	65.9	62.4 to 69.3
Highest level of maternal education at survey	No education	92	30.3	25.0 to 36.3	152	41.5	35.4 to 47.9	558	64.1	59.4 to 68.6
	Primary	415	31.5	28.8 to 34.4	728	42.6	39.7 to 45.6	2726	61.3	59.2 to 63.3
	Secondary+higher	296	47.0	42.6 to 51.5	576	55.3	50.4 to 60.0	1713	71.0	68.6 to 73.3
Parity	1	185	36.7	32.2 to 41.4	311	45.7	40.6 to 51.0	1162	66.9	63.9 to 69.7
	2–3	262	38.0	33.7 to 42.5	522	52.3	47.9 to 56.7	1722	64.4	62.0 to 66.8
	4–5	158	31.5	27.3 to 36.0	288	42.8	38.5 to 47.2	1072	65.6	62.5 to 68.6
	6+	200	35.7	31.2 to 40.4	335	43.5	39.6 to 47.4	1041	63.1	60.0 to 66.2
Mode of delivery for last birth	Caesarean birth	101	55.6	46.6 to 64.3	199	61.6	54.8 to 68.1	565	82.2	78.4 to 85.4
	Vaginal birth	704	33.9	31.5 to 36.4	1257	44.9	42.2 to 47.7	4432	63.1	61.3 to 64.9
Highest cadre of health professional at birth	Doctor/NPC	136	45.3	38.5 to 52.2	283	59.8	54.4 to 65.0	853	73.3	69.8 to 76.4
	Nurse/midwife	661	34.4	32.0 to 37.0	1154	44.9	42.1 to 47.8	4072	63.6	61.8 to 65.4
	Non-skilled/other/none	8	22.8	10.1 to 43.7	19	22.7	13.4 to 35.8	72	52.9	42.9 to 62.8

NPC, non-physician clinician.

Factors associated with immediate maternal postnatal check on the 2016 survey

Table 4 presents the association of key factors with

care compared with not being weighed at birth. Mode of delivery was also an important factor; women who had a caesarean section were 2.93 times (95% CI: 2.28



Table 3 Distribution, mean and median time of first postnatal check in women having immediate postnatal care in healthcare facilities by sector in Uganda DHS 2006, 2011, 2016

	Categories	n	Overall	Public sector	Private sector
2006	<1 hour	90	11.0%	10.8%	11.5%
	1–4 hours	352	44.1%	42.9%	46.6%
	5–8 hours	150	18.6%	19.0%	17.7%
	9–12 hours	59	7.2%	7.8%	5.9%
	13–24 hours	154	19.1%	19.5%	18.3%
	Distribution in hours		Mean (median)	Mean (median)	Mean (median)
	Total	805	7.25 (4)	7.36 (4)	6.99 (3)
2011	<1 hour	261	18.9%	16.4%	27.1%
	1–4 hours	756	52.6%	53.7%	49.1%
	5–8 hours	213	14.3%	15.1%	11.8%
	9–12 hours	89	6.0%	6.8%	3.4%
	13–24 hours	137	8.2%	8.0%	8.6%
	Distribution in hours		Mean (median)	Mean (median)	Mean (median)
	Total	1456	4.49 (2)	4.61 (2)	4.11 (2)
2016	<1 hour	1565	31.8%	30.0%	38.4%
	1–4 hours	2520	49.5%	50.1%	47.5%
	5–8 hours	513	10.3%	11.1%	7.4%
	9–12 hours	190	3.7%	3.8%	3.1%
	13–24 hours	209	4.7%	5.0%	3.6%
	Distribution in hours		Mean (median)	Mean (median)	Mean (median)
	Total	4997	3.09 (1)	3.23 (1)	2.62 (1)

a previous child (online supplemental material 3). In multivariable analysis, women who reported a previous child dying within 24 hours of birth were not more likely to have reported an immediate maternal postnatal check than women without a previous child death (adjusted OR 1.05 (95% CI: 0.80 to 1.38)).

DISCUSSION

Over the 15-year period under investigation, when the percentage of births in health facilities increased, the percentage of women who remained in health facilities for 24 hours or longer remained stable at just above 70%, and coverage of immediate maternal postnatal care after facility birth increased to 65.0%. We found large geographic variations in immediate maternal postnatal care after facility births on the 2016 survey, particularly

postnatal care compared with those with a vaginal birth. Other factors positively associated with higher odds of being checked included exposure to mass media, baby having been weighed at birth, and receipt of ANC.

Our findings show the most significant improvement to postnatal care provision occurred between 2011 and 2016 where coverage increased by 20%. This is in line with the 15.1% increase in deliveries in healthcare facilities in line with current global trends and recommendations. Despite this, immediate postnatal care coverage after such births remained suboptimal at 65%.^{15–17} This rate is higher than the 50% coverage reported in Uganda by Ndugga *et al*, although this report included births at both home and facility.²⁸ A common reason given for poor coverage of care is that women do not remain in facilities long enough (for 24 hours) to receive postnatal care.¹⁸ However, our study shows that women who remain



Table 4 Bivariate and multivariable logistic analysis of factors of coverage of immediate maternal postnatal care of woman who gave birth in healthcare facilities for most recent live births in Uganda 2016

Factor	Categories	Crude analysis (n=7620)			Multivariable analysis (n=7620)		
		OR	95% CI	Wald p-value	aOR	95% CI	Wald p value
Health facility	Public sector	1 (REF)			1 (REF)		
	Private sector	1.12	0.96 to 1.30	0.156	1.14	0.98 to 1.33	0.099
Residence	Rural	0.72	0.60 to 0.87	0.001	0.96	0.78 to 1.17	0.684
	Urban	1 (REF)			1 (REF)		
Household wealth quintile	Poorest	1 (REF)			1 (REF)		
	Poorer	0.84	0.68 to 1.02	0.083	0.95	0.77 to 1.18	0.653
	Middle	0.77	0.61 to 0.98	0.033	0.95	0.74 to 1.22	0.688
	Richer	0.84	0.68 to 1.05	0.125	0.87	0.68 to 1.13	0.300
	Richest	1.39	1.10 to 1.76	0.006	0.98	0.73 to 1.31	0.880
Geographical zone at survey	Central	1.04	0.83 to 1.32	0.718	0.77	0.61 to 0.97	0.024
	Eastern	1 (REF)			1 (REF)		
	Western	0.47	0.38 to 0.58	0.000	0.40	0.32 to 0.49	0.000
	Northern	0.98	0.76 to 1.27	0.895	0.93	0.72 to 1.19	0.549
Maternal age at birth	<20	1 (REF)			1 (REF)		
	20–24.9	1.18	1.00 to 1.38	0.039	1.18	0.98 to 1.42	0.079
	25–29.9	1.22	1.04 to 1.44	0.018	1.24	1.00 to 1.53	0.046
	30–34.9	1.32	1.09 to 1.61	0.005	1.52	1.17 to 1.98	0.002
	35–49.9	1.24	1.01 to 1.51	0.041	1.54	1.15 to 2.06	0.004
Highest level of maternal education at survey	No education	1 (REF)			1 (REF)		
	Primary	0.91	0.73 to 1.13	0.379	0.89	0.73 to 1.08	0.235
	Secondary +higher	1.28	1.03 to 1.61	0.029	0.94	0.74 to 1.18	0.582
Marital status at time of survey	Yes	1.08	0.94 to 1.23	0.260	1.04	0.91 to 1.20	0.553
	No not in union	1 (REF)			1 (REF)		
Total persons in residence at time of survey	<4	1 (REF)					
	four to 5	0.93	0.79 to 1.09	0.379			
	6+	0.88	0.74 to 1.04	0.139			
Total children <5 in residence at time of survey	0–1	1 (REF)					
	2–3	0.99	0.88 to 1.11	0.901			
	4+	0.77	0.58 to 1.03	0.075			
Religion	Christian	0.85	0.71 to 1.01	0.078			
	Other	1 (REF)					
How much of a problem does getting permission pose to getting to the doctor when sick?	Big problem	0.85	0.68 to 1.07	0.160			
	Not a big problem	1.00					
Bank account at time	Yes	1.77	1.46 to 2.15	0.000	1.26	1.03 to 1.54	0.027



Table 4 Continued

Factor	Categories	Crude analysis (n=7620)			Multivariable analysis (n=7620)		
		OR	95% CI	Wald p-value	aOR	95% CI	Wald p value
No of ANC attendances at healthcare facilities	None	1 (REF)			1 (REF)		
	1–3 visits	2.43	1.55 to 3.83	0.000	2.18	1.39 to 3.42	0.001
	4+ visits	2.74	1.74 to 4.31	0.000	2.34	1.50 to 3.64	0.000
Read a newspaper at time of survey	Yes	1.89	1.60 to 2.22	0.000	1.38	1.15 to 1.65	0.000
	Not at all	1 (REF)			1 (REF)		
Listened to the radio at time of survey	Yes	1.22	1.08 to 1.43	0.002	1.13	0.98 to 1.31	0.091
	Not at all	1 (REF)			1 (REF)		
Watched TV at time of survey	Yes	1.49	1.28 to 1.72	0.000			
	Not at all	1 (REF)					
Use of internet at time of survey	Yes	2.40	1.88 to 3.08	0.000	1.39	1.04 to 1.86	0.027
	Not at all	1 (REF)			1 (REF)		
Mobile phone at time of survey	Yes	1.24	1.10 to 1.41	0.000	0.96	0.84 to 1.09	0.501
	No	1 (REF)			1 (REF)		
Parity	One	1 (REF)			1 (REF)		
	Two-three	0.89	0.77 to 1.04	0.140	0.83	0.70 to 0.99	0.033
	Four-five	0.95	0.79 to 1.13	0.547	0.83	0.66 to 1.04	0.110
	Six+	0.85	0.71 to 1.01	0.068	0.75	0.57 to 0.98	0.036
Wantedness of last pregnancy at time of pregnancy	Wanted	1 (REF)			1 (REF)		
	Unwanted	0.85	0.76 to 0.95	0.003	0.87	0.78 to 0.98	0.019
Sex of last baby	Female	1.06	0.95 to 1.20	0.255	1.10	0.98 to 1.24	0.116
	Male	1 (REF)			1 (REF)		
Was baby weighed at birth	Yes	2.08	1.79 to 2.42	0.000	1.84	1.58 to 2.14	0.000
	No	1 (REF)			1 (REF)		
How big did the woman think the baby was at birth	Other	1 (REF)					
	Very small	0.87	0.68 to 1.11	0.259			
Start time of breast feeding	Within an hour	1 (REF)			1 (REF)		
	>1 hours	0.95	0.83 to 1.09	0.474	0.72	0.62 to 0.83	0.000
	Yes-CS	2.70	2.13 to 3.41	0.000	2.93	2.28 to 3.75	0.000
Mode of delivery for last birth	No-vaginal	1 (REF)			1 (REF)		
Highest cadre of health professional at birth	Doctor/NPC	1.56	1.32 to 1.84	0.000			
	Nurse/midwife	1 (REF)					
	Other/none	0.64	0.43 to 0.96	0.03			

ANC, antenatal care; aOR, adjusted OR; CS, Caesarean section; NPC, non-physician clinician; TV, television.



women receiving early postnatal care.³³ Through employment, women not only have a better financial status and ability to use quality health services but are also empowered to participate in the decision-making process about their healthcare.³³ DHS data do not provide the means to accurately examine the role of a women's occupation on receipt of immediate postnatal care and therefore it might be useful to examine this factor directly at regional level. Interestingly, there was poorer coverage of care in Central Uganda than Eastern Uganda. The Central Uganda region contains Kampala, the capital and largest city in Uganda. Coupled with the rise in health facility births, crowding does exist within facilities and this has been found to have an ongoing detrimental effect on the quality of respectful care received by women.^{8 31} Other examples of a lack of respectful postnatal care in Uganda (physical and verbal mistreatment by staff, and stigma and denial of care for marginalised communities) have been shown to contribute to a negative care experience by mothers.³⁴ This has resulted in a reduced utilisation and therefore coverage of postnatal care services.³⁵ Again, data for respectful care were not collected in the DHS and this would also be worth examining directly at regional level.

Conceptually, a key factor thought to impact maternal immediate postnatal care provision is if immediate postnatal care is provided for the baby. In the 2016 survey, nearly two-thirds of mother–baby dyads received both maternal and neonatal immediate postnatal care, while a quarter did not receive any immediate postnatal care for either mother or baby. Very few women reported receiving only maternal or only neonatal immediate postnatal care. This suggests that if a baby is to receive immediate postnatal care, a mother is likely to as well, and vice versa. This finding is perhaps driven by the notion that those mothers and babies with complications (eg, mothers most unwell following birth or with existing conditions, and babies which are smaller, premature or who are most unwell), will be prioritised to receive care.³⁴ This idea is further exemplified in our multivariable model which found reporting that the baby was weighed at birth was positively associated with the mother received an immediate postnatal check. To our knowledge, there is no existing literature examining this interaction. With this knowledge, further work perhaps should focus on integrating maternal and newborn immediate postnatal care within in-facility postnatal care guidelines to aid in improving coverage of overall immediate postnatal care.⁸

spent in the facility.^{16 36} Unfortunately, the DHS did not gather data on quality or components of postnatal checks, and it was not possible to determine if the speed of check compromises the quality of care provided. Early postnatal checks are not necessarily ideal.¹⁶ WHO recommends that all new mothers remain in the facility for 24 hours following birth because the majority of maternal and neonatal deaths occur during this period.⁹ Mothers receiving only one check in the first hour following delivery therefore, without any further checks, might not be sufficiently monitored to detect complications of birth.^{9 15} As such, it has been suggested that in sub-Saharan Africa >75% of women receive suboptimal postnatal health checks.^{16 17} Further qualitative work focusing on quality of care and actions taken following postnatal checks would be important to enable this finding to be explored further.

Factors affecting coverage of immediate postnatal care were explored through crude and multivariable logistic regression analysis in the 2016 database. Having a caesarean section increased the odds of being checked compared with those women who had a vaginal delivery which has been noted in existing literature from Bangladesh.³⁷ Women having a caesarean section are at a higher risk of severe acute maternal morbidity, particularly in low-resource settings.³⁸ As such, clinicians faced with time pressures and a large number of patients to see, might prioritise examining high risk postoperative women.¹⁷ That said, coverage of immediate postnatal care for mothers giving birth by caesarean section was still suboptimal at 82% (2016). It is, therefore, imperative that new strategies are looked into to improve postnatal care coverage. In sub-Saharan Africa, up to 20% of caesarean sections are conducted under general anaesthesia.³⁹ Following a long labour and emergency caesarean under general anaesthesia, women can often be drowsy and disorientated resulting in poor recall of birth and postnatal care events. The figure of 82% coverage should, therefore, be interpreted with caution.

Women who had access to mass media were noted to have a higher likelihood of receiving immediate postnatal care. This finding is in line with previous studies across sub-Saharan Africa.⁴⁰ Mass media can be harnessed as a platform to educate and inform mothers in order increase their access to knowledge and improve their ability to seek care.²⁸ In all low-resource settings, education has consistently been noted as key to postnatal care utilisation.⁴¹ Additionally, coverage of ANC was identified



conditions requiring receipt of more ANC and therefore resulting in a higher need to be checked postnatally.

Limitations

By using three DHS datasets from 2006 to 2016, we were able to explore changes over time over 15 years of births based on recall periods and examine the coverage and determinants of coverage of immediate postnatal care in health facilities. There are, however, some limitations to our work. First, the DHS relies on women's recall of the immediate postnatal period up to 5 years preceding the survey. This relies on the accuracy of the woman's memory of the receipt and timing of postnatal care provided in the immediate postnatal period. A study in two sub-Saharan African settings showed that women were able to recall key postnatal events to an acceptable threshold.⁴⁴ However, our results flagged some clear anomalies as across the three surveys women consistently reported caesarean sections being conducted by nurses/midwives and unskilled birth attendants. This could be that women are actually remembering the latter parts of intrapartum care prior to birth. Studies on the validity of women's recall in the immediate postnatal care have found that women are consistently less able to recall indicators in the intrapartum period and within 1 hour of delivery immediately postnatally.⁴⁵⁻⁴⁶ With checks being conducted earlier, there is additionally a higher chance of women being unable to distinguish between the latter parts of intrapartum care and immediate postnatal care.⁴⁶ We attempted to limit the extent of recall error by restricting responses to the respondents' most recent birth. Second, the DHS questions do not capture the presence of complications, nor the quality and content of postnatal care. Our ability to examine postnatal care comprehensively and adjust for important confounders was therefore somewhat limited.⁴⁴ Third, demographic data within the DHS survey such as marital status are taken at the time of the survey being conducted and not at the time of birth. That said, the DHS recall period of live births is limited to 5 years and thus it limits the extent of discrepancies.

CONCLUSION

Although there have been significant advances in coverage

how to ensure best practice through guidelines training and implementation. One strategy could be to look at further integrating maternal and newborn care services, even beyond discharge. Another would be to acknowledge that increasing facility-based births or the number of women remaining in facility for 24 hours following birth has not led to the sufficient change needed to make immediate postnatal care coverage universal, nor reduce maternal and neonatal mortality. If anything, the resulting crowding has increased the pressure on overburdened and burned-out healthcare providers, reducing respectful quality postnatal care provision and preventing the swift recognition and action if postnatal complication are identified. Perhaps education and active involvement of mothers and their partners in their care could act to enhance respectful care and improve coverage and utilisation of care. Finally, there is need for a direct needs assessment of health system, staff and quality of care, to identify factors that impede immediate postnatal care coverage. It would be useful for the work to be conducted by region to help uncover the geographical and sub-national differences that exist in care provision.

Twitter Teesta Dey @teesta_dey and Lenka Benova @lenkabenova

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Appendix 3.2: AGREE II Scoring of recommendations

Title	Year Published	Commissioning Agency	Domain 1- Scope and Purpose	Domain 2- Stakeholder Involvement	Domain 3- Rigor of development	Domain 4- Clarity of presentation	Domain 5- Applicability	Domain 6- Editorial Independence	Outcome
Quantitative Blood Loss in Obstetric Haemorrhage: ACOG COMMITTEE OPINION, Number 794.	2019	ACOG	100.00%	66.67%	96.43%	100.00%	46.43%	100.00%	AGREE
ACOG Practice Bulletin No. 212: Pregnancy and Heart Disease.	2019	ACOG	100.00%	66.67%	96.43%	100.00%	46.43%	100.00%	AGREE
ACOG Practice Bulletin No. 196: Thromboembolism in Pregnancy.	2018	ACOG	100.00%	66.67%	96.43%	100.00%	46.43%	100.00%	AGREE
Emergent Therapy for Acute-Onset, Severe Hypertension During Pregnancy and the Postpartum Period. Committee Opinion, Number 692	2017	ACOG	100.00%	66.67%	96.43%	100.00%	46.43%	100.00%	AGREE
Hypertension in Pregnancy. Report of the American College of Obstetricians and Gynaecologists' Task Force on Hypertension in Pregnancy	2013	ACOG	100.00%	66.67%	96.43%	100.00%	46.43%	100.00%	AGREE
ACOG Practice Bulletin No. 183: Postpartum Haemorrhage	2017	ACOG	100.00%	66.67%	96.43%	100.00%	46.43%	100.00%	AGREE
Guidelines of the American Thyroid Association for the diagnosis and management of thyroid disease during pregnancy and postpartum.	2011	American Thyroid Association	100.00%	71.43%	87.50%	100.00%	78.57%	100.00%	AGREE
UK guidelines on the management of iron deficiency in pregnancy	2019	British Society of Haematologists	100.00%	100.00%	100.00%	100.00%	78.57%	100.00%	AGREE
Peripartum Haemorrhage, Diagnosis and Therapy. Guideline	2018	DGGG, OEGGG, SGGG	100.00%	80.95%	100.00%	100.00%	50.00%	100.00%	AGREE
Prevention and treatment of postpartum haemorrhage in low-resource settings.	2012	FIGO	100.00%	71.43%	64.29%	100.00%	53.57%	100.00%	AGREE
FOGSI's GCPR on Hypertensive Disorders in Pregnancy (HDP) 2019	2019	FOGSI	100.00%	85.71%	50.00%	100.00%	42.86%	100.00%	AGREE

FOGSI good clinical practice recommendation on management of Iron deficiency Anaemia in pregnancy	2017	FOGSI	100.00%	85.71%	50.00%	100.00%	42.86%	100.00%	AGREE
Clinical practice guideline the diagnosis and management of severe pre-eclampsia and eclampsia	2011	Institute of Obstetricians and Gynaecologists, Royal College of Physicians of Ireland	100.00%	71.43%	62.50%	85.71%	53.57%	100.00%	AGREE
Clinical practice guideline management of urinary retention in pregnancy, post-partum and after gynaecological surgery	2018	Institute of Obstetricians and Gynaecologists, Royal College of Physicians of Ireland	100.00%	71.43%	62.50%	85.71%	53.57%	100.00%	AGREE
Clinical practice guideline management of urinary tract infections in pregnancy	2018	Institute of Obstetricians and Gynaecologists, Royal College of Physicians of Ireland	100.00%	71.43%	62.50%	85.71%	53.57%	100.00%	AGREE
The classification, diagnosis and management of the hypertensive disorders of pregnancy: A revised statement from the ISSHP	2014	ISSHP	100.00%	71.43%	39.29%	100.00%	46.43%	100.00%	AGREE
Guidelines for obstetrical practice in Japan: Japan Society of Obstetrics and Gynaecology (JSOG) and Japan Association of Obstetricians and Gynaecologists (JAOG)	2014	JSOG/JAOG	100.00%	71.43%	83.93%	80.95%	71.43%	100.00%	AGREE
Clinical Practice Guidelines for prevention, detection early and treatment of complications of pregnancy, childbirth, or the puerperium	2013	Ministry of Health Columbia	100.00%	80.95%	92.86%	100.00%	50.00%	100.00%	AGREE
National Standards for maternal and newborn care	2010	Ministry of Health Honduras	100.00%	80.95%	35.71%	100.00%	35.71%	100.00%	AGREE

Patient blood management in obstetrics: prevention and treatment of postpartum haemorrhage. A NATA consensus statement.	2019	NATA/FIGO/IFG /EBCOG/ESA	100.00%	66.67%	87.50%	100.00%	50.00%	100.00%	AGREE
Patient blood management in obstetrics: management of anaemia and haematinic deficiencies in pregnancy and in the post-partum period: NATA consensus statement.	2017	NATA/FIGO/IFG /EBCOG/ESA	100.00%	66.67%	87.50%	100.00%	50.00%	100.00%	AGREE
S3-Guidelines for the Treatment of Inflammatory Breast Disease during the Lactation Period	2013	National Breastfeeding Committee and German Society for Gynaecology and Obstetrics	100.00%	80.95%	100.00%	100.00%	50.00%	100.00%	AGREE
Observation of Mother and Baby in the Immediate Postnatal Period: Consensus statements guiding practice	2012	New Zealand Ministry of Health	71.43%	71.43%	46.43%	85.71%	35.71%	57.14%	AGREE WITH CHANGES
Antenatal and postnatal mental health: clinical management and service guidance	2014	NICE	100.00%	80.95%	100.00%	100.00%	100.00%	100.00%	AGREE
Postnatal care up to 8 weeks after birth	2015	NICE	100.00%	80.95%	100.00%	100.00%	100.00%	100.00%	AGREE
Hypertension in pregnancy (NICE clinical guideline 107)	2019	NICE	100.00%	80.95%	100.00%	100.00%	100.00%	100.00%	AGREE
SIGN 127 • Management of perinatal mood disorders	2012	SIGN	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	AGREE
Mental Health Care in the Perinatal Period	2018	RANZCOG	100.00%	100.00%	92.86%	100.00%	78.57%	100.00%	AGREE
Management of Women with Mental Health Issues during Pregnancy and the Postnatal Period	2011	RCOG	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	AGREE
Sepsis following Pregnancy, Bacterial (Green-top Guideline No. 64b)	2012	RCOG	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	AGREE
Prevention and Management of Postpartum Haemorrhage	2016	RCOG	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	AGREE
Thromboembolic Disease in Pregnancy and the Puerperium: Acute Management	2015	RCOG	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	AGREE
Guidelines for Hypertension in Pregnancy	2019	SFOG	85.71%	100.00%	89.29%	100.00%	57.14%	100.00%	AGREE

Appendix 3.3: List of Signs and Symptoms

PET/Eclampsia/HELLP

Group	PET Sign/ Symptom	Number of Recommendations Mentioning Sign and Symptom
A01	<ul style="list-style-type: none"> • Visual disturbance • Blurred vision • Problems or changes with vision • Flashing before the eyes • Persistent visual impairment • Blindness • Persistent visual disturbances e.g. photopsia, scotoma, cortical blindness, posterior reversible encephalopathy syndrome, retinal vasospasm 	15
A02	<ul style="list-style-type: none"> • Severe headache • Persistent, new headache • Worsening and increasing in frequency headache • Headache not alleviated by analgesics or medicine 	14
A03	<ul style="list-style-type: none"> • Hypertension • Raised blood pressure • SBP>160 • DBP>110 on one reading • DBP>90 on two readings • Uncontrolled hypertension • New onset hypertension 	13
A04	<ul style="list-style-type: none"> • Right upper quadrant pain • Liver tenderness • Severe pain below the ribs • Epigastric pain or discomfort • Hypochondrial pain 	12
A05	<ul style="list-style-type: none"> • Nausea • Vomiting 	10
A06	<ul style="list-style-type: none"> • Sudden swelling of face, hands or feet • Sudden excessive weight gain 	7
A07	<ul style="list-style-type: none"> • Convulsions • Seizures 	9
A08	<ul style="list-style-type: none"> • UO <80ml/4hrs • Oliguria • Passing <400mls in 24 hours 	7
A09	<ul style="list-style-type: none"> • Hyper-reflexia 	5

	<ul style="list-style-type: none"> • Brisk tendon reflexes 	
A10	<ul style="list-style-type: none"> • Altered consciousness • Altered mental state • Unconscious • Lack of consciousness 	5
A11	<ul style="list-style-type: none"> • Cramps • Sustained clonus 	5
A12	<ul style="list-style-type: none"> • Shortness of breath • Chest pain • Rales on auscultation of lung • Pulmonary oedema 	4
A13	<ul style="list-style-type: none"> • Feeling faint • Dizziness • Giddiness • Syncope 	2
A14	<ul style="list-style-type: none"> • General malaise 	1
A15	<ul style="list-style-type: none"> • Appetite loss 	1

Postpartum haemorrhage

Group	Postpartum Haemorrhage Sign/Symptom	Number of Recommendations Mentioning Sign and Symptom
B01	<ul style="list-style-type: none"> • Blood loss of 2 cups after a vaginal birth • Blood loss more than 1 pad or cloth soaked in <5 minutes • Sudden blood loss • Profuse blood loss • Increase in blood loss rather than decrease after birth • Constant trickling of blood • Blood loss >2-3 pads soaked in 20-30 minutes after birth • Intermittent heavy bleeding • Colour of blood • Blood loss >1000mls after caesarean section • Blood loss >500mls after vaginal birth 	16
B02	<ul style="list-style-type: none"> • Palpitations • Tachycardia • Tachycardia >110bpm 	11
B03	<ul style="list-style-type: none"> • Hypotension • Hypotension <90mmHg 	10
B04	<ul style="list-style-type: none"> • Poor Uterine contraction • Poor Uterine tone • Raised fundal height 	8

	<ul style="list-style-type: none"> • Displaced uterine position • Large size of uterus • Soft, slack Uterus 	
B05	<ul style="list-style-type: none"> • Cool Temperature of skin • Cold extremities • Moist skin • Clammy skin 	6
B06	<ul style="list-style-type: none"> • Change in Consciousness • Altered mental state • Anxiousness • Confusion 	6
B07	<ul style="list-style-type: none"> • Faint • Dizzy 	4
B08	<ul style="list-style-type: none"> • Pallor • Pallor of inner eyelid • Pallor of palms • Pallor around the mouth 	4
B09	<ul style="list-style-type: none"> • Fast respiratory rate • Tachypnoea >30rr/min • Tachypnoea 	4
B10	<ul style="list-style-type: none"> • Uterine tenderness 	3
B11	<ul style="list-style-type: none"> • Poor capillary refill time • Low Oxygen Saturations 	3
B12	<ul style="list-style-type: none"> • Lack of mobility • Weakness 	3
B13	<ul style="list-style-type: none"> • Weak pulse 	2
B14	<ul style="list-style-type: none"> • Scanty Urine output of <30mls/hour 	1
B15	<ul style="list-style-type: none"> • Sweating 	1
B16	<ul style="list-style-type: none"> • Nausea 	1
B17	<ul style="list-style-type: none"> • Thirsty 	1

Genital tract sepsis

Group	Genital Tract Sepsis Sign/ Symptom	Number of Recommendations Mentioning Sign and Symptom
C01	<ul style="list-style-type: none"> • Fever • Temperature >38C • Temperature <36C • Abnormal temperature • Spikes 	11

C02	<ul style="list-style-type: none"> • Offensive vaginal loss • Offensive odour of perineum • Foul smelling vaginal discharge • Draining pus • Green lochia • Purulent foul-smelling lochia • Heavy lochia 	10
C03	<ul style="list-style-type: none"> • Abdominal pain • Uterine tenderness 	8
C04	<ul style="list-style-type: none"> • Uncontrollable shivering • Chills • Rigors • Hypothermia 	6
C05	<ul style="list-style-type: none"> • Perineal pain • Stinging • Perineal inflammation 	6
C06	<ul style="list-style-type: none"> • Heart racing • Tachycardia >90bpm 	2
C07	<ul style="list-style-type: none"> • Fast laboured breathing • Tachypnoea RR>25 	3
C08	<ul style="list-style-type: none"> • Hypotension SBP <90mmHg 	3
C09	<ul style="list-style-type: none"> • Lethargy • Very weak/ cannot stand 	2
C10	<ul style="list-style-type: none"> • Confusion • Mild agitation • Altered Mental state • Impaired consciousness 	2
C11	<ul style="list-style-type: none"> • Vomiting 	1
C12	<ul style="list-style-type: none"> • Delay in uterine involution • Distended uterus 	2
C13	<ul style="list-style-type: none"> • Diarrhoea 	1
C14	<ul style="list-style-type: none"> • Reduced appetite 	1
C15	<ul style="list-style-type: none"> • Oliguria 	1
C16	<ul style="list-style-type: none"> • Generalised maculopapular rash 	1
C17	<ul style="list-style-type: none"> • Hypoxia 	1

Anaemia

Group	Anaemia Sign/ Symptom	Number of Recommendations Mentioning Sign and Symptom
D01	<ul style="list-style-type: none"> • Pallor • Severe pallor • Pallor conjunctiva, tongue, nail beds, palms, eyelids 	8

D02	<ul style="list-style-type: none"> • Fatigue • Lethargy • Generalised weakness • Easy tiredness • Extreme tiredness • Reduced exercise tolerance 	8
D03	<ul style="list-style-type: none"> • PICA for non-food items 	4
D04	<ul style="list-style-type: none"> • Palpitations • Rapid heartbeat • Tachycardia 	4
D05	<ul style="list-style-type: none"> • Shortness of breath • Difficulty breathing 	4
D06	<ul style="list-style-type: none"> • Headache • Frontal headache 	3
D07	<ul style="list-style-type: none"> • Irritability 	3
D08	<ul style="list-style-type: none"> • Dizziness 	3
D09	<ul style="list-style-type: none"> • Brittle nails • Flat or concave nails • Nail ridging • Koilonychia 	3
D10	<ul style="list-style-type: none"> • Decreased mental concentration ability • Impaired cognition • Impaired cognitive performance tests 	3
D11	<ul style="list-style-type: none"> • Smooth tongue • Glossitis • Stomatitis 	3
D12	<ul style="list-style-type: none"> • Depression 	2
D13	<ul style="list-style-type: none"> • Frequent minor infections • Reduced immunity 	2
D14	<ul style="list-style-type: none"> • Weakness 	2
D15	<ul style="list-style-type: none"> • Restless legs 	2
D16	<ul style="list-style-type: none"> • Poor concentration 	2
D17	<ul style="list-style-type: none"> • Cyanosis 	1
D18	<ul style="list-style-type: none"> • Cold intolerance 	1
D19	<ul style="list-style-type: none"> • Decreased appetite • Dysphagia • GI discomfort 	1
D20	<ul style="list-style-type: none"> • Weight loss 	1
D21	<ul style="list-style-type: none"> • Ringing in the ear 	1
D22	<ul style="list-style-type: none"> • Blue sclera 	1
D23	<ul style="list-style-type: none"> • Leg oedema 	1
D24	<ul style="list-style-type: none"> • Functional heart murmur 	1
D25	<ul style="list-style-type: none"> • Alopecia 	1
D26	<ul style="list-style-type: none"> • Dry mouth 	1

Urinary dysfunction

Group	Urinary dysfunction Sign/ Symptom	Number of Recommendations Mentioning Sign and Symptom
E01	<ul style="list-style-type: none"> • Dysuria 	5
E02	<ul style="list-style-type: none"> • Leakage of urine • Urinary incontinence • Urine dribbling 	4
E03	<ul style="list-style-type: none"> • Bladder Pain • Bladder tenderness • Suprapubic pain 	2
E04	<ul style="list-style-type: none"> • Increased urinary frequency 	2
E05	<ul style="list-style-type: none"> • Low grade fever • Pyrexia 	2
E06	<ul style="list-style-type: none"> • Incomplete emptying 	1
E07	<ul style="list-style-type: none"> • Not passing Urine within 6 hours of birth 	1
E08	<ul style="list-style-type: none"> • Voiding small amounts 	1
E09	<ul style="list-style-type: none"> • Slow intermittent stream 	1
E10	<ul style="list-style-type: none"> • Uterus displaced • Abnormal uterine fundal height 	1
E11	<ul style="list-style-type: none"> • Palpable bladder • Distended bladder 	1
E12	<ul style="list-style-type: none"> • Vulval oedema 	1
E13	<ul style="list-style-type: none"> • Haematuria 	1
E14	<ul style="list-style-type: none"> • Polyuria 	1
E15	<ul style="list-style-type: none"> • Loin pain 	1
E16	<ul style="list-style-type: none"> • Rigors 	1
E17	<ul style="list-style-type: none"> • Straining to void 	1

Cardiovascular disease

Group	Cardiovascular Sign/ Symptom	Number of Recommendations Mentioning Sign and Symptom
F01	<ul style="list-style-type: none"> • Shortness of breath • Trouble breathing 	3
F02	<ul style="list-style-type: none"> • Swelling of legs • Moderate oedema 	3
F03	<ul style="list-style-type: none"> • Palpitations • HR>120 	2
F04	<ul style="list-style-type: none"> • SBP >160 • DBP>110 	2
F05	<ul style="list-style-type: none"> • Systolic S3 Murmur • Irregular heartbeat 	2

F06	<ul style="list-style-type: none">• Fatigue• Overwhelming tiredness	2
F07	<ul style="list-style-type: none">• Orthopnoea	2
F08	<ul style="list-style-type: none">• Chest pain	2
F09	<ul style="list-style-type: none">• Cough	2
F10	<ul style="list-style-type: none">• Syncope	1
F11	<ul style="list-style-type: none">• Enlarged liver	1
F12	<ul style="list-style-type: none">• Lung rales on auscultation	1
F13	<ul style="list-style-type: none">• Paroxysmal dyspnoea	1
F14	<ul style="list-style-type: none">• Prominent neck veins	1
F15	<ul style="list-style-type: none">• RR>25	1
F16	<ul style="list-style-type: none">• O2 Sat's <95% OA	1
F17	<ul style="list-style-type: none">• No visible JVP	1

Postpartum psychosis

Group	Postpartum Psychosis Sign/ Symptom	Number of Recommendations Mentioning Sign and Symptom
G01	<ul style="list-style-type: none"> • Believing strange things that can't be true (delusions) • Unusual beliefs • Hearing, seeing or feeling things that are not there (hallucinations) 	2
G02	<ul style="list-style-type: none"> • Sleep Disturbance • Unable to sleep • Feeling of no need for sleep 	2
G03	<ul style="list-style-type: none"> • Suicidal/ Infanticidal impulses 	2
G04	<ul style="list-style-type: none"> • Obsessive thoughts about the baby 	1
G05	<ul style="list-style-type: none"> • Severe depression • Despair 	1
G06	<ul style="list-style-type: none"> • Anxiety 	1

Venous thromboembolism

Group	Venous Thromboembolism Sign/ Symptom	Number of Recommendations Mentioning Sign and Symptom
H01	<ul style="list-style-type: none"> • Calf pain • Calf pain when flexing, standing or walking • Calf tender to touch 	10
H02	<ul style="list-style-type: none"> • Swelling >2cm or more of a calf • Leg heaviness • Lower limb oedema 	7
H03	<ul style="list-style-type: none"> • Calf redness • Red calf 	5
H04	<ul style="list-style-type: none"> • Spiking fever despite antibiotics • Low grade pyrexia 	2
H05	<ul style="list-style-type: none"> • Warm to touch Calf 	1
H06	<ul style="list-style-type: none"> • Shortness of breath 	1
H07	<ul style="list-style-type: none"> • Chest pain 	1
H08	<ul style="list-style-type: none"> • Lower abdominal pain 	1
H09	<ul style="list-style-type: none"> • Leg cramp 	1
H10	<ul style="list-style-type: none"> • Itching of leg 	1
H11	<ul style="list-style-type: none"> • Hyperpigmentation of leg 	1
H12	<ul style="list-style-type: none"> • Venous ulcer 	1

Postnatal depression

Group	Postnatal depression Sign/ Symptom	Number of Recommendations Mentioning Sign and Symptom
I01	<ul style="list-style-type: none"> • Feeling down, depressed or hopeless in the last month • Low mood • Felt sad or miserable 	7
I02	<ul style="list-style-type: none"> • The desire to hurt others or yourself, including thoughts about taking your own life, • The thought of harming themselves has occurred to me • Thoughts of harming baby • Thoughts of suicide or self-harm 	6
I03	<ul style="list-style-type: none"> • Bothered by having little interest or pleasure in doing things in the last month • Unable to laugh and see the funny side, • Not looking forward with enjoyment to things, • Inability to enjoy things • Inability to enjoy activities which were enjoyed prior to pregnancy or birth • Low motivation 	6
I04	<ul style="list-style-type: none"> • Bothered by feeling nervous, anxious or on edge over the last 2 weeks • Extreme worry • Severe anxiety • Uncontrollable feeling of panic • Scared or panicky for no very good reason, • Obsessional thinking 	5
I05	<ul style="list-style-type: none"> • Tearfulness • Crying • Weepiness 	4
I06	<ul style="list-style-type: none"> • Unable to concentrate due to distraction from depressive feelings • Feeling of things have been getting on top of me • Feeling overwhelmed • Feeling trapped • Feeling out of control • Unable to make decisions or get things done 	4
I07	<ul style="list-style-type: none"> • Poor sleep • Constant exhaustion • Inability to rest • Low energy 	3

I08	<ul style="list-style-type: none"> • Unusual irritability • Angry • Sensitive 	3
I09	<ul style="list-style-type: none"> • Change in appetite 	2
I10	<ul style="list-style-type: none"> • Constant headaches 	2
I11	<ul style="list-style-type: none"> • Sweaty hands 	2
I12	<ul style="list-style-type: none"> • Constant guilt/shame 	1
I13	<ul style="list-style-type: none"> • Withdrawal and avoiding contact with other mothers, family or professionals • Remote from family and friends 	1
I14	<ul style="list-style-type: none"> • Bothered by not being able to stop or control worrying over the last 2 weeks • Loss of confidence 	1
I15	<ul style="list-style-type: none"> • Palpitations 	1
I16	<ul style="list-style-type: none"> • Confused 	1
I17	<ul style="list-style-type: none"> • Disturbed thoughts which could include other people telling you that you are imagining things (hallucinations and delusions) 	1
I18	<ul style="list-style-type: none"> • Unnecessary self-blame when things went wrong 	1

Pulmonary Embolism

Group	Pulmonary Embolism Sign/ Symptom	Number of Recommendations Mentioning Sign and Symptom
J01	<ul style="list-style-type: none"> • Chest discomfort • Pleuritic chest pain 	6
J02	<ul style="list-style-type: none"> • Shortness of breath • Obstructed breathing • Trouble catching your breath • Difficulties breathing • Sudden dyspnoea 	5
J03	<ul style="list-style-type: none"> • Cough with bloody sputum • Haemoptysis 	3
J04	<ul style="list-style-type: none"> • Dizzy • Collapse • Syncope 	2
J05	<ul style="list-style-type: none"> • O2 Sat's <94% RA • Hypoxia 	2
J06	<ul style="list-style-type: none"> • Tachycardia >100bom 	1
J07	<ul style="list-style-type: none"> • RR>24bpm 	1
J08	<ul style="list-style-type: none"> • Swollen arm 	1
J09	<ul style="list-style-type: none"> • Swollen leg 	1
J10	<ul style="list-style-type: none"> • Dry cough 	1

Mastitis

Group	Mastitis Sign/ Symptom	Number of Recommendations Mentioning Sign and Symptom
K01	<ul style="list-style-type: none"> • Red breasts • Locally limited redness • Reddened wedge-shaped area on breast 	6
K02	<ul style="list-style-type: none"> • Swollen breasts • Swollen areas in the breast • Breast engorgement 	5
K03	<ul style="list-style-type: none"> • Tender breasts • Painful breasts to touch • Strong local pain • Pain on breastfeeding 	5
K04	<ul style="list-style-type: none"> • Sore nipples • Cracked nipples 	3
K05	<ul style="list-style-type: none"> • Warmth of breasts to touch 	2
K06	<ul style="list-style-type: none"> • Generalised discomfort 	1
K07	<ul style="list-style-type: none"> • Fever >38.4 	1

Postpartum thyroiditis

Group	Postpartum thyroiditis Sign/ Symptom	Number of Recommendations Mentioning Sign and Symptom
L01	<ul style="list-style-type: none"> • Irritability 	1
L02	<ul style="list-style-type: none"> • Intolerance to hot and cold 	1
L03	<ul style="list-style-type: none"> • Fatigue • Lack of energy 	1
L04	<ul style="list-style-type: none"> • Palpitations 	1
L05	<ul style="list-style-type: none"> • Impaired concentration 	1
L06	<ul style="list-style-type: none"> • Dry skin 	1
L07	<ul style="list-style-type: none"> • Aches and Pains 	1

Appendix 3.4: List of excluded signs and symptoms from the first expert review

Condition Category	Sign/Symptom	Rationale for exclusion	Alternate Phrasing
Postpartum Haemorrhage	Blood loss >1000mls after caesarean section	Lack of ability for woman/birth partner to assess	
	Blood loss >500mls after vaginal birth	Lack of ability for woman/birth partner to assess	
	Tachycardia	Lack of ability for woman/birth partner to assess	Fast Heart Rate
	Tachycardia >110bpm	Lack of ability for woman/birth partner to assess	Fast Heart Rate
	Hypotension	Lack of ability for woman/birth partner to assess	
	Hypotension <90mmHg	Lack of ability for woman/birth partner to assess	
	Poor Uterine contraction	Lack of ability for woman/birth partner to assess	
	Poor Uterine tone	Lack of ability for woman/birth partner to assess	
	Raised fundal height	Lack of ability for woman/birth partner to assess	
	Displaced uterine position	Lack of ability for woman/birth partner to assess	
	Large size of uterus	Lack of ability for woman/birth partner to assess	
	Tachypnoea >30rr/min	Lack of ability for woman/birth partner to assess	
	Tachypnoea	Lack of ability for woman/birth partner to assess	
	Low Oxygen Saturations	Lack of ability for woman/birth partner to assess	

	Sudden Blood Loss	Lack of ability for woman/birth partner to assess- as quite subjective	
	Profuse Blood Loss	Lack of ability for woman/birth partner to assess- as quite subjective	
	Colour of Blood	Not deemed essential for condition category- as deemed to occur later	
	Pallor of inner eyelid	Lack of ability for woman/birth partner to assess	
	Pallor around the mouth	Lack of ability for woman/birth partner to assess	
	Poor capillary refill time	Lack of ability for woman/birth partner to assess	
	Lack of mobility	Not deemed essential for condition category as quite subjective	
	Weakness	Not deemed essential for condition category as quite subjective	
	Scanty Urine output of <30mls/hour	Lack of ability for woman/birth partner to assess	Not passed urine for 6 hours
Genital Tract Sepsis	Temperature >38C	Lack of ability for woman/birth partner to assess	
	Temperature <36C	Lack of ability for woman/birth partner to assess	
	Abnormal temperature	Lack of ability for woman/birth partner to assess	
	Spikes	Lack of ability for woman/birth partner to assess	
	Purulent foul-smelling lochia	Duplicate	
	Heavy lochia	Lack of ability for woman/birth partner to assess	
	Tachycardia >90bpm	Lack of ability for woman/birth partner to assess	

	Tachypnoea RR>25	Lack of ability for woman/birth partner to assess	
	Impaired consciousness	Lack of ability for woman/birth partner to assess	
	Delay in uterine involution	Not deemed essential for condition category	
	Distended uterus	Not deemed essential for condition category	
	Oliguria	Lack of ability for woman/birth partner to assess	
	Generalised maculopapular rash	Not deemed essential for condition category	
	Draining pus	Not deemed essential for condition category- as unlikely to occur in first 24 hours	
	Green lochia	Not deemed essential for condition category- as unlikely to occur in first 24 hours	
	Hypotension SBP <90mmHg	Lack of ability for woman/birth partner to assess	
	Reduced appetite	Not deemed essential for condition category as hard to determine in the first 24 hours	
	Hypoxia	Lack of ability for woman/birth partner to assess	
Cardiovascular	Moderate oedema	Lack of ability for woman/birth partner to assess	
	HR>120	Lack of ability for woman/birth partner to assess	Fast Heart Rate
	SBP >160	Lack of ability for woman/birth partner to assess	
	DBP>110	Lack of ability for woman/birth partner to assess	

	Systolic S3 Murmur	Lack of ability for woman/birth partner to assess	
	Irregular heartbeat	Lack of ability for woman/birth partner to assess	
	Orthopnoea	Lack of ability for woman/birth partner to assess	
	Enlarged liver	Lack of ability for woman/birth partner to assess	
	Lung rales on auscultation	Lack of ability for woman/birth partner to assess	
	Paroxysmal dyspnoea	Lack of ability for woman/birth partner to assess	
	Prominent neck veins	Lack of ability for woman/birth partner to assess	
	RR>25	Lack of ability for woman/birth partner to assess	Fast Breathing
	O2 Sat's <95% OA	Lack of ability for woman/birth partner to assess	Fast Breathing
	No visible JVP	Lack of ability for woman/birth partner to assess	
PET	Persistent visual disturbances e.g. photopsia, scotoma, cortical blindness, posterior reversible encephalopathy syndrome, retinal vasospasm	Lack of ability for woman/birth partner to assess	
	Hypertension	Lack of ability for woman/birth partner to assess	
	Raised blood pressure	Lack of ability for woman/birth partner to assess	
	SBP>160	Lack of ability for woman/birth partner to assess	

	DBP>110 on one reading	Lack of ability for woman/birth partner to assess	
	DBP>90 on two readings	Lack of ability for woman/birth partner to assess	
	Uncontrolled hypertension	Lack of ability for woman/birth partner to assess	
	New onset hypertension	Lack of ability for woman/birth partner to assess	
	Epigastric pain or discomfort	Lack of ability for woman/birth partner to assess	Upper right belly pain
	Hypochondrial pain	Lack of ability for woman/birth partner to assess	Upper right belly pain
	UO <80ml/4hrs	Lack of ability for woman/birth partner to assess	Not passed urine for 6 hours
	Oliguria	Lack of ability for woman/birth partner to assess	Not passed urine for 6 hours
	Passing <400mls in 24 hours	Lack of ability for woman/birth partner to assess	Not passed urine for 6 hours
	General malaise	Not deemed essential for condition category	
	Hyper-reflexia	Lack of ability for woman/birth partner to assess	
	Brisk tendon reflexes	Lack of ability for woman/birth partner to assess	
	Unconscious	Lack of ability for woman/birth partner to assess	
	Lack of consciousness	Lack of ability for woman/birth partner to assess	
	Sustained clonus	Lack of ability for woman/birth partner to assess	

	Rales on auscultation of lung	Lack of ability for woman/birth partner to assess	
	Pulmonary oedema	Lack of ability for woman/birth partner to assess	
	Syncope	Not deemed essential for condition category	
	Liver tenderness	Lack of ability for woman/birth partner to assess	
	Sudden excessive weight gain	Lack of ability for woman/birth partner to assess	
	Cramps	Not deemed essential for condition category	
	Appetite loss	Not deemed essential for condition category	
Urinary dysfunction	Palpable bladder	Lack of ability for woman/birth partner to assess	
	Distended bladder	Lack of ability for woman/birth partner to assess	
	Suprapubic pain	Lack of ability for woman/birth partner to assess	
	Uterus displaced	Lack of ability for woman/birth partner to assess	
	Abnormal uterine fundal height	Lack of ability for woman/birth partner to assess	
	Vulval oedema	Lack of ability for woman/birth partner to assess	
	Loin pain	Lack of ability for woman/birth partner to assess	
	Rigors	Lack of ability for woman/birth partner to assess	
Anaemia	Alopecia	Not deemed essential for condition category	
	Blue sclera	Not deemed essential for condition category	

	Functional heart murmur	Not deemed essential for condition category	
	GI discomfort	Not deemed essential for condition category	
	Reduced immunity	Not deemed essential for condition category	
	Glossitis	Not deemed essential for condition category	
	Tachycardia	Lack of ability for woman/birth partner to assess	
	Koilonychia	Not deemed essential for condition category	
	Impaired cognition	Not deemed essential for condition category	
	Impaired cognitive performance tests	Not deemed essential for condition category	
	Stomatitis	Not deemed essential for condition category	
	Brittle nails	Not deemed essential for condition category	
	Flat or concave nails	Not deemed essential for condition category	
	Nail ridging	Not deemed essential for condition category	
	Decreased mental concentration ability	Not deemed essential for condition category	
	Smooth tongue	Not deemed essential for condition category	
	Depression	Not deemed essential for condition category	
	Frequent minor infections	Not deemed essential for condition category	
	Weakness	Not deemed essential for condition category	
	Restless legs	Not deemed essential for condition category	
	Poor concentration	Not deemed essential for condition category	
	Cyanosis	Not deemed essential for condition category	
	Cold intolerance	Not deemed essential for condition category	

	Dysphagia	Not deemed essential for condition category	
	Decreased appetite	Not deemed essential for condition category	
	Weight loss	Not deemed essential for condition category	
	Ringing in the ear	Not deemed essential for condition category	
	Leg oedema	Not deemed essential for condition category	
	Dry mouth	Not deemed essential for condition category	
	Irritability	Not deemed essential for condition category	
	Pallor conjunctiva, tongue, nail beds, palms, eyelids	Lack of ability for woman/birth partner to assess	
	Fatigue	Not deemed essential for condition category	
	Lethargy	Not deemed essential for condition category	
	Reduced exercise tolerance	Not deemed essential for condition category	
	PICA for non-food items	Not deemed essential for condition category	
Postpartum Psychosis	Unusual beliefs	Lack of ability for woman/birth partner to assess as subjective	

Appendix 3.5: List of signs and symptoms to be reviewed by first round of Delphi Survey

Condition	Sign/Symptom
Postpartum Haemorrhage	Blood loss of 2 cups after a vaginal birth Blood loss more than 1 pad or cloth soaked in <5 minutes Increase in blood loss rather than decrease after birth Constant trickling of blood Blood loss >2-3 pads soaked in 20-30 minutes after birth Intermittent heavy bleeding Passing a clot the size of or bigger than an egg Soaking through 1 pad per hour Palpitations Cool Temperature of skin Cold extremities Moist skin Clammy skin Change in Consciousness Altered mental state Anxiousness Confusion Faint Dizzy Pallor Pallor of palms Fast respiratory rate Uterine tenderness Weak pulse Sweating Nausea Thirsty Fast Heart Rate Soft Slack Uterus Not passed Urine for 6 hours

Genital Tract Sepsis	<ul style="list-style-type: none"> Fever Offensive vaginal loss Offensive odour of perineum Foul smelling vaginal discharge Bad smelling vaginal blood or discharge Abdominal pain Uterine tenderness Uncontrollable shivering Chills Rigors Hypothermia Perineal pain Stinging Perineal inflammation Heart racing Fast laboured breathing Lethargy Very weak/ cannot stand Confusion Mild agitation Altered Mental state Vomiting Diarrhoea Anxiety/ impending doom enlargement of wound sudden opening up of wound Sudden Leakage of blood
Cardiovascular Disease	<ul style="list-style-type: none"> Shortness of breath Trouble breathing Swelling of legs Palpitations Fatigue Overwhelming tiredness Chest pain Cough Syncope Fast Heart Rate Fast breathing

PET	<p>Visual disturbance Blurred vision Problems or changes with vision Flashing before the eyes Persistent visual impairment Blindness Severe headache Persistent, new headache Worsening and increasing in frequency headache Headache not alleviated by analgesics or medicine Right upper quadrant pain Severe pain below the ribs Upper right Belly pain Nausea Vomiting Sudden swelling of face, hands or feet Convulsions Seizures Altered consciousness Altered mental state Shortness of breath Chest pain Feeling faint Dizziness Giddiness Tea/coffee coloured urine Not PU for 6 hours</p>
Urinary dysfunction	<p>Leakage of urine Urinary incontinence Urine dribbling Dysuria Incomplete emptying Unable to urinate easily Bladder Pain Bladder tenderness Increased urinary frequency Low grade fever Pyrexia Not passing Urine within 6 hours of birth Voiding small amounts Slow intermittent stream Haematuria Polyuria Straining to void</p>

Anaemia	Pallor Severe pallor Generalised weakness Easy tiredness Extreme tiredness Palpitations Rapid heartbeat Shortness of breath Difficulty breathing Headache Frontal headache Dizziness
Postpartum Psychosis	Sleep Disturbance Unable to sleep Feeling of no need for sleep Obsessive thoughts about the baby Severe depression Despair Anxiety Suicidal/ Infanticidal impulses Believing strange things that can't be true (delusions) Hearing, seeing or feeling things that are not there (hallucinations)

Appendix 3.6: Suggested revisions from participants to the ImPoWA content

Alternate phrasing

Participants were invited to provide suggestions for alternate phrasing to the tool.

Sign/Symptom	Alternate phrasing (n)
Change in consciousness	<ul style="list-style-type: none"> - Collapsing (2) - Fainting (2) - How does one generally feel, mentally and physically? - Feeling of worry - Un-consciousness - Change in the understanding - Semi-conscious - Signs of change in consciousness e.g. It can be loss of speech, change in condition, and no energy in the body
Seizure	<ul style="list-style-type: none"> - Convulsions (8) - Epilepsy (2) - Collapsing (1) - Bad breathing - Did you develop any kind of sickness? - Accident
Severe Headache	<ul style="list-style-type: none"> - Headache (4) - Pain in the head
Persistent visual impairment	<ul style="list-style-type: none"> - Blindness - Loss of sight - Sight problems - Are you seeing well? - Are you able to see well? - Do you have any problems with your eyes? - Are you not seeing well? - Not seeing well - Incurable illness - Did you develop any complications related to seeing? - Visual problems - Dizziness - Are you visualising things differently - Inability to see well - Blurred vision
Urinary incontinence	<ul style="list-style-type: none"> - Leaking of urine (3) - Weak bladder - Frequent flow of urine - Does your bladder have the capacity to hold urine, or it comes automatically? - Painful urination - Problems in urinating - Urinary leakage

	<ul style="list-style-type: none"> - Are you passing urine? - Problems passing out urine - Dripping of urine - Flowing of urine with no control - Involuntary passing of urine - Unable to control urine
Chest pain	<ul style="list-style-type: none"> - Pain in chest - Do you have pain in the chest
Shortness of Breath	<ul style="list-style-type: none"> - Difficulty in breathing (3) - Do you have difficulties in breathing in and out? (2) - Blood pressure - Suffocation - Low breath - Not breathing well
Severe Pallor	<ul style="list-style-type: none"> - Anaemic (3) - Change in skin colour (2) - Body change - Abnormal appearance of skin - Has your skin colour changed after birth? - Little blood
Fast Heartbeat	<ul style="list-style-type: none"> - Palpitations (2) - Quick beating - High blood pressure - Is your heart beating fast? - High respiration
Rejection of baby	<ul style="list-style-type: none"> - Refusal of the baby (2) - Denial of the baby - Throwing out the baby - Do you have love for your baby?
Suicidal/ infanticidal	<ul style="list-style-type: none"> - Postnatal madness - Do you feel like you want to do something wrong to yourself or your baby? - Are you tired of living? - Do you have any feeling of harming or hurting yourself or your baby? - Committing suicide - Feeling of wanting to die
Syncope/ Dizziness	<ul style="list-style-type: none"> - Body weakness - Are you yourself? - Lack of energy
Amount of Blood Loss	<ul style="list-style-type: none"> - Anaemia (4) - Do you think you have anaemia - Blood anaemia - Are you bleeding a lot? - Too much or too less blood - Are you bleeding (then say if flow if high or low)? - Much bleeding

	- Excessive blood loss
Soft flabby uterus	- Soft uterus - How do you feel when you touch your uterus? - Soft floppy uterus - Failure of uterus to contract - I think you just give an explanation that if you touch the abdomen and you don't feel any hard-like thing then you can report. * Get an easier word
Unable to urinate easily	- Painful urination (3) - Difficulty in urinating - Do you find difficulties in urinating? - UTI - Failure to urinate - Do you have issues passing out urine?
Foul smelling discharge	- Bad smelling discharge (4) - Smelling discharge (2) - Smelly discharge - Bad smelling water - Do you have discharge (and too the colour) - Do you have a smell coming out of you?
Rigors	- Shivering (5) - Shaking of the body (2) - Dizziness - Fever - Abdominal temperature - "Do you have any feeling of harming or hurting yourself?" - Chills
Fever	- High temperature (2) - Malaria (2) - Convulsions - Being sickly - Hot body - Are you feeling fever? - High body temperature - Do you feel hot? - Feeling hot?
Abnormal coloured urine	- What's the colour of your urine? - "Have you had a change in your urine colour?"

Additional signs and symptoms

Participants were invited to suggest any additional signs and symptoms worth including. The number of participants providing this suggestion is given in parenthesis:

- Prolapse (3)
- Neonatal signs and symptoms (3)
- General pains (2)
- Support from family and partner (2)

- Pressure (2)
- Diabetes (2)
- Feeding, Appetite (2)
- Epigastric pain (2)
- Painful breasts
- Constipation
- Hygiene
- Covid-19 symptoms
- Stressed and depressed
- Preparedness to get pregnant
- Ulcer
- Stomach or back pain

Suggested removals from the tool

Participants were invited to suggest signs and symptoms for removal. The number of participants providing this suggestion is listed in parenthesis.

- Fever - as similar to rigors (4)
- Amount of blood loss- as similar to severe pallor
- Rejection of baby- rare
- Headache- as similar to seizure (1)

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