**Child poverty and health inequalities in the United Kingdom - a guide for paediatricians**

**Alice R Lee 1,2, Camilla C Kingdon** 3**, Max Davie** 4,5**, Daniel B. Hawcutt \* 1,2, Ian P. Sinha \* 1,2**

1 Alder Hey Children’s Hospital, Liverpool, UK

2 Department of Women’s and Children’s Health, University of Liverpool, UK

3 Evelina London Children's Hospital, London, UK

4 Royal College of Paediatrics and Child Health, UK

5 Community Paediatrics, Guy's and St Thomas's NHS Trust, London, UK

\* Joint Senior Authors, who contributed equally to this work

Corresponding author: [iansinha@liv.ac.uk](mailto:iansinha@liv.ac.uk)

Alder Hey Children’s Hospital, East Prescott Road, Liverpool, UK

Lee is funded by the Department of Innovation, Alder Hey Children’s Hospital

**Abstract**

One in three children in the UK lives in relative poverty. There are clear and consistent links between child poverty and paediatric morbidity and mortality. In this review we discuss drivers for family poverty in the UK, and how this leads to poor child health outcomes. We present a framework for healthcare professionals and institutions to consider interventions and strategies relating to socioeconomic health inequalities. We will focus on approaches to mitigate the effects of child poverty on children using our services at a local level, and outline the importance of health care workers advocating for structural and high-level policy change to address the deep-rooted societal problems that cause child poverty.

**Introduction**

Child health outcomes in the UK are suboptimal when compared with other rich countries. One of the drivers for this is child poverty. In this review paper, we discuss key elements of child poverty in the UK, and consider two mechanistic processes: why are children living in poverty, and how does this affect child health? Strategies for change are then considered, grounded in these mechanistic concepts, detailing why short-term, small-scale interventions to mitigate against the effects of poverty must happen alongside wider approaches to deep-rooted societal problems. Although we acknowledge the importance of ethnic, gender, and geographical drivers of inequality, we do not address these in this guide.

**Aims, scope, and outline:** (i) equip paediatricians and other professionals with the knowledge and tools to understand how poverty drives inequalities and affects health outcomes in the UK, and (ii) what child-health professionals can do about it.

In Section 1 we define poverty, and describe the current state of child poverty in the UK.

In Section 2 we present evidence that living in poverty puts children at risk of acute and chronic health problems throughout their lives .

In Section 3 we describe the complex mechanisms by which child poverty can lead to health inequalities.

In Section 4, using these mechanistic concepts, a framework is presented demonstrating both how clinicians and healthcare institutions can address inequalities, and suggesting key considerations for successful interventions.

In Section 5 we offer some tips on communication about child poverty and health inequalities.

**Section 1: What do we mean by ‘child poverty’?**

When a person does not have the resource to live according to an acceptable standard, they are living in poverty. Typically, we think of poverty as financial hardship, but other dimensions include reduced freedom to express opinions and have choices, and impaired ability to access services and resources.

Child poverty is usually described in relative terms of children living in households with income below 60 per cent of the UK median household income (the “poverty line”). This describes an income at which households may struggle to afford the absolute basics in life but does not cover additional costs required to participate in society. The level at which families can afford to do this is called the Minimum Income Standard (MIS), which is calculated, and updated, based on views of the public 1. Families below the poverty line, therefore, have insufficient income to raise children at an acceptable standard of living as judged by the public.

* The median household income in 2020 was around £30,000 per annum in the UK, so families with income below £18,000 would be below the poverty line. The MIS was calculated as £26,592 (for a two-parent family, with two children in primary school)1. Children living in households with an income of £18,000-£27,000 may not be below the poverty line, but their parents would struggle to have sufficient finances to offer them an acceptable standard of living.

Around one in three children lives in poverty in the UK. This proportion has got worse over the last ten years. The levels of child poverty may rise even further in the aftermath of Covid-19, as the uplift to Universal Credit comes to an end, with economic uncertainty during the UK’s financial recovery compounded by Brexit. After the last recession, the United Nations Children's Fund (UNICEF) identified that in rich countries, children were the age group most at risk of falling into poverty 2. Figure 1 shows a map of child poverty in 2019 from Public Health England data.

Figure 1 - Child poverty (Indices of Deprivation) from Public Health England Obtained from [www.localhealth.org.uk](http://www.localhealth.org.uk), Public Health England.  Contains public sector information licensed under the Open Government Licence v3.0

Some features of child poverty in the UK are listed here:

* 75% of children in poverty have at least one parent in work –living in “in-work” poverty.
* Having someone with chronic illness in the household increases the risk of children poverty.
* The causes of poverty and how it affects child health and well-being will differ by geographical location
* There are stark ethnic differences in the rates of child poverty, such that children from Bangladeshi backgrounds are nearly three times as likely to be in poverty than White British children (Figure 2).

Figure 2 Rates of child poverty by ethnicity in the UK (Taken from ONS “People in Low Income Households, available at [https://www.ethnicity-facts-figures.service.gov.uk/work-pay-and-benefits/pay-and-income/people-in-low-income-households/latest - by-ethnicity](https://www.ethnicity-facts-figures.service.gov.uk/work-pay-and-benefits/pay-and-income/people-in-low-income-households/latest#by-ethnicity))

Single parent families are at particular risk, due to the highcosts associated with childcare leading to reduced opportunities for savings, and no scope for investment (e.g. in a mortgage, or opportunities for children); families may then incur and enter a vicious cycle of debt. This is depicted in the model in Figure 3.

Figure 3 – The ‘Low Financial Resilience Model’ of family poverty (Lee, Hawcutt, Sinha 2021): Structural financial drivers of family poverty: the problems of insufficient income and high outgoings mean families cannot save – they are not financially resilient. They are liable to experience acute financial shocks (such as benefits sanctions) and therefore are at increased risk of debt. These problems reduce opportunities to invest in their children.

Although detailed consideration is beyond the scope of this review, mothers are particularly vulnerable to many elements in this model due to the “motherhood penalty” 3, gender inequalities in employment 4, and benefit sanctions 5.

**Section 2: Correlation between poverty and child health inequalities in the UK**

Health inequalities do not only exist between the most advantaged and most deprived children in the UK; findings from the millennium cohort study highlight how health outcomes worsen across the board with every quintile of equivalised household income (ref: DTR’s work). This section will focus on how the most deprived children suffer the highest levels of morbidity and mortality throughout their lives.

Mortality in childhood: Infants in the most deprived decile are, consistently, around twice as likely to die as those in the least deprived decile (England data shown in Figure 4). Additionally, between 2013 and 2017 there was an unprecedented rise in infant mortality, which was only observed in the most deprived quintile, and associated with an increase in child poverty 6.

Figure 4 - Infant mortality rates are associated with child poverty in England (using Office for National Statistics data - Child and infant mortality in England and Wales Statistical bulletins <https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/deaths/bulletins/childhoodinfantandperinatalmortalityinenglandandwales/previousReleases>)

The National Child Mortality Database (NCMD) reviews paediatric deaths in the UK. In 2021, they reported key findings about the association between socioeconomic deprivation and paediatric death 7:

* On average, there was a relative 10% increase in risk of death between each decile of increasing deprivation.
* Seven hundred fewer children per year might dieif the children living in the most deprived areas had the same mortality risk as those living in the least deprived.
* The proportion of deaths with identified modifiable factors increased with increasing deprivation, with factors relating to the social environment being the most frequently reported.
* At least 1 in 12 of all child deaths reviewed had one or more factors related to deprivation identified at review.

Acute illness: Children from disadvantaged backgrounds are significantly more likely to require hospital admission8, and require longer duration of stay 9. Of children attending Emergency Departments (ED), those from the most deprived quintile are 60% more likely to be frequent attenders (>4 attendances in a year) than the most affluent 10.

Chronic illness: A meta-analysis identified that children from a disadvantaged socioeconomic background were 72% more likely than other children to be diagnosed with a chronic illness 11 (Table 1).

|  |  |  |
| --- | --- | --- |
| **Chronic condition/impairment** | **Studies (n)** | **Odds ratio (95% Confidence Interval) for children in socioeconomically deprived conditions developing the condition (95%CI)** |
| All causes | 20 | 1.72 (1.48 to 2.01) |
| Psychological disorders | 55 | 1.88 (1.68 to 2.10) |
| Intellectual disability | 21 | 2.41 (2.03 to 2.86) |
| Asthma (causing activity limitation or hospitalisation) | 13 | 2.20 (1.87 to 2.85) |
| Cerebral palsy | 6 | 1.42 (1.26 to 1.62) |
| Congenital abnormalities | 13 | 1.41 (1.24 to 1.61) |
| Epilepsy | 6 | 1.38 (1.20 to 1.59) |
| Sensory impairment | 9 | 1.70 (1.39 to 2.07) |

Table 1 - increased risks of developing chronic conditions and impairments in childhood amongst children from socioeconomically disadvantaged backgrounds (Odds ratios taken from a meta-analysis by Spencer et al 11)

Healthiness: In Section 3 we discuss how poverty limits the choices that families have around healthy food. Data from the National Child Measurement Programme (NCMP) show that the rates of obesity and severe obesity in Year 6 are increasing in the most deprived quintile. The gap is widening - in this age group the rates are decreasing in the most affluent quintile. There are also significant ethnic differences in the increasing rates of obesity. The worsening inequalities in severe obesity at school Year 6 are shown in Figure 5.

Figure 5 - NCMP data showing inequalities in childhood obesity (data taken from <https://www.gov.uk/government/collections/national-child-measurement-programme> , last accessed 12/12/2021). A shows the widening gap in obesity at Year 6 between the most deprived and most affluent quintiles; B shows widening gap in obesity prevalence between different ethnic groups.

Health and wellbeing in adulthood:

Improvements in life expectancy had stalled before the pandemic, and getting worse for certain groups, particularly women in the poorest decile12. There are clear associations between levels of child poverty and life expectancy (Figures 6 and 7).

Figure 6 Lower Tier Local Authority - life expectancy vs child poverty in that location (women, England) r-0.82 (p <0.001). Data - Public Health England Fingertips <https://fingertips.phe.org.uk/> accessed 12/12/2021; analysis Sinha IP

Figure 7 Lower Tier Local Authority - life expectancy vs child poverty in that location (men, England) r-0.77 (p <0.001). Data - Public Health England Fingertips <https://fingertips.phe.org.uk/> accessed 12/12/2021 analysis Sinha IP

Chronic ill-health in adulthood is an important driver for reduced life expectancy. There is increasing recognition that diseases widely considered to be “adult illnesses” in fact have their origin in childhood – and may even start manifesting before adulthood. For example, Chronic Obstructive Pulmonary Disease (COPD) has been shown in long-term cohort studies to have origins within the Early Years, with 60% of adults with the disease entering adulthood with obstructive lung function13. Children from the poorest quintile are five times more likely to develop COPD as adults 14.

**Section 3: Mechanisms by which poverty can affect child health outcomes to consider when attempting to develop interventions to address inequality**

There are various models that describe the complex factors involved in determining a person’s health. In the commonly-used Dahlgren-Whitehead Rainbow (Figure 8) 15, the health of a person is determined by their constitutional factors, lifestyle factors, community networks, and the wider socioeconomic, cultural and environmental conditions in which they live.

Figure 8 The Dahlgren-Whitehead model of health determinants 15

In this section we describe the complexity of the mechanisms by which poverty leads to child health inequality. We highlight four key mechanistic considerations:

* **Parents in poverty are less able to offer their children a healthy lifestyle.**
* The odds stack up against children.
* The Inverse Care Law.
* Poverty gets under your skin.

1. **Parents in poverty are less able to offer their children a healthy lifestyle.**

We developed the “clock/capacity/cost” model to understand how families are limited in their choices with regards to healthy lifestyle for their children. In short, the inability to offer a healthy lifestyle can be traced to “three C’s”: clock (time restraints); capacity (resource constraints); and cost (financial restraints), and consideration of the “requirements versus the reality” at each step shows the intricate and deep-rooted effects of poverty. In Figure 9 we illustrate how this model can demonstrate the challenges parents face in providing a healthy meal for children if they are living in socio-economic deprivation.

Figure 9- Example of a “clock/capacity/cost analysis” of limitations of healthy living choices. This example relates to the process behind cooking a healthy meal.

When developing interventions to address inequalities, co-producing a matrix like this with families can help identify the deep-rooted structural problems that need to be addressed. The key points for paediatricians demonstrated in such models are as follows:

* Development of interventions to address health inequality must be co-produced with families and communities. Clinicians, managers and people who make funding decisions are often removed from the realities of living in poverty , and cannot imagine the best way to address these real-world problems – insight from the people living through them is required.
* Iintervention(s) to address a symptom (e.g. obesity), cannot focus solely on educating parents. Educational resources are important but will not address the structural problems.
* When considering the affordability of healthy lifestyle choices, this model demonstrates that, for example, it is too simplistic to think about the price of food alone.

1. **The odds stack up against children: adverse exposures associated with poverty accumulate, with disproportionately bad effects:**

There are four concepts to consider around the cumulative effect of adverse exposures:

1. Adverse exposures associated with poverty tend not to occur in isolation
2. Adverse exposures may work synergistically against children
3. Children at risk may be less likely to have access to protective factors
4. Temporal factors (persistence and time of the insult) are likely to make the problem worse

The importance of considering adverse exposures of poverty in this framework can be illustrated with the example of air quality in Table 2.

Table 2 - The synergistic effects of poverty on child health - the example of air pollution

|  |  |
| --- | --- |
| Adverse exposures associated with poverty tend not to occur in isolation | Air pollution exposure is highest in the most deprived areas 18, and children are disproportionally exposed to the highest levels of pollution 19  Children in more deprived families are more likely to be exposed to second hand smoke 20  Children in deprived areas are more likely to live in housing with poor ventilation 21 and other features of substandard housing. Families in poverty may ventilate their house less because of problems such as fuel poverty, or living in areas with crime, that make it less easy to open windows. |
| Adverse exposures may work synergistically against children | Exposure of pregnant women to air pollution in the second trimester increases the risk of their offspring having asthma 22, but this risk is greatest in mothers suffering from psychological stress 23.  Expectant mothers suffering from stress are more likely to smoke antenatally, which increases the risk of their offspring developing asthma 24. Smoking and poor quality housing put their baby at higher risk of severe bronchiolitis 25 (which in turn increases the risk of asthma 26). |
| Children at risk of these adverse exposures may be less likely to have access to protective factors | Good nutrition could have a protective effect against inflammation caused by air pollution, but the more deprived families may find this prohibitively expensive.  Exercise in childhood is associated with better lung function, but living in polluted areas, with lack of green space, makes this more difficult to achieve.  The foundations for developing a robust respiratory system happen in babies – those babies living in cold housing during their first winter will be expending calories on maintaining body temperature and avoiding hypoglycaemia, rather than organ development. |
| Temporal factors are likely to make the problem worse | Persistence: Pollution-related airway damage in the poorest children happens both outdoors and indoors meaning they do not get a break from exposure. They may be exposed to high levels of traffic pollution on their school commute. At school, viral spread and poor building quality compounds the problem further.  Time of insult: Children from deprived areas enter primary school with suboptimal lung function due to antenatal and Early Years disruption of airway development and are at increased risk of the effects of air pollution. |

Considering these mechanisms, effective intervention to improve respiratory health by improving air quality should address a variety of factors:

* Better mental and physical health for pregnant women
* Better housing for children in deprived areas
* Interventions to reduce second-hand smoke exposure
* Better access to healthy nutrition and green space
* Better access to mental health resources for children
* Clean air strategies for schools, including better walking routes for children

1. **The Inverse Care Law: Socioeconomic status tends to be associated with quality of care**

Children have benefitted greatly from policies, upstream interventions, and large-scale interventions to improve health such as legislation and interventions to reduce second-hand smoke exposure 27, and immunisation programs. However, interventions to improve child health, in and of themselves, do not always reduce inequalities relating to socioeconomic deprivation. Multiple public health interventions, whilst improving overall health, can in fact widen inequalities relating to socioeconomic deprivation. This includes air pollution reduction policies, breast feeding initiatives and newborn screening for Cystic Fibrosis.

One cause to consider is that healthcare in more deprived communities may be less effective. The Inverse Care Law (*"availability of good medical care tends to vary inversely with the need for it in the population served")* was first described in 1971 31. Over fifty years later, this is still one of the major barriers to improving health inequalities.

It is important for clinicians and healthcare institutions to consider the Inverse Care Law when planning interventions to reduce child health inequalities:

* Children in deprived areas may have less access to the medical care they need. Analyses from the Health Foundation 32 and the Nuffield Trust ([https://www.nuffieldtrust.org.uk/news-item/are-parts-of-england-left-behind-by-the-nhs - where-health-follows-wealth)](https://www.nuffieldtrust.org.uk/news-item/are-parts-of-england-left-behind-by-the-nhs#where-health-follows-wealth))<https://www.nuffieldtrust.org.uk/news-item/are-parts-of-england-left-behind-by-the-nhs#where-health-follows-wealth> ) report that deprived communities have fewer GPs per head; GPs in the most deprived areas have around 370 more patients on average than those in the least deprived. For paediatric secondary care services, there are financial barriers to accessing care: in a survey in Liverpool, we identified that it costs families approximately £35 to attend a respiratory clinic appointment and 8% of families reported missing appointments because of financial difficulties 33.
* Children from deprived backgrounds may receive less good care. GP practices in more deprived areas on average earn fewer quality and outcomes framework (QOF) points, and have worse Care Quality Commission (CQC) ratings and lower patient satisfaction scores than those in more affluent communities 32. A recent report also found that children with chronic renal failure were significantly less likely to receive a pre-emptive kidney transplant if they came from a deprived background; a finding not explained by their clinical status or time of presentation to specialist services 34.
* Public spending cuts affect poorer areas disproportionately hard. Austerity measures tend to hit northern towns and cities with high population rates of premature mortality 35. High levels of public spending cuts are associated with adverse effects in children, including rates of food poverty 36,37, and perinatal outcomes such as low birth weight 38,39.

1. **Poverty gets under your skin: the pathobiological effects of socioeconomic deprivation**

Living in poverty has chronic pathobiological effects 40 including inflammatory 41,42, metabolic 43, and endocrine 44,45 dysfunction and maladaptation. There are also epigenetic factors associated with poverty. It is estimated that poverty can affect up to 10% of a person’s DNA function 46. The pathobiology of child poverty is driven by various factors, summarised in Figure 10. An example of how epigenetic factors can affect child health is depicted in Figure 11, which shows how epigenetic factors can be involved in every aspect of the pathology of asthma – and why this may explain our finding that across our severe asthma network, children in the worst deprivation had higher levels of airway inflammation and worse lung function 47.

Figure 10 - The pathobiology of poverty in childhood (Lee et al)

Figure 11 - Epigenetic processes involved in the pathology of asthma - from epithelial dysfunction, inflammatory processes, airway hyperresponsiveness, and chronic airway remodelling

**Section 4: A framework for healthcare institutions to use to address inequalities in child health**

If paediatricians, and the institutions in which they work, want to develop strategies to address inequalities, they should be incorporated into Quality Improvement processes. We propose the framework outlined in Figure 12.

Figure 12 - A framework for healthcare institutions to address child health inequalities

In Section 3, we highlighted the complexities of how health inequalities are driven by poverty. Based on these key concepts, we suggest the following considerations when developing interventions locally to address child poverty and health inequalities in children:

* When planning an intervention, time should be spent understanding, in detail, the mechanisms behind the inequalities of interest. The four steps to consider (described in Section 3) are: (i) a clock/capacity/cost exercise to identify the limitations of choice for families (ii) co-existing drivers for inequality that may have synergistic effects, (iii) where the Inverse Care Law may manifest in clinical pathways, and (iv) how the pathobiology of poverty might impact on clinical outcomes (and what can be done to address this).
* Interventions should be co-developed in partnership with children, families, and the communities in which they live. Strategies placing the onus on families (such as solely focussing on education about health choices) are unlikely to lead to sustained reduction in inequality.
* Setting the scope is crucial, as this will influence the strategy. System-wide changes across pathways and services are more likely to reduce inequalities. Small changes may offer some relief for families, and may be necessary and well-received, but will not reduce inequalities.
* Healthcare delivery systems need to develop strategies that mitigate against the effects of poverty. For real and sustained improvements in inequality, policy changes are needed to end child poverty and remove structural and societal barriers – and paediatricians should see it as part of our role to champion and advocate for these.

**Section 5: How to talk to parents, professionals and local influencers about child poverty and health inequalities**

Talking to parents

Many health professionals find it difficult to raise questions about finances. The stigma associated with poverty may also impact parents’ ability to discuss the challenges they face. To make this subject more approachable:

* Change the thinking about smoking, housing, food, and air quality from “*wider* *determinants*” of health to “*core determinants”* - then it doesn’t just become easier to ask about them, it becomes imperative. If we aren’t asking families about things which may impact on their children’s health, we are short-changing the children themselves.
* It is important to not shy away from questions and explaining in an empathetic way why you are asking can help deconstruct the stigma associated with poverty. Timing of discussions is also vital; parents may feel alienated if they are confronted about smoking when they are stressed about an acutely unwell child with pneumonia.
* Don’t guess who might be struggling based on appearances – “screening” for poverty can be counter-intuitive. Ask everyone the same suite of questions and tell every parent that you ask these routinely. Children in relative deprivation can live in affluent council wards. As mentioned in section 1, families who do not fall below the poverty line may still be struggling to get by. They may in fact be ineligible for certain resources, such as Free School Meals, that might otherwise have made their financial situation easier. It is important to let families know they are not alone in experiencing problems.

Talking to professionals and local influencers

Changing policy, reforming how funds are distributed for healthcare, and making new laws that protect children are how sustained and meaningful change can happen. Inequalities cannot improve without repairing the inherent problems in society and within health services. Although doctors are not taught how to influence thinking in strategic areas, the key principles are simple.

* As paediatricians, the expertise we bring to the table needs to be a combination of our experiences, and evidence. Healthcare leaders, activists and policy-makers are keen to hear from clinicians about inequality.
* It is important to understand the landscape for local and national influence. Talking is the best way to open doors and develop a network; colleagues will often be linked in with different initiatives and leadership roles and may be able to get a foot in the door with the right person.
* Stand firm. Compromise is fine (and healthy), but reaching for “low hanging fruit” can often divert from where the problems really lie.
* The key benefits of addressing child poverty cut across the board – there are financial, resource, moral, ethical, and environmental benefits if children do not live in poverty. It is useful to identify which of these is relevant to the people with whom we speak.
* Paediatricians must ensure that people know that poverty increases the risk of childhood mortality, and that there is an urgency to improve the situation. There is ongoing work to enshrine the rights of children in UK law, which may improve the situation.

**Key messages**

1. Child poverty is common in the UK and has catastrophic short-term and long-term effects on children’s health and well-being.
2. As paediatricians we have a duty to understand the structural, complex mechanisms behind health inequalities and how they impact the families we care for.
3. The roles of the paediatrician is to look deep within ourselves and our services to see where we have fallen short, and using the frameworks set out alongside families, effect changes which reduce inequalities.
4. All children deserve to live their best life; the frameworks outlined in this guide should help us achieve that goal.

**Conflicts of interest**

There are no political, financial, or other conflicts of interest to declare.

**Contributorship statement**

Sinha, Hawcutt, and Lee wrote the paper. Davie, Kingdon and Lam conceived of the need for this paper and have reviewed the final version. Sinha is the guarantor.

**Appendix A – resources for harnessing data**

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| National level data | Data collected at GP, CCG, and local authority level is available at [Public Health England “Fingertips” site](https://fingertips.phe.org.uk/) and can be viewed on an interactive map at the [local health site](https://www.localhealth.org.uk/" \l "c=home).  [The Office for National statistics](https://www.ons.gov.uk/) is an excellent resource for many aspects of socioeconomic deprivation and child health  National audits for diabetes, epilepsy and asthma can be used to assess outcomes and service provision. |
| Local data | Hospital Business Intelligence data and local audit  Community knowledge is vital and can be accessed by linking with local research groups and community programmes such as children’s centres. |

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