

The emergence of health gaps in early life in France: Effects of childhood deprivation

Context and research questions

Population health and an efficient health care system have been always at the top of the policy agenda of many governments. The French healthcare system has been globally recognized for overall quality: France is among the world's biggest healthcare spenders – 11.2% of its GDP versus an average of 8.8% in OECD countries in 2018; there is a high level of public support for expenses through national solidarity – the National health insurance covers an average of 83% costs; direct out-of-pocket spending for patients is the lowest in the OECD at 9% versus 21% on average [1]. This has contributed to the achievement of prominent results. For example, 99.9% of the population is covered for a core set of services and the French population has one of the best life expectancies in the world – 82.9 years in 2018 [2]. At the same time, despite the coverage and enormous investments into the healthcare system, health inequality remains high. Among the richest 5% and the poorest 5%, there is a gap of 13 years in life expectancy at birth for men [3]. According to the French National Health Strategy 2018/22, the reduction of health inequalities is at the top of a healthcare policy framework. Research literature emphasizes that inequalities in health start early in life and that children's early environment “get under the skin” from the earliest moments of life. Early childhood is therefore crucial to our understanding of the production of health inequalities in later life [4-5]. Compared to other national settings, there is less empirical research about the dynamics of health inequalities in early years for France, yet preliminary results suggest stark health gaps from birth, comparable to those documented in other developed countries [6].

A body of research, mostly coming from the economics literature, has put forward multi-domain deprivation as a tool for a better understanding childhood disadvantage, rather than classic measures such as income poverty, which do not fully capture children's lived experience of disadvantage. However, the epidemiology literature still uses relatively simple concepts of (parental) “socio-economic status” to describe health gaps in childhood. In this paper, we propose to conceptually and methodologically bring together the economics literature on the measurement and conceptualization of childhood deprivation on the one hand, with the epidemiological literature on health inequalities on the other hand for a better understanding of the emergence of “socio-economic” inequalities in early childhood.

A particular innovation of this paper is the use of a dynamic, child-centred, multi-domain framework to study early childhood deprivation and how it links to early health. We apply longitudinal framework and explore how dynamics of early childhood deprivation are associated with dynamics of early health. Our focus on multiple domains of deprivation allows exploring which dimensions of deprivation matter most for early health and this is a critical step to move from describing to understanding health inequalities.

Data

We use first French representative, large-scale multidisciplinary birth cohort study, Etude Longitudinale Française depuis l'Enfance, which follows over 18,000 children born in 2011 at a representative sample of 344 hospitals in continental France. Data collected shortly after birth in hospital (including data from the mothers' pregnancy notes), then during the phone interviews at 2 months, 1, 2, 3.5 and 5.5 years. The data is based on a multidisciplinary approach covering a wide range of topics, i.e., socio-economic context, child development and health, environmental exposures, etc.

Comparable over waves child's health outcomes include parent-reported general health, body-weight status (underweight, normal weight and overweight), respiratory issues such as wheezing and asthma, atopic dermatitis (eczema) and unintentional injuries.

Research methods

The first part of our paper is dedicated to the conceptualisation and construction of longitudinal measures of early childhood deprivation. Based on existing definitions and methodologies of multidimensional poverty, we modify them to construct longitudinal measures that adapt over time to account for children's changing needs, while still allowing longitudinal analyses. Dimensions of deprivations stay constant over times, while the items making up each dimension are a mixture of stable and changing variables that adapt to children's needs. The choice of the dimensions depends on the scoping review and the data available.

The identification of deprived children is based on a double counting approach: first, we count the number of items of deprivation in each dimension; second, we count the number of dimensions in which the child is considered as deprived to define an overall deprivation status. This double counting approach imposes a triple cut-off methodology (adapted from the dual cut-off methodology [7]), in order to define: (1) deprivation for each item, (2) deprivation for each dimension, and (3) overall deprivation within each wave. This methodology allows following children over time as we keep constant the dimensions of deprivation, while taking into account the changing needs of children according to their age, as the item composition of each dimension can vary with child age.

In the second part of the paper, we link dynamics of deprivation with dynamics of child health. First, we carry out cross-sectional analyses measuring associations between each dimension of deprivation and the overall deprivation indicator with each child health outcome. We also look at associations with classic measures such as financial poverty to assess whether the use of multi-domain deprivation concepts leads to different patterns of health inequalities. Second, longitudinal analyse is implemented. While we do have some repeated measures of child health across waves, treating health variables in a longitudinal manner in very young children is problematic because it would imply that the outcome has the same meaning across the ages considered. We propose to use a latent variable set-up in which different measures of child health are used to identify a latent concept of "health" at each age.

We implement structural equation models including autoregressive paths and cross-lagged effects, allowing simultaneously estimating sets of longitudinal relationships (see, for example, Pakpahan, Hoffmann, and Kröger, 2017, for a description of these methods as applied to social science research, [8]). These types of models allow analysing longitudinal panel data with repeated measurements of sets of latent variables. More specifically, we estimate the correlation between deprivation on child health at the following wave, while simultaneously estimating the impact of child health on deprivation at the following wave, given a set of controls. While the cross-lagged effects and the inclusion of a large panel of child and household controls address in some ways issues of causality, these models do not attempt to isolate a "causal" impact of deprivation on child health but provide a complementary approach by providing nuanced overview of these processes over time.

Four sets of models, answering different questions about the relationships between early deprivation and health, are estimated. In the first model, deprivation is measured using each dimension. This allows to test how different dimensions of deprivation correlate with health at the following wave, and whether there is a dimension of deprivation that matters more for child

health or whether there is a similar correlation between each dimension of deprivation and health at the next wave. In the second model, the correlation between interactions between dimensions of deprivations is explored. In the third model, one variable measuring the number of dimensions on which a child is classed as deprived is entered. This allows to study the depth of deprivation within each wave and whether the cumulation of deprivation, at each wave, matters for subsequent child health. The fourth model studies trajectories of health and the persistence of deprivation over time by applying latent growth methods [8]. In this model, trajectories of health are estimated through a latent growth model, analysing changes in child outcomes over time. This model specification allows to explore the issue of the cumulation of deprivation across time.

Preliminary results

Based on the literature review, available data and Multiple Component Analysis, we select items identifying the lack of a specific good/activity and identify discrete dimensions of deprivation. As a result, we get five different dimensions of deprivation, namely material deprivation, housing deprivation, extreme living conditions deprivation, parental deprivation and health deprivation (health deprivation takes into account nutrition, sedentary behaviour and physical activity). Table 1 shows the proportions of children who fall into different deprivation dimensions and the proportion of children who are overall deprived following the definition of two-dimension cut-off (the child is overall deprived if he/she is deprived at least in two dimensions).

Table 1 – Dimensions of deprivation and overall deprivation index

Dimension of deprivation	Child's age				
	2 months	1 year	2 years	3.5 years	5.5 years
Material deprivation	6.6	5.4	3.4	8.2	11.1
Housing deprivation	12.1	11.4	11.5	8.4	7.1
Extreme living conditions	2.4	2.3	2.0	1.3	1.0
Parenting deprivation	4.0	7.7	2.6	3.8	6.1
Health deprivation	26.8	11.9	13.0	14.6	13.1
Number of dimensions	5	5	5	5	5
Cut-off	2	2	2	2	2
Overall deprivation index	8.5	6.6	4.3	9.9	6.3

The cross-sectional analysis measuring associations between overall deprivation and child health outcomes shows that there are statistically significant differences in health between overall deprived and not deprived children: deprived children have worse overall health by age 5.5 years, they more often suffer from underweight and overweight issues, and they are more likely to get asthma. Exploring these differences by different dimensions of deprivation, we find that those who considered as material, housing and health deprived significantly more often have worse overall health and issues with weight while respiratory and atopy issues are related to housing and extreme living conditions deprivations.

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