WORKING paper

BANQUE DE FRANCE
EUROSYSTÈME

Currency Crises and Malnutrition

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Jully 2025, WP #1003

ABSTRACT

This paper investigates the effects on children and adult height of currency crises experienced during childhood. It uses survey data from Demographic and Health Surveys (DHS) collected in 57 countries between 1986 and 2023 for hundreds of thousands of children and adults, combined with a monthly dataset indicating the start of currency crises between 1970 and 2017. It finds that children facing a currency crisis between their birth and the date of the survey tend to be shorter, by about - 0.1 standard deviation (SD). Reduced food affordability explains part of the results: estimated effects are larger in net food importing developing countries and smaller when controlling for inflation. Children growing up during a currency crisis are less likely to eat any solid food and to have a diversified diet on the day preceding the survey, mostly because of a reduced consumption of nutrient-rich non-starchy food. Early exposure to currency crises have persistent effects on adult height. Adults having faced a currency crisis between their birth and 10 years old are on average shorter than their peers, with a maximum effect of about -0.04 SD for crises experienced between 5-6 years old. They are also less likely to have completed secondary or higher education. Our results are unlikely to be influenced by differential selection in parenting across households' wealth levels, and are robust to a large number of alternative specifications and sample restrictions.

Keywords: Currency Crises, Malnutrition, Human Development

JEL classification: F31, I14, J13, O15

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The authors thank Christophe Blot, Arielle Cohen Tanugi-Carresse, Michel Dimou, Lionel Fontagné, Michael Guillossou, Hervé Le Bihan, Florian Léon, Edouard Mien, Valérie Mignon, Erica Perego, Francisco Serranito as well as participants to the RES 2025 Annual Conference, AFSE Annual Congress 2025, PhD seminar at Université Paris Nanterre and Banque de France Research Seminar for useful comments. They thank Thomas Cheilan for research assistance. The views expressed in this paper are those of the authors and do not necessarily represent those of the Banque de France or the Eurosystem.

NON-TECHNICAL SUMMARY

Do currency crises increase children malnutrition in emerging markets and developing economies (EMDEs), and does it affect their socio-economic outcomes as adults? In this paper, we explore this question by combining data from Demographic and Health Surveys (DHS) for several hundreds of thousands of individuals across 57 EMDEs with the dataset from Laeven and Valencia (2020), documenting currency crises worldwide since 1970 at a monthly frequency. Our main variable of interest is height, which is commonly used as a direct measure of malnutrition in the literature, represents a key measure of children's health, and is a good proxy for socioeconomic conditions and general welfare at adult age.

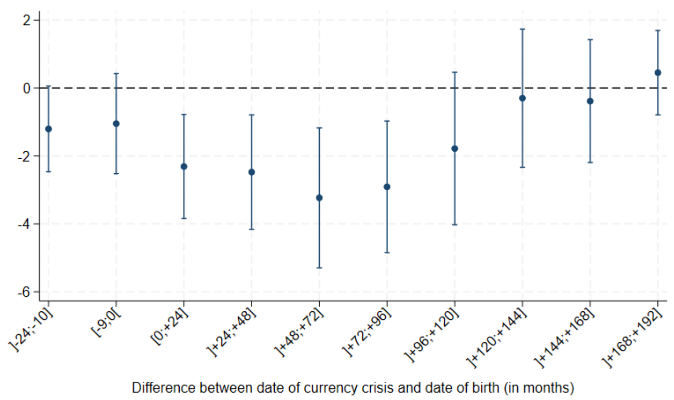
In this setting, we show, for a survey of children under 5, and using height-for-age z-scores (HAZ) based on World Health Organization (WHO) standards relating height to age in months by gender, that the occurrence of a currency crisis between their month of birth and the month of survey reduces their height by about 0.1 standard deviation. This effect is stronger for events occurring during the 12 months preceding the survey, but we do not find significant effect of shocks occurring in utero or before conception. This baseline effect reflects a higher prevalence of stunting (i.e. HAZ below -2). This effect is robust to controlling for potential confounding factors considered both prior to the currency crisis and during its occurrence, which can be macroeconomic (debt crisis, banking crisis, economic growth) or non-economic (conflicts, natural disasters). It is also unlikely to reflect the existence of differential selection into parenting between households, as it is robust to controlling for birth height, birth weight and mother's height, and to controlling for same-mother fixed effects.

This effect is largely channeled through lower food affordability. Currency crises indeed have stronger effects on children's height in countries that are net food importing developing countries (NFIDC) or that have a high level of undernourishment, and when currency crises occur in years of strongly increasing wheat prices. Part of the effect is channeled through inflation, which increases following a currency crisis. Controlling for the latter in our baseline estimation reduces the effect of currency crises by 20 to 35 %, and this reduction is observed only in NFIDC. By contrast, controlling for other macroeconomic variables likely to be affected by currency crises, such as economic growth, public debt, or official development assistance flows, does not affect the estimate of currency crises effects. We then document a decrease in the quantity and diversity of food consumed by children affected by currency crises. The occurrence of a currency crisis within the year preceding the survey decreases both the probability that children eat food during the day before the survey and the number of types of solid food they consume. This mainly comes from a lower consumption of nutrient-rich non-starchy food, often more expensive, and less caloric (namely fresh products such as fruits, vegetables, meat and dairy), while cheaper, more caloric starchy food (such as cereals, grains and roots) decreases by a smaller amount. This suggests that, facing a tighter budget constraint due to a currency crisis, households prioritize starchy food in order to maintain minimal caloric intake for their children. This likely induces a reduction of the nutritional quality of meals, and thus a higher prevalence of stunting. The reduction of food intake is paradoxically stronger for children of richer households. This might be due to the fact that poorer households have a lower initial caloric intake, making it more difficult for them to reduce their food consumption. This might also be explained by the fact that they are more often rural, and are thus more likely to eat local food, which is likely less affected by currency crises. Finally, we also test whether currency crises affect the probability that children access pharmaceutical products, and find no significant effect.

Currency crises occurring during childhood have persistent effects. Using a survey of adults between 20 and 30 years old, we simultaneously estimate the effect of being born between 2 years before and 16 years after the beginning of a currency crisis. We show that being born around a currency crisis reduces adult height by a maximum of about -3 mm (0.04 standard deviation, Figure 1). We estimate significant effects for crises suffered between 0 to 8 years old, with the maximum effect materializing for crises suffered between 5 and 6. As adult height is a strong predictor of other socio-economic outcomes, this suggests early exposure to currency crises have socio-economic consequences at adult

age. We confirm this by showing that adults who faced a currency crisis during childhood were also less likely to complete secondary or higher education.

Figure 1. Effect of an exposure to a currency crisis during childhood on adult height (in mm)



Source: Demographic and Health Surveys, Laeven and Valencia (2020), author's computation
Note: The sample includes adults between 20 and 30 years old. The regressions includes controls for gender, maximum years of education, relationship to head of household, and whether the respondent lives in a rural or urban area. Regressions are weighted based on respondent's weight in the survey. Confidence intervals are at the 95 % level and are based on standard errors clustered at the country level.

Crises de change et malnutrition

RÉSUMÉ

Cet article analyse l'effet sur la taille des enfants et des adultes de crises de change ayant lieu durant l'enfance. Il combine des données du Demographic and Health Survey (DHS) dans 57 pays entre 1986 et 2023, portant sur des centaines de milliers d'enfants et d'adultes, avec des données mensuelles indiquant la date de début de crises de change entre 1970 et 2017. Il montre que les enfants ayant connu une crise de change entre leur naissance et la date de l'enquête sont plus petits que les autres, de l'ordre de 0.1 écart-type. Ces résultats s'expliquent en partie par un coût plus élevé de l'alimentation : les effets sont plus forts dans les pays en développement importateurs nets de denrées alimentaires, et plus faibles si l'inflation est ajoutée comme variable de contrôle. Les enfants qui grandissent en période de crise de change mangent moins et de façon moins diversifiée le jour précédant l'enquête, surtout en raison d'une moindre consommation de denrées non-céréalières, riches en nutriments. L'exposition précoce à une crise de change a des effets persistants sur la taille à l'âge adulte. Les adultes ayant connu une crise de change entre leur naissance et leurs 10 ans sont en moyenne plus petits que leurs pairs, avec un effet maximal de 0.04 écart type pour les crises ayant eu lieu entre 5 et 6 ans. Ils ont également une probabilité plus faible d'avoir atteint un niveau d'éducation secondaire ou supérieur. Ces résultats ont peu de chances d'être influencés par des effets de sélection différentielle dans la parentalité entre ménages de niveau de revenus différents, et sont robustes à un grand nombre de spécifications alternatives et de restrictions d'échantillons.

Mots-clés : crises de change, malnutrition, développement humain

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1. Introduction

Do currency crises increase children malnutrition in emerging markets and developing economies (EMDEs), and does it affect their socio-economic outcomes as adults? Experiencing malnutrition as a child is a long-run determinant of both health and socio-economic conditions (Perkins et al., 2016). Among the drivers of malnutrition, increases in food prices have been proven to be particularly significant (Kidane and Woldemichael, 2020; Woldemichael et al., 2022; Headey and Ruel, 2023). Yet, while currency crises are likely to strongly affect food prices in EMDEs (Akofio-Sowah, 2009; Razafimahefa, 2012; Kassi et al., 2019), their role in shaping malnutrition remains an open question. As many EMDEs faced currency depreciations following the pandemic and the war in Ukraine (IMF, 2023; IMF, 2024), and as several policy contributions deem currency depreciation as a major vector of food insecurity (UNCTAD, 2022; European Commission, 2023; World Food Program, 2023), there does not exist any systematic analysis of the short and long run effects of currency crises in this regard.

In this paper, we evaluate whether children exposed to a currency crisis have different nutritional outcomes than others, and whether this has socio-economic consequences at adult age. We combine data from Demographic and Health Surveys (DHS) for several hundreds of thousands of individuals across 57 EMDEs[2] with the dataset from Laeven and Valencia (2020), documenting currency crises worldwide since 1970 at a monthly frequency. The unique richness of DHS data allows us to test, for children under 5 years old, whether their exposure to currency crises affect their height, but also to explore the mechanisms through which this effect occurs. It also allows to test whether early-life exposure to currency crises have long-run effects, focusing on the height of individuals between 20 and 30 years old, for which height has stabilized (Adserà et al., 2021).

Our main variable of interest is height, as it is an easily measurable and widely available information used to define malnutrition (WHO, 2024). Low height indeed reflects cumulative chronic or recurrent undernutrition (WHO, 2024; Mertens et al., 2024; Benjamin-Chung et al., 2023), and represent a key measure of health for children (UNICEF, 2017), as well as for adults (Perkins et al., 2016, Leongómez et al., 2020). Height is also considered as a good proxy for socioeconomic conditions and general welfare, as it is correlated with income (Persico et al., 2004; Akachi and Canning, 2015; Peracchi, 2008; Mankiw and Weinzierl, 2010), cognitive and non-cognitive skills (Bossavie et al., 2021; Schick and Steckel, 2010), educational achievement (Vogl, 2014), wellbeing (Carrieri and De Paola, 2012) or inequality (Deaton, 2008). Since our aim is to track the effects of currency crises from infancy to adulthood, using height measures appears as warranted, since adult's height can be considered as a balance between cumulative food intake and effects from diseases during the two first decades of life, and thus contains information about individuals' early life socio-economic conditions (Deaton, 2008). Using height measures also appears more relevant than using weight measures. Indeed, even though height and weight are positively correlated, weight is typically more volatile across individuals and time than height (Adserà et al., 2021; Mertens et al., 2024), and weight measures might be more likely to reflect recent and severe shocks (WHO, 2024), making them a less accurate signal of underlying socio-economic conditions. Furthermore, while poorer socioeconomic conditions unambiguously predict lower height (stunting), it might be associated with a higher prevalence of both wasting (low weight-for-height) and overweight (high weight-for-height; Popkin et al., 1996; Norte et al., 2019) depending on how households adjust the quantity and quality of their food consumption[3]. Regarding our geographical scope, focusing on emerging or developing countries appears relevant, since they import a higher share of their food[4]. To the extent that nutrition

[2] Out of the 57 countries we consider, 15 were classified as upper middle income countries (UMIC) in 2023, 26 as lower middle income countries (LMIC), 15 as low income countries (LIC), and one as a high income country (Guyana, which accessed this group only in 2021).
[3] Several studies also suggest that food insecurity increases the risk of obesity (Hoffman et al., 2000; Carvajal-Aldaz et al., 2022).
[4] For instance, in 2023, according to the World Bank data, the share of food imports in total imports was of 17 % in low income countries, against a world average of 9 %. According to the FAO data, in 2018-2020, the cereal import dependency ratio (which is positive if the

is the most important external factor determining height (Perkins et al., 2016), the height of children from these countries is likely to be particularly vulnerable to negative shocks on the exchange rate (making imported goods more expansive).

In this setting, we first show, for a survey of children under 5, and using height-for-age z-scores (HAZ) based on World Health Organization (WHO)[5] standards relating height to age in months by gender, that the occurrence of a currency crisis between their month of birth and the month of survey reduces their height by about 0.1 standard deviation. This effect is stronger for events occurring during the 12 months preceding the survey, but we do not find significant effect of shocks occurring in utero or before conception. We show that this baseline effect reflects a higher prevalence of stunting (i.e. HAZ below -2) and that it is associated with a lower weight-to-age z-score (WAZ). However, it is not associated with higher weight-to-height ratios, and it is weakly heterogeneous across children's characteristics (gender and household income).

This effect is robust to a wide set of different specifications and samples. In particular, we document that it is robust to controlling for potential confounding factors considered both prior to the currency crisis and during its occurrence, which can be both macroeconomic (debt crisis, banking crisis, economic growth) or non-macroeconomic (conflicts, natural disasters). We also show that the estimated effect is unlikely to reflect the existence of differential selection into parenting between households. Indeed, richer, and on average taller families, might be more likely to delay their decision of having children in times of crisis (Akbulut-Yuksel et al., 2020), or surviving children might be taller than non-surviving children (Gørgens et al., 2012). We deal with these concerns by showing that the effect is robust to conditioning on birth height, birth weight, and mother's height, and to controlling for same-mother fixed effects (as suggested by Akbulut-Yuksel et al., 2020, or Adserà et al., 2021). In this last test, comparing siblings of a same mother wipes away any mother-invariant characteristic (such as income), which could simultaneously be correlated with height and the timing of the decision to have a child. Finally, we do not find that currency crises occurring before or during pregnancy affect children's birthweight, the occurrence of pregnancy complication, or the occurrence of early pregnancy termination.

We then explore the role of food consumption in explaining these results, through both macro and micro approaches. We first show that currency crises have stronger effects on children's height in countries that are net food importing developing countries (NFIDC) or that have a high level of undernourishment, and when currency crises occur in years of strongly increasing wheat prices[6]. Part of the effect is channeled through inflation, which increases following a currency crisis. Controlling for the latter in our baseline estimation reduces the effect of currency crises by 20 to 35 %, and this reduction is observed only in NFIDC. By contrast, controlling for other macroeconomic variables likely to be affected by currency crises, such as economic growth, conflicts, public debt, or official development assistance flows, does not affect the estimate of currency crises effects. This suggests that currency crises decrease food affordability, essentially through higher food prices.

In line with these results, we document a strong decrease in the quantity and diversity of food consumed by children affected by currency crises. The occurrence of a currency crisis during the year preceding the survey decreases both the probability that children eat any food during the day before the survey and the number of types of solid food they consume. This effect is driven by solid

country is net importing, and negative if it is net exporting) was of -6.7 in high income countries, -6.5 in upper middle income countries, 4.7 in lower middle income countries, and 20.6 in low incomes countries. According to the ITC (2022), food products such as cereals and vegetable oils are among the most common with high import dependency, and LICs and African countries represent a large majority of countries with high import dependency for such products.

[5] A height-for-age z-score (HAZ) indicates how an individual's height deviates from the median height of individuals of the same gender and age (in months). This approach is particularly warranted for child height, since the latter increases non-linearly with age in the first months of life. For adults, we directly use the reported height in mm as an outcome variable, as, for a given individual, her height is stable across ages. Height tends to decline at older ages, but this is not an issue in our setting, since we focus on adults aged between 20 and 30.

[6] The rationale for focusing on wheat prices is that wheat is among the most traded and consumed cereal worldwide (OECD/FAO, 2024), with many emerging and developing countries depending on wheat imports for their consumption (Rajesh et al., 2022).

food intakes rather than by baby-specific food such as milk (either fresh, tinned, powdered or through breastfeeding) or infant formula, which is in line with the fact that baby-specific food is more often distributed through global multilateral programs. This reduction of food intake is heterogeneous across types of food and across households. First, we find that it mainly comes from a lower consumption of non-starchy food, often more expensive, less caloric, and added for taste in meals (namely fresh products such as fruits, vegetables, meat and dairy), while cheaper, more caloric starchy food (such as cereals, grains and roots) decreases by a smaller amount. This suggests that, facing a tighter budget constraint due to a currency crisis, households prioritize starchy food in order to maintain minimal caloric intake for their children. This likely induces a reduction of the nutritional quality of meals, and thus a higher prevalence of stunting, as key nutrients to children growth are mainly contained in non-starchy food. This heterogeneity of effects between starchy and non-starchy food might also explain why we observe effects on height but not on the weight-to-height ratio: households might maintain the daily caloric requirements of their children (thus maintaining their weight), but reduce at the same time the intake of key nutrients contained in non-starchy food (thus inducing a higher prevalence of stunting). Second, the reduction of food intake is paradoxically stronger for children of richer households. This might be due to the fact that poorer households have a lower initial caloric intake, making it more difficult for them to reduce their food consumption. This might also be explained by the fact that they are more often rural, and are thus more likely to eat local food, which is likely less affected by currency crises. This lower reduction in food consumption for poorer households might explain why we do not observe any heterogeneity of height effects across income levels. Considering that poorer households also face an initially tighter budget constraint, this suggests that they implement non-food coping strategies[7]. Finally, since diseases are also an important determinant of height (Deaton, 2008; Bozzoli et al., 2009), and pharmaceutical products are often imported in EMDEs[8], we test whether currency crises affect the probability that children access pharmaceutical products, and we find no significant effect.

We then document that currency crises occurring during childhood have persistent effects. Using a survey of adults aged between 20 and 30 years old, we simultaneously estimate the effect of being born between 2 years before and 16 years after the beginning of a currency crisis. We show that being born around a currency crisis reduces adult height by a maximum of about 0.04 standard deviation. We estimate significant effects for crises suffered between 0 to 8 years old, with the maximum effect materializing for crises suffered between 5 and 6. We do not find effect of exposure to crises in utero or during adolescence, in line with previous contributions (Adserà et al., 2021). Interestingly, the effect (expressed in standard deviations) is somewhat smaller than for the one estimated for children, suggesting that the effects of crises occurring during childhood can partly be dampened later in life. These results on adult's height are also robust to alternative specifications, and do not appear to be driven by selection effects, as controlling for siblings fixed effects, by focusing on respondents who are brothers and sisters also yields significant effects. Focusing on adults, we also find stronger effects among NFIDCs and weaker effects controlling for inflation during childhood, in line with the estimated effects on children. Given that adult height is a strong predictor of other socio-economic outcomes, this suggests an early exposure to currency crises has socio-economic consequences at adult age. We confirm this by showing that adults who faced a currency crisis during childhood were also less likely to complete secondary or higher education.

This paper contributes to the literature on the health and socio-economic effects of macroeconomic shocks occurring during childhood, by analyzing both short and long-term outcomes of a type of crisis whose distributive effects remain hardly documented. Indeed, while macroeconomic effects of

[7] Non-food coping strategies notably include borrowing money, prioritizing some members of the household or changing the composition of the latter, spending savings, selling assets, or searching additional sources of income (Maxwell et al., 2003; Jensen and Miller; 2008, D'Souza and Jolliffe, 2014 ; Biadgilign, 2023).

[8] According to the ITC (2022), pharmaceutical products are among the most common products with high import dependency. Emerging and developing countries particularly depend on imports regarding pharmarceutical products, since their local production is insufficient (WHO, 2023; Kumraj et al., 2022).

currency crises have been largely studied (Bussière et al., 2012; Burstein and Gopinath, 2014; Fukui et al., 2023), their distributional effects have started to be investigated only recently (Cravino and Levchenko, 2017; Drenik et al., 2018; Guo et al., 2023; Alazzawi and Hlasny, 2024; Auer et al., 2024). To the best of our knowledge, only a handful of papers have investigated their effects on nutrition (Delpeuch et al., 1996; Bendech et al., 1998; Fouéré et al., 2000), in the specific case of the devaluation of CFA Franc in 1994, and focusing on short-term effects. More broadly, while a large literature documented the effects of childhood nutrition on adult health or socioeconomic situation,[9] these contributions do not necessarily link these long-term effects of nutrition to economic shocks occurring during childhood. Furthermore, while a growing strand of literature has documented the long-term effects of macroeconomic or social events occurring during "impressionable years"[10], only few papers used this framework to study long-term health effects of economic crises (Adserà et al. (2021)), and none of it focused on currency crises. Finally, while a broad literature studied the socioeconomic determinants of health[11][12], this often focuses on either adult or birth outcomes, without bridging the gap between the two. The richness of DHS data allows us to bridge these gaps, by showing, in a global cross-country perspective, that growing up during currency crises has effects for several ages of life. More generally, the fact that we study effects on several ages and for shocks occurring at different times in life helps address the issue raised by Almond et al. (2018) relating to a gap between the rich information available regarding both childhood circumstances and adult outcomes, and the absence of information regarding what happens in between.

The remainder of the paper is structured as follows. Section 2 describes the data used in our analysis while Section 3 describes the empirical specifications and discusses the identification strategy. Section 4 provides the main results on the children's sample. In Section 5 we provide detailed evidence on the transmission channels of currency crises. Section 6 presents the long-lasting effects of currency crises. Section 7 Concludes.

2. Data and descriptive statistics

2.1 Data

To assess the effects that currency crises can have on population's health, we mobilize individual survey data, which are mainly anthropometric, and household related, provided by the Demographic and Health Survey (DHS). DHS is composed of surveys designed to collect relevant individual health and nutrition data on both adults, from 15 to 49 for women, 15 to 59 for men, and children between 0 and 5 years old. Each survey is designed to be representative at national, regional and residence levels and uses a two-stage cluster sampling method (Aliaga and Ren, 2006). Launched in 1984, the DHS program has been active in more than 90 emerging and developing countries. Each national survey contains four core questionnaires as of the 7th round (and 3 before): Household, Women, Men and Biomarker questionnaires. Household questionnaires contain information on both the individuals in the household and the facilities available. Women questionnaires contain information relative to background, contraception, pregnancy, and children's health. Men questionnaires are analogous to

[9] Dercon and Porter, 2014; Victora et al., 2008; Hoddinott et al., 2013; Van den Berg et al., 2016; Pehkonen et al., 2021; Li et al., 2004; Sharygin, 2011; Black et al., 2007, Behrman and Rosenzweig, 2004; Perkins et al., 2016

[10] Malmendier and Nagel, 2011, 2016; Roth and Wohlfart, 2018; Carreri and Teso, 2023; Adhvaryu and Fenske, 2023; Eichengreen et al., 2020. For systematic reviews of existing results, see Almond and Currie, 2011; Almond et al., 2018; Currie and Vogl, 2013.

[11] While height is determined at about 80 % by genetics (Jelenkovic et al., 2016; Silventoinen, 2003), external factors (such as socioeconomic ones) explain much of the variations across country (Steckel, 1995).

[12] Commonly studied factors include: the quality of political institutions (Schwekendiek and Pak, 2009), serfdom (Markevich and Zhuravskaya, 2018), social policies (Duflo, 2003; Buser et al. 2017; Majid and Behrman, 2023), industrialization (Bailey et al., 2018), conflict (Minoiu and Shemyakina, 2012; Akresh at al., 2012; Brown, 2018). Macroeconomic shocks have been mostly studied through the lens of inflation (Woldemichael et al., 2022; Headey and Ruel, 2023), or economic activity, with the Global Financial Crisis bridging the two approaches (Brinkman et al., 2010). Regarding economic activity, most studies are within-country, notably in the US (Dehejia and Lleras-Muney, 2004; Margerison-Zilko et al., 2017), Argentina (Bozzoli and Quintana-Domeque, 2014), Turkey (Akbulut-Yuksel et al., 2020), or Brazil (Mrejen and Machado, 2019). See Headey and Ruel (2022) for a cross-country contribution using DHS data.

the Women questionnaires. We use Women and Household questionnaires in our analysis to collect respectively information related to children and adults. Our main variables of interest, namely anthropometric measures of height and weight, are measured by the surveyor.

Our main explanatory variable is a dummy indicating the start date of a currency crisis, based on the dataset from Laeven and Valencia (2020). This dataset indicates, at a monthly frequency between 1970 and 2017, the dates at which currency crises started in 113 countries. According to the authors, a currency crisis starts when a local currency unit (LCU) has *"(1) a year-on-year depreciation [against the USD] of at least 30 %, and (2) of at least 10 percentage points higher than the rate of depreciation observed in the year before"*. Furthermore *"for countries that meet the currency crisis criteria for several consecutive years" the authors "use the first year of each 5-year window to identify the crisis"*. Among countries studied by Laeven and Valencia (2020), we keep those for which i) at least one DHS vintage is available and ii) at least one currency crisis was observed between 1970 and 2017.

The full dataset of currency crises we consider contains 109 events across 57 countries and is described in Table C.1 in Appendix. This table reports several additional information. First, we describe whether the currency crisis is contemporaneous of a change in exchange rate regime. To do so, we match the date of the currency crisis with the monthly dataset of exchange rate regimes between 1940 and 2019 by Ilzetzki et al. (2019, 2021). Our table reports whether there has been a transition from an exchange rate regime to another, following the coarse definition of Ilzetzki et al. (2019, 2021), whereby an exchange rate regime can be either a peg, a crawling peg, a band, freely floating, freely falling or a dual market. We identify a change of exchange rate regime and the start of a currency crisis to be concomitant if they happen with less than 6 months of distance. Out of the 109 events we consider, 31 (29 %) are concomitant of a change in exchange rate regime. Among them, 24 represent a transition to a more flexible arrangement (with 18 of them being a transition to a freely falling exchange rate), and 7 represent a switch to a less flexible arrangement. Secondly, we identify from public sources whether the crisis was due to a depreciation (driven by market dynamics) or to a devaluation (where the parity of the local currency is changed overnight). Among the 109 crises, 49 (45 %) are identified as a devaluation, 13 of which are within the framework of a peg.

Secondly, we also document the magnitude of the shock. To do so, we combine the Laeven and Valencia (2020) dataset with monthly bilateral LCU/USD exchange rate from the International Monetary Fund's IFS data. In order to compute the magnitude of the shock, we first compute the duration of the shock. To do so, we identify, following the start of the shock, and over a 5-year window, the month during which the year-on-year variation of exchange rate reaches its minimum value. The crisis is estimated to be over whenever this minimum value is reached. The duration of the crisis therefore corresponds to the number of months between the estimated start of the crisis, and the estimated end. Based on this definition, we report the magnitude of the crisis, which corresponds to the variation in the level of the exchange rate between its level in the month prior to the start of the crisis and the level it reaches when the minimum year-on-year variation is reached. The crises we consider last between 1 month (for devaluations of currency pegged to the USD) and 57 months, with an average duration of 12 months. The minimum decrease in currency value is of 14 %, and the maximum is of 99 %, with an average value of 54 %. In Figure C.1 in Appendix, we report all the series of LCU/USD exchange rate, with the estimated start of the crisis and the estimated duration. In a small number of cases, the estimated start date from Laeven and Valencia (2020) occurs a few months after a visible break in LCU/USD. In our event study analysis, we do not change the estimated start date from Laeven and Valencia (2020), but adjust it when computing the duration and intensity of the crisis, in order to avoid underestimating the latter. Whenever this situation occurs, it is reported in Table C.1. In robustness analyses, we check that our results are robust to dropping countries in which we identify at least one uncertain start date in Laeven and Valencia (2020).

Finally, individuals' health can be affected by many external factors, others than currency crises, such as economic crises, conflict or natural disasters. To account for economic situation, we use real GDP from the World Bank and compute inflation rates using the Consumer Price Indices from the World Bank's Global Database of Inflation. To account for climate related events, we use EM-DAT database, which contains the occurrence and impacts of over 26,000 mass disasters worldwide from 1900 to the present day. To control for conflicts related events we mobilize the UCDP/PRIO Armed Conflict Dataset (version 22.1), that provide data on violent conflicts all over the world since 1946 (Gleditsch et al., 2002; Davies et al., 2022). We control for the evolution of political institutions using the Polity V database. Our control for ODA comes from OECD DAC database, our control for debt comes from IMF's Public Finance in Modern History database, and our control for the variation of wheat prices comes from the World Bank's Commodity Market Outlook. Additionally, the list of NFIDC countries as well as the share of undernourished individuals are provided by the FAO.

2.2 Descriptive statistics on DHS data

In this section we document the characteristics of our datasets[13]. Regarding children, we use the Women's questionnaire, which reports data pertaining to children aged 0 to 5 years old. In Table 1, we detail the main characteristics of children on the final sample, which contains 1,759,750 observations for 52 countries. The sample is broadly balanced in terms of gender (49.2% of girls), contains a majority of children living in rural areas (62.3%), and a minority of children originating from households where the mother had no years of schooling (38.8 %). The average duration of schooling is however small, as on average 29.4 % of mothers completed secondary or higher education, and among those that went to school, the maximum number of schooling years reaches 4.2 on average. As the age of children is often specified in months during early childhood, we observe a mean age of 29.0 months, which reflects a relatively well distributed sample across the ages as the maximum age is 59 months old. Within this sample, 1,080,773 have non-missing height values: the characteristics of this sample are very close and comparable to those of the raw sample, albeit with slightly younger children (28.0 months on average) and a slightly higher level of schooling of mothers (36.7 % of unschooled mothers, 31.1% of mothers having completed secondary or higher education).

Table 1 - Main characteristics of the samples

	Children sample				Adults sample			
	Unrestricted		Non-missing height values		Unrestricted		Non-missing height values	
Characteristics	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Female (%)	49.16		49.36		85.59		90.75	
Age (*)	28.96	17.26	28.01	17.15	24.62	3.09	24.63	3.09
Rural (%)	62.34		61.99		54.74		55.23	
No schooling (%)	38.82		36.67		22.60		22.52	
Highest schooling years (if ever schooled)	4.19	1.98	4.23	2.01	4.23	1.91	4.26	1.91
Completed secondary or higher education (%)	29.47		31.15		51.02		50.65	
Number of observations	1,759,750		1,080,773		619,871		536,776	
Number of countries	52				50			

Note: the characteristics referring to schooling refers to the schooling of the mother for children sample, and of the surveyed individual for adults sample. The "no schooling" variable is a dummy equal to one if the mother/surveyed individual did not go to school, and zero otherwise. The "completed secondary or higher education" variable is a dummy equal to one if the mother/surveyed individual completed secondary or higher education. (*) Age is expressed in months for children and in years for adults.

[13] Table C.2 in appendix documents the number of observations per DHS survey wave and country. Even though our overall sample focus is on 57 countries, our final sample of adults is based on 50 countries, and our final sample of children is based on 52 countries, because of an absence of availability of height measures in some datasets.

Based on children height data, we compute a height-for-age z-score (HAZ) for each child in the DHS dataset, reporting the deviation (expressed in standard deviation) of a child's height from the median based on gender and age (in months). We compute our HAZ using the child's measured height, comparing it with references median and standard deviation provided by WHO, by monthly age and gender. In detail, it is built through the following formula:

$$HAZ_{i,a,g} = \frac{(Height_{i,a,g} - Median\ Height_{a,g})}{Height\ Std\ dev_{a,g}} \qquad (1)$$

Where i is the child and a, is the age documented in months, and g is the gender of child i.

Table 2 - Average height and height-for-age z-score (HAZ) across individuals' characteristics

	Children			Adults
Characteristics	**Average height in mm**	**HAZ**	**Characteristics**	**Average height in mm**
All	822.50	-1.39	**All**	1,586.44
	(145.06)	(2.16)		(76.34)
Gender			**Gender**	
Female	817.59	-1.30	*Female*	1,574.94
	(145.93)	(2.10)		(66.77)
Male	827.279	-1.46	*Male*	1,699.23
	(144.150)	(2.20)		(72.33)
Age			**Age**	
0	637.13	-0.56	*20-22*	1,585.43
	(82.09)	(2.64)		(76.43)
1	763.09	-1.56	*23-24*	1,585.53
	(65.59)	(2.20)		(76.56)
2	847.46	-1.74	*25-26*	1,587.03
	(69.74)	(1.94)		(75.82)
3	923.69	-1.67	*27-28*	1,586.85
	(74.30)	(1.80)		(76.28)
4	993.06	-1.52	*29-30*	1,588.48
	(76.93)	(1.69)		(76.62)
Place of residence			**Place of residence**	
Rural	814.68	-1.59	*Rural*	1,583.78
	(143.28)	(2.20)		(76.09)
Urban	835.24	-1.05	*Urban*	1,589.72
	(147.04)	(2.04)		(76.51)
Mothers' number of years of schooling			**Number of years of schooling**	
0	812.01	-1.69	*0*	1,587.32
	(143.06)	(2.34)		(71.25)
>0	828.56	-1.21	*>0*	1,586.18
	(145.87)	(2.02)		(77.75)

Note: this table is based on the samples of children and adults with non-missing height values (1,080,773 children in 52 countries and 536,776 adults in 50 countries)

Table 2 documents how height (82.2 cm on average) and HAZ (-1.39 on average) vary along children characteristics. On average, boys are 1 cm taller than girls and urban children are 2 cm taller than rural ones. Children whose mother benefited from at least one year of schooling are about 1.5 cm taller than others. Focusing on the HAZ, its average value in the sample is negative, which is coherent with the fact that our sample tends to display lower mean height than world standards (Prendergast and Humphrey, 2014). On average male children display a larger HAZ in absolute value (-1.46) than female children (-1.30). Additionally, along the age dimension, the absolute value of the HAZ increases between 0 to 2 years old (from -0.56 to -1.74) and then reduces slightly to reach -1.52 at 4-year-old, which is coherent with the literature (Prendergast and Humphrey, 2014). On average, children born in rural areas display a larger height gap than urban-born children (-1.59 and -1.05 respectively). Eventually, children born from mothers who did not benefit from any schooling are on average further away from the world averages than children born from mothers with some schooling, with average HAZ values of -1.69 and -1.21 respectively[14].

Additionally, in Table C.1 in Appendix, we compare the average HAZ to other indicators of malnutrition, namely the weight-to-age z-score (WAZ), and the weight-to-height z-score (WHZ), built using the same methodology as the HAZ. The WAZ indicates the deviation (expressed in standard deviation) of a child's weight from the median based on gender and age (in months). The WHZ indicates, the deviation (expressed in standard deviation) of a child's weight from the median based on gender and height (using height bracket of 0.5 cm). While the average HAZ is strongly negative, the WAZ is less so (-0.6), while the weight-to-height is on average slightly positive (0.2). This indicates that, while the children we study are far below the world median in terms of height, conditioning on the latter, they are close to the world median. This analysis is confirmed by the share of children with z-scores below -2 (this value representing a standard threshold of deprivation). Indeed, we observe a high share of stunting children (34 % of children with a HAZ below -2), but a smaller share of underweight children (9 % of them with a WAZ below -2) and an even smaller one of wasting children (5 % of them with a WHZ below -2). In fact, the share of overweight children (with a WHZ above 2) is higher than that of wasting children, as it reaches 8 %. These findings are in line with contributions documenting that obesity rises in EMDEs (Herens et al., 2023), and that, paradoxically, stunting or food insecurity increase risks of obesity (Hoffman et al., 2000; Carvajal-Aldaz et al., 2022). They confirm the relevance of using height rather than weight as a baseline indicator for measuring socio economic conditions in our setting. While poor socioeconomic conditions are likely to have a negative effect on height, it might be reflected in both an increase in the share of overweight and wasting children, making the effects of a currency crisis difficult to track through measures of weight (Popkin et al., 1996).

Regarding adults, our raw sample contains 619,871 observations in 50 countries. This sample focuses on individuals born after 1970 (since the data from Laeven and Valencia (2020) document only currency crises starting after this year) and aged between 20 and 30. We focus on adults aged of 20 years or more in order to make sure that their height stabilized. While individuals' height generally stabilizes around 16 years old, some adults keep growing in their late teens (Steckel, 1995; Deaton, 2008; Adserà et al., 2021). We restrain the sample to individuals below 30 in order to maintain a balanced age structure depending on the DHS wave studied. Indeed, since we focus only on individuals born after 1970, the age structure of the population we study evolves with each DHS wave: namely, individuals surveyed earlier tend to be younger, which can complicate the econometric analysis. In order to avoid this, we focus on survey years starting no earlier than 2000, and on individuals aged no more than 30. Therefore, at each survey date, surveyed individuals are aged between 20 and 30.

Table 1 documents the main characteristics of this sample. It contains a large majority of women (85.6 %), and of individuals living in rural areas (54.7 %). Individuals are aged 24.6 years on average, 77.4 % of them have at least one year of education, and among them, the average highest year of education is 4.2 years. 51. % of the adult's sample completed secondary or higher education. The restricted sample, including individuals with non-missing height values[15], contains 536,776

[14] Figure A.1 in Appendix plots the distribution of HAZ by country for children. Guatemala is the country that ranks last and displays the lowest average HAZ, while Moldova ranks first.

[15] Regarding the adults' sample, we consider as missing values measurements below 140 cms and above 220 cms. Indeed, the 220 cms threshold theoretically corresponds to the upper threshold of adult height measured in DHS survey. Since there is no lower theoretical threshold, we apply a 140 cms threshold, corresponding to the threshold of the bottom 1 % of the observed height distribution. We do not apply such ex ante restrictions on height to the children sample, but we restrict the subsequent regressions to HAZ below 5 in absolute values, and show robustness to alternative restrictions.

observations in 50 countries, and has broadly similar characteristics, except for a slightly higher share of women (90.8 %).

Table 2 documents the heterogeneity of height across observable characteristics. Women have an average height of 157 cm, while men have an average height of 170 cm, for a sample average height of 159 cm. There is no discernible heterogeneity depending on age, as average values range between 158 and 159 cm. Populations from rural and urban areas have on average similar height (158 vs 159 cm), as have populations with no or some years of education[16].

Figure A.3 in Appendix documents that adults' height increases along year-of-birth/year-of-survey: people surveyed earlier in the sample (and therefore born earlier since the age structure is constant across survey years) are on average smaller than those born later in the sample. However, the variability of height along year-of-birth/year-of-survey is mainly driven by the variability along year-of-survey. This suggests that, when comparing individuals of a same age group (here 20-30) across cohorts, their difference of height comes more from the fact that they are surveyed in different years than the fact that they are born in different years. One possible interpretation for this is that the context in which they grew up (i.e. what happened between their year of birth and their survey year) plays a more important role than the exact year in which they were born. This leaves room for macroeconomic determinants to play a role.

3. Econometric specification

3.1 Baseline specification for children

We begin our analysis by focusing on the consequences of currency crises on early life health conditions. In order to account for early childhood growth dynamics, we use the height for age Z-score (HAZ), computed in equation (1). The main reason we use such metric rather than a direct measure of height is that children's height evolves very rapidly and in a nonlinear fashion with monthly age (and with differences between male and female children). It is therefore necessary to account accurately for these growth curves.

Using the HAZ as endogenous, our baseline estimation takes the following form:

$$HAZ_i = \alpha + \delta D_i + \beta X_i + \gamma_{a,c} + \gamma_{y_s} + \varepsilon_i \qquad (2)$$

Where HAZ_i is the HAZ of child i. To model the effect of the start of a currency crisis, we create a binary variable D_i, equal to one if a currency crisis started in the country of child *i,* between her birth date and the survey date, both expressed in months, and zero otherwise. Additionally, we control for individual level variables through X_i including the gender of the child, the age of the mother at birth, her relationship to head of household, her highest level of education and whether the household is rural or urban.

We include two sets of fixed effects to account for different dimensions. First, we include a yearly age-country fixed effect ($\gamma_{a,c}$) to account for the fact that, even if by construction the HAZ accounts for the median height at a given age in months, it is not stable across ages and countries, and tends to decline after birth in developing countries (Prendergast and Humphrey, 2014). Second, we include year-of-survey fixed effect (γ_{y_s}) in order to control for the fact that, globally, the average height of individuals of a given age typically increases following economic development (Baten, 2006;

[16] Figure A.2 in Appendix plots the distribution of height by country for adults, net of the effects of gender. The tallest population on average is from Senegal (+55 mm compared to the average), and the shortest is from Guatemala (-71 mm compared to average).

Peracchi, 2008). Such a fixed effect also captures potential shocks common to all countries in the same year.

This choice of fixed effects is guided by parsimony and by the structure of the data. Indeed, while controlling for country-specific year fixed effects would be appealing, this bears strong risks of collinearity with the treatment. The most stringent way of doing it would be to control for country-specific joint survey and birth fixed effects (γ_{c,y_s,y_b}), but such fixed effects would be almost totally collinear with the treatment, as all children of a given country born at the same date and surveyed at the same date have the same treatment status. Alternatives such as country-year-of-birth fixed effects (γ_{c,y_b}) or country year-of-survey fixed effects (γ_{c,y_s}), also pose risks of collinearity, because of the structure of the data. Indeed, surveys focus on children under 5 years and the DHS surveys are in general distant by at least 4-5 years in a given country. This implies that, in a given country, most of birth years are observed in only one or two survey years, such that γ_{c,y_b} is close to γ_{c,y_s,y_b}[17]. Additionally, currency crises reported by Laeven and Valencia (2020) are also distant by at least 5 years in a given country. This implies that, for many survey years, the treatment is constant and null for all individuals (while for the remaining survey years, it is positive for individuals born before the crisis, and null for others). Put differently, the variability of treatment within a given country is rather *across* years of interview than *within* years of interview, and it therefore appears useful to leverage this variability[18]. Based on these observations, in our baseline, we include survey year fixed effect γ_{y_s} (and conditionally on this fixed effect, we do not include year of birth fixed effect, as it would be mostly redundant since we already control for age, and since birth years and survey years are distant by less than 5 years). However, in robustness checks, we show that the results are robust to the inclusion of the more stringent fixed effects discussed above (γ_{c,y_s} or γ_{c,y_b}) as well for controlling for economic and non-economic country level shocks.

As childhood growth is a rapid process and in order to underline the potential importance of very short term effects of currency crises on early life conditions, we test alternative specifications using a narrower window for our treatment, using the following model:

$$HAZ_i = \alpha + \rho D'_i + \beta X_i + \gamma_{a,c} + \gamma_{y_s} + \varepsilon_i \qquad (3)$$

where D'_i is equal to one if a currency crisis occurs in the country of individual i in the 12 months preceding the survey date. This specification allows us to evaluate the contemporaneous consequences of currency crises by focusing on the occurrence of a crisis occurring very close to the survey date. Finally, in alternative specifications, we use alternative definitions of treatment, in order to compare their effects with those of our baseline. We use in particular dummies indicating whether a shock occurred in the country of individual i i) between birth and 12 months before the survey, ii) in the 9 months preceding the birth of individual i (in utero), iii) between 24 to 10 months before the birth of individual i, iv) in the year following the survey (placebo analysis). Additionally, in order to analyze the role of consumption in our baseline effects, we estimate similar regressions as those of equation (3), but replacing HAZ_i by measures of access to food of child i on the day preceding the survey. In all these analyses, the controls and fixed effects are similar to those in model (2), the regressions are weighted using survey weights, and standard errors are clustered at the country level.

3.2 Baseline specification for adults

Our main estimating equation regarding the adults' sample is of the following form:

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[17] Regressions of HAZ_i on these fixed effects alone confirms this. The R^2 is of 12.1 % when regressed on γ_{c,y_b} and of 12.9 % when regressed on γ_{c,y_b,y_s}.

[18] Regressions of D_i on γ_{c,y_s} confirms this: γ_{c,y_s} alone explain 55 % of the variability of D_i in our sample. Additionally, regression of D_i on γ_{c,y_b} suggest that γ_{c,y_b} explain 90 % of the variability of D_i, further confirming that including such a fixed effect is unwarranted.

$$h_i = \alpha + \sum_{j(t_b)\in J} \delta_j T_{i,j(t_b)} + \beta X_i + \gamma_{c,y_s} + \gamma_{y_b,y_s} + \varepsilon_i \quad (4)$$

Where h_i is the height, in millimeters, of surveyed individual i. J is a set of bins of monthly distance to birth of individual *i*, computed in months, from 2 years (24 months) before birth, to 16 years (192 months) after birth. It therefore comprises the following bins, expressed in monthly distance to birth:]-24;-10], [-9;0[, [0;+24],]+24;+48],]+48;+72],]+72;+96],]+96;+120],]+120;+144],]+144;+168],]+168;+192]. All bins after birth contain 24 months: the bin [- 9;0[corresponds to the *in utero* period, and the bin]-24;-10] corresponds to the period between ranging from 23 months before birth to the last month before conception. For any interval j, and individual i $T_{i,j(t_b)}$ therefore corresponds to a dummy equal to 1 if, in his country, a currency crisis started at a distance to birth of individual *i* falling in bin *j*, and 0 otherwise.. ε_i is an error term.

We include several sets of fixed effects. We add country specific year-of-survey fixed effects, γ_{c,y_s} in order to capture country-specific trends in adults' height, and this choice is motivated by several factors. Contrarily to the children specification, conditionally on the country we consider, the treatment is independent from the survey date (which occurs several decades after the shock), while it is collinear with the birth date of the individual. Second, as illustrated in Figure A.3 in Appendix, survey years tend to better capture the evolution of adult height over time than birth years.[19] We also control for year-of-birth-and-year-of-survey fixed effects (γ_{y_b,y_s}), in order to account for global trends in the evolution of height. Contrarily to the case of children, such a joint fixed effect is relevant as year of birth and year of survey are far apart. Since all individuals born in the same year have the same age during the year of the survey, it can also be seen as a global cohort effect. Namely, it controls for the difference of height of individuals of the same age, but surveyed in different years. Finally, contrarily to the case of children, we do not consider age as a potentially relevant fixed effect since, as demonstrated in Table 2 above, and as demonstrated by the literature (Huang et al., 2013; Adserà et al., 2021), height is stable on average for non-elderly adults.

As for the case of children, in robustness checks, we show that our results are robust to the inclusion of alternative, more stringent fixed effects, as well for controlling for economic and non-economic country level shocks. Adults' regressions are also weighted using survey weights, and standard errors are clustered at the country level.

3.3 Discussion of the identification strategy

The main assumption behind our identification strategy, for both children and adults, is that the date of birth of the surveyed individual is independent of the start date of the crisis[20]. Regarding children, the baseline specification also relies on the hypothesis that the survey date is independent of the start of the crisis. We discuss several factors that could threaten these hypotheses, and how we address it.

3.3.1 Exogeneity of currency crises with respect to birth date

The exogeneity of a currency crisis with respect to an individual's birth date might be threatened by the fact that the prospect of an economic crisis could influence households' decision to have a child. In this context, the main challenge to our identification strategy is if there exists differential decisions to have children across households: if taller households delay their decision to have a child as they

[19] Another option could be, as in Adserà et al. (2021), to control for country specific date of birth trends, which, contrarily to country-date-of-birth fixed effects, does not prevent the estimation. However, in such a setting, the interpretation of the coefficient is less straightforward, since the country trends themselves would are affected by the treatment. In a robustness exercise, we show that controlling for such trends does not affect our results, but we do not resort to such a control in the baseline specification.

[20] This is also true of the children specification where we focus only on the occurrence of a crisis in the 12 months preceding the survey, since the survey reports information only on children under 5 (creating some correlation between the date of survey and the date of birth of surveyed children).

foresee an economic crisis, it could lead to an overrepresentation of children from shorter households born at the onset of the crisis. In this situation, the effect would therefore be driven by a selection effect. Such a risk is especially salient given that height is correlated with income, and that income itself is likely to be correlated with both the knowledge of the economic context (Weber et al., 2022) and the ability to select the date of conception (for example through contraception – Budu et al., 2023). This risk might be more salient in countries with multiple currency crises or more troubled economic environments, where the expected probability of the occurrence of a currency crisis in the future is higher (Vlaar, 2000; Berg and Coke, 2004). In these countries, well-informed households might be more aware of a possible upcoming crisis, which could lead to selection into the treatment even for distant horizons[21].

Such a hypothesis is unlikely to be fully warranted since, on average, information frictions regarding macroeconomic circumstances are high among households (Weber et al., 2022; Link et al., 2023), and since a large share of the events we study is sudden, notably in the case of devaluations. However, in order to alleviate the risk that our main effect be driven by selection effects, we run alternative specifications in which we explicitly take care of the latter. In particular, we consider specifications with mother fixed effects, which allow comparing children born of an identical mother. In this case, the estimates can be considered as net of any effect that could lead to differential selection into having children across households. We complement this analysis by testing the effect of currency crises on birth outcomes (such as birthweight, pregnancy complications or terminations) and the probability of survival of children, and by controlling for birth outcomes, such as birthweight. Finally, we also show that the effects are observed for several types of crises (devaluation or depreciation) and for both countries with single or multiple crises.

3.3.2 Exogeneity of currency crises with respect to survey date

As our identification methodology also relies on the date of survey for children, a concern is that the timing of the survey might not be exogenous to that of currency crises. More specifically, the decision of conducting a survey in a certain country might be driven by an intention to evaluate the damages induced by a crisis which started a few years before (for instance a currency crisis). In such a case there would be a risk of unrepresentativeness of the sample, with an overrepresentation of post-crisis years. According to DHS, surveys are conducted every 5 years and it takes approximately nine to twelve months to design a survey and collect the data. In this context, a correlation between the survey date and the occurrence of currency crises appears unlikely. In order to alleviate such concern, in Figure B.1 in Appendix, we show, on the sample of children, that the occurrence of a survey in a country and in a given year is uncorrelated with the start of a currency crisis in the 5 preceding years.

3.3.3 Exogeneity of currency crises with respect to economic and non-economic shocks

Finally, currency crises are not exogenous events since they might be correlated with the occurrence of other economic and non-economic shocks. Exchange rates are notably affected by economic growth (Bussière et al., 2012; Fukui et al., 2023). It can also be associated with simultaneous debt or banking crises (Eijffinger and Karatas, 2023; Eichengreen and Hausmann 2019; Bordo and Meissner, 2006), and be related to the occurrence of events such as conflicts (Michail, 2021; Lemaire, 2023), or natural disasters (Farhi and Gabaix, 2016). These shocks might occur simultaneously or prior to the currency crisis. In the former case, these shocks may have direct consequences on height or

[21] A related issue in countries with multiple currency crises is that individuals might be affected at several times during their life, which might be an issue for the adult's regression. Indeed, because of the autocorrelation of crises, being born around a currency crisis might be correlated with the probability of being exposed to currency crises later in life, which might be an issue since nutritional intake occurring in late childhood and adolescence is also likely to be a strong determinant of adult height (Prendergast and Humphrey, 2014). From this standpoint estimating only the effect of exposure to a crisis at certain specific periods without controlling for the exposure in other periods might yield biased estimates, and our approach estimating simultaneously the effects of exposure to a crisis at different periods in time, might alleviate such concerns.

weight. In the latter case, the risk is that we attribute to currency crises effects that are only protracted consequences of the buildup of shocks ultimately leading to the crisis.

In order to mitigate the risk that our estimates reflects such shocks we test whether the effects are robust to controlling for several macroeconomic and non-macroeconomic factors that could either trigger or come simultaneously with the currency crisis. In particular, we control for economic growth, variation of polity score, the occurrence of conflict, natural disaster, banking crises and debt crises. In the specification where we estimate the effect of being exposed to a currency crisis between birth and survey, we control for both the values of these variables in the five years preceding birth and in the period between birth and survey. In the specification where we estimate the effect of being exposed to a currency crisis in the 12 months before survey, we simply control for the values of these variables in the five years preceding survey, as well as for the evolution of these variables between the year of the survey and two years before.

4. Results on the sample of children

4.1 Baseline results

In this section, we present the results of our baseline specification quantifying the effects of currency crises on children's health conditions, focusing on children under 5 years old with a HAZ lower than 5 in absolute values (unless specified otherwise).

In Table 3, we find that children who endure a currency crisis are shorter than those that do not, as their HAZ is significantly lower. On average, those who endured a currency crisis between their date of birth and the time of the survey have a HAZ lower than their peers of about 0.09 standard deviations (Table 3, column 1). This means that the deviation from world's average height for a given age, conditional on a child's gender, is negative and more important for children who experienced a currency crisis during early years of their life. These deviations are sizeable in the context of our sample of developing countries. In these economies children are on average already smaller than world standards of about – 1.27 standard deviations as reported by the constant term.

Table 3 - Baseline estimates of currency crises on children height

	HAZ			
	(1)	(2)	(3)	(4)
Crisis between birth and survey	-0.0924**			
	(0.0349)			
Crisis one year before survey		-0.161***		-0.166***
		(0.0438)		(0.0429)
Crisis between birth and 1 year before survey			-0.047	-0.0545
			(0.0513)	(0.0504)
Constant	-1.267***	-1.269***	-1.271***	-1.267***
	(0.00224)	(0.00108)	(0.00202)	(0.00219)
N	1,006,452	1,006,452	1,006,452	1,006,452
adj. R-sq	0.148	0.148	0.148	0.148

Note: In each regression, we focus on children under 5 years old, and the outcome variable is the HAZ (excluding those greater than 5). The controls for every specification are the following: the child's gender, the highest years of education achieved by the mother, the age of the mother at birth, her relationship to the head of household and whether the household is considered as rural or urban. In the four columns, two sets of fixed effects are included: an age-country set and a year of survey set. Standard errors clustered at the country level in parentheses. * $p<0.10$, ** $p<0.05$, *** $p<0.01$

In order to test whether the effects of currency crises dampen over time, we distinguish, in columns 2 to 4, crises occurring during the year (12months) prior to the survey and those occurring between birth and one year before the survey. Interestingly, the estimated effects are larger and more significant (-0.16 standard deviation) for events occurring within a year of the survey date, than those occurring before that date (-0.05 standard deviation, not significant). This may indicate that the contemporaneous consequences of currency crises are partially offset after several years. We return to this point in Section 6.

In Table B.1 in the Appendix, we show that the results largely reflect an increase in the prevalence of stunting (i.e. of children with a HAZ below -2), from 2.1 percentage points (out of a baseline rate 32.0 %, i.e. an increase of 6.7 %). We also document that they translate into a lower weight-for-age z-score (WAZ), and an increase in the probability to display a negative WAZ even though this effect is less precisely estimated. This effect on WAZ is however channeled only through height. Indeed, conditionally on the latter, weight-to-height z scores (WHZ) are unaffected by currency crises, suggesting that such crises can lead to both increases and decreases in weight conditional on height, depending on how the channel through which it affects food consumption (namely quantity or quality).

4.2 Robustness of the results

4.2.1 Sensitivity to alternative specifications, types of shocks and samples

Our identification strategy relying essentially on both dates of crises and survey, it may be sensitive to alternative specifications. In this context, we present in Table 4 a set of alternative specifications to test the robustness for both treatment we considered. For each specification, our endogenous variable remains the same as in the baseline analysis, i.e. a child's height-for-age Z-Score, excluding those above 5 in absolute values. The main changes we perform are relative to the fixed effects and controls we use. In the first panel (Panel A) of the table, the treatment is a dummy for a currency crisis starting between birth and survey date. In the second panel (Panel B), the treatment is a dummy for the occurrence of a currency crisis in the twelve months before the survey.

In order to account for potential confounding factors we first control (column 1) for both macroeconomic and non-macroeconomic variables, including economic growth, variation of Polity score, the occurrence of conflict, natural disaster, banking crises and debt crises. In Panel A, we control for both the values of these variables in the five years preceding birth and in the period between birth and survey. In Panel B, we simply control for the values of these variables in the five years preceding survey, as well as for the evolution of these variables between the year of the survey and two years before. In column (2), we consider the same specification as the baseline except that we replace the country-age fixed effect by a country-year of birth fixed effect. In column (3) we keep a country-age fixed effects, but with age specified in months. In column (4), we interact the year of survey fixed effects with year of birth fixed effects. In columns (5), we interact the year of survey fixed effect with country fixed effects. In column (6) we use the baseline set of fixed effects, but add country-specific month of birth and month of survey fixed effects in order to account for potential seasonal factors. In column (7), we add to the baseline fixed effects and controls a wealth index[22] provided by DHS. In column (8), we replace the baseline age-country fixed effect by and age-ethnicity-country-survey wave fixed effect. In column (9), we maintain the baseline fixed effects and add country-year-of birth trends as in Adsera et al. (2021). Finally, in column (10), we replace the baseline age-country fixed effect by and age-region-country-wave fixed effects.

[22] The Wealth index, provided by DHS, is a composite measure of a household's cumulative living standard. This index is computed with a principal component analysis using data on household's ownership of selected assets, such as televisions, bicycles, materials used for housing construction, types of water access and sanitation facilities.

Across all these specifications, the point estimates associated to currency crises are broadly stable and significant. They range from -0.066 to -0.149 for currency crises occurring between birth and interview, and from -0.123 to -0.226 for crises occurring between one year prior to and the survey year. Our baseline estimates appear to be in the middle of these ranges.

In the Appendix, we present several other sensitivity checks, all confirming the robustness of our results. In Table B.2, we show that our baseline estimates are robust to interacting all the control variables with country fixed effects, to estimating unweighted regressions, to computing robust standard errors (rather than clustered at the country level), and to dropping children with a HAZ greater than 3. In Table B.3 in Appendix, we demonstrate that our estimates are still negative and significant when using the robust framework of Borusyak et al. (2024). Finally, in Table B.4, we implement a placebo regression, in which, on top of our baseline treatment, we add a variable indicating whether a crisis occurred within the 12 months following the survey. We do not find any significant effect of this variable, suggesting that the effects of currency crises do not materialize before they start (and are not driven by imbalances on macro variables leading to the currency crisis).

In Table B.5, we test the robustness of the effects to alternative samples. In a first test, we drop every country with at least one crisis beginning during what we consider uncertain dates as presented in the table C.1 in the Appendix. In a second test, we exclude all countries belonging to a monetary union, i.e. the Common Monetary Area (CMA), and countries of Africa-France monetary cooperation, as the latter are characterized by common shocks on their currency. We then distinguish samples of countries that experienced only one currency crisis from those that experienced more than one crisis. In all these specifications, we find significant effects that are close to the baseline. We find even stronger effects when we drop uncertain dates (suggesting that the latter may cause some underestimation in our baseline), and when we focus on countries with only one crisis. These results tend to indicate that the consequences of currency crises may be stronger when currency crises are an exceptional shock, compared to when they are recurrent and reflect a more uncertain local economic environment.

In Table B.6 in Appendix, we show that the results are not driven by a single country. Estimating our baseline equations dropping countries one by one, we find that the effect of a crisis between birth and survey dates ranges between -0.7 and -0.11 standard deviations (baseline effect of -0.09), and that the effect of a crisis in the last twelve months ranges between -0.14 and -0.19 standard deviations (baseline effect of -0.16). Finally, we show, in Tables B.7 and B.8 in Appendix, that the effects are widespread across household characteristics and types of shocks. In Table B.7, we interact the shocks with characteristics of the child (gender) and of the household (level of education of the mother, rural or urban status, whether the household is considered as among the poorest in the country). Overall, we find no discernible heterogeneity. In Table B.8, we test whether the effects depend on the type of currency crises, (devaluation or a depreciation), and on the intensity of the crisis (considering as higher intensity crises those where the currency loses more than 50 % against the USD). We find negative effects, close to the baseline effects for all types of shocks, though more significant for shocks in the year preceding the survey, and with some heterogeneity. Overall, depreciations have moderately larger effects than devaluations, and high intensity crises moderately have larger effects than lower intensity crises (though, regarding crisis intensity, the difference of effect is noticeable only for shocks in the year prior to the survey).

4.2.2 Addressing selection biases

A threat to our identification framework is that selection issues may affect our results. In particular, populations with higher income (and who are likely to be taller) may better anticipate future crises and therefore be more likely to delay their decision to have a child. In this case, a lower average height for a cohort of children born in the years following a crisis might be explained by a differential selection into parenting between richer (taller) households and poorer (hence smaller) households.

In order to rule out the possibility that our results are driven by such a mechanism, we run several specifications reported in Table 5, which aim at controlling for factors that might capture part of this potential selection effect.

In a first exercise, (columns (1) and (5)) we control, on top of baseline treatment variables, for currency crises experienced in utero and in the 24 months preceding birth, and document that none of these variables have significant effects. This reinforces the idea that our estimated effects are unlikely to be driven by events occurring pre-birth, or pre-conception[23]. In a second exercise (columns (2) and (6)), we control for a subjective measure of the size of the child at birth as reported by the mother. This measure is composed of the five following categories: *very large, larger than average, average, smaller than average* and *very small.* In a third exercise (columns (3) and (7)), we control for the weight of the child, in grams[24], at birth. Additionally, in columns (4) and (8), we control for the height of mother to account for a proxy of family height. For all these specifications, we observe that the coefficients associated with currency crises for both our treatments are negative, significant and of a similar magnitude as our baseline estimates. Overall, pre-crises characteristics of the child or of her mother do not affect the effect of crises, further suggesting that selection effects are unlikely to affect our results

Eventually, in column (9) of Table 5, we conduct a more restrictive analysis using a mother fixed effect[25]. In detail, we keep only children born from the same mother; this allows comparing the consequences of currency crises between a child who experienced a crisis and his/her sibling who did not experience any crisis. In addition, we control for the gender of the child, the birth rank and the interaction of these two variables. Despite using such a restrictive framework, we observe that the effects of experiencing a crisis between birth and the survey date are still negative and significant, alleviating the threat of a selection bias.

In order to further reinforce the idea that pre-birth selection effects are unlikely to drive our results, we complement our analysis by documenting the effects of pre-birth shocks on birth outcomes and pregnancy complications. The results are available in Table B.9 in the Appendix. Our first set of analyses is at the mother level and leverages dummy variables indicating whether the latter declared having experienced a terminated pregnancy during the 12 months preceding the survey, and whether she declared enduring complications during her last pregnancy (in the last 36 months). To document the effect of currency crises on pregnancy terminations, we consider any crisis occurring in the two years before the survey (since only pregnancy terminations in the 12 months before the survey are reported). To document the effect of currency crises on pregnancy complications, we consider any crisis occurring in the 36 months preceding the survey (as only pregnancy complications related to the births of the 36 months before the survey are reported). We do not find that experiencing a currency crisis in the years before survey significantly affects the probability of pregnancy terminations or of pregnancy complications. Additionally, we test whether the birthweight of surveyed children, is affected by a currency crisis starting either *in utero* or from 24 to 10 months before birth: we also find non-significant effects. These elements further confirm that currency crises occurring before birth are unlikely to drive our baseline results.

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[23] While this result is reassuring, as it dampens the concern that our baseline result is driven by selection effect, it is also challenging to interpret. On the one hand, it is in line with some contributions finding limited effects of crises in utero (Adserà et al., 2021) or showing that prenatal nutrition tends to have more limited effects than post-natal nutrition (Susser and Stein,1994; Perkins et al., 2016; Silventoinen, 2003). On the other hand, a vast literature found that adverse in utero conditions have immediate and long term health effects (see Almond and Currie, 2011 for a summary). One hypothesis for our *in utero* result (which, despite being non-significant, is negative and about half the effect of the baseline treatment effect) is that it might be more affected by measurement errors. Indeed, while the effect of a crisis occurring in utero crucially depends on its timing during gestation (Bozzoli et al., 2006), we do not observe exactly the gestational age at which the child was born. Furthermore, we do not observe the extent to which the mother was affected by the crisis while pregnant.

[24] The sample is drastically reduced as birthweight is not consistently reported for many children.

[25] We do not apply the estimation with mother fixed-effects to currency crises occurring within a year of the survey, as the estimation is not possible: within a given family, all children have the treatment status with such a definition of the shock.

Table 4 - Robustness analysis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Panel (A)									
Crisis between birth and survey	-0.1000***	- 0.145***	- 0.066*	- 0.072*	- 0.094***	- 0.109 ***	- 0.091**	- 0.134 ***	- 0.086 ***	- 0.149***
	(0.0361)	(0.051)	(0.035)	(0.039)	(0.033)	(0.033)	(0.035)	(0.028)	(0.030)	(0.026)
Constant	-1.203***	- 1.264***	- 1.269***	- 1.268***	- 1.267 ***	- 1.267***	- 1.267***	- 1.265***	- 35.46***	- 1.264***
	(0.0549)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(7.210)	(0.002)
adj. R-sq	0.151	0.149	0.163	0.153	0.151	0.152	0.154	0.169	0.151	0.178
N	879,353	1,006,450	1,006,452	1,006,452	1,006,452	1,006,449	1,006,452	1,005,498	1,006,452	1,006,452
	Panel (B)									
Crisis one year before survey	-0.227***	- 0.152**	- 0.123***	- 0.136***	- 0.207***	- 0.232***	- 0.157***	- 0.146**	- 0.126**	- 0.193***
	(0.048)	(0.074)	(0.045)	(0.040)	(0.061)	(0.054)	(0.045)	(0.068)	(0.051)	(0.032)
Constant	-1.273***	- 1.269***	- 1.270***	- 1.270***	- 1.268***	- 1.267***	- 1.269***	- 1.270***	- 30.89***	- 1.268 ***
	(0.0464)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(6.766)	(0.001)
adj. R-sq	0.150	0.149	0.163	0.153	0.151	0.155	0.154	0.169	0.151	0.178
N	881,440	1,006,450	1,006,452	1,006,452	1,006,452	1,006,449	1,006,452	1,005,498	1,006,452	1,006,452
Fixed effects	$a * c$ y_s	$c * y_b$ y_s	$a_{month} * c$ y_s	$a * c$ $y_s * y_b$	$a * c$ $y_s * c$	$a * c$ y_s $c * m_b$ $c * m_s$	$a * c$ y_s	$a * eth$ $* c_{phase}$ y_s	$a * c$ y_s	$a * region$ $* c_{phase}$ y_s
Additional controls	Macro						Wealth index		$c * t_{y_b}$	

Note: In all columns, the outcome variable is the HAZ of children under 5. The baseline controls for every specification are: the child's gender, the highest years of education achieved by the mother, the age of the mother at birth, her relationship to the head of household and whether the household is considered as rural or urban. a_{month} indicates the age of children specified in months, eth indicates the ethnicity, c_{phase} indicates the wave of the survey country in which the country has been surveyed, $region$ denotes the region in which the household has been surveyed, m_b denotes the month of birth and m_s denotes the month of survey. Columns (1), panel (A) controls for the dynamic of macro and non macro between birth and the survey and during the 5 years prior to birth. Column (1), panel (B) controls for the evolution of the same set of variables during the 5 years preceding the survey and during two years prior to the survey. The set of variables is the following: GDP growth the occurrence of bank and debt crises, the occurrence of conflicts and natural disasters and the dynamic of a democracy index. $Wealth\ index$ represents a wealth variable provided by DHS and computed using the consumption of durable goods, t_{y_b} is a linear trend by year of birth. Standard errors clustered at the country level in parentheses. * p<0.10, ** p<0.05, *** p<0.01

Table 5 - Accounting for selection biases

	Treatment: Crisis one year before survey				**Treatment**: Crisis between birth and survey				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Treatment	-0.179***	-0.170***	-0.172***	-0.173***	- 0.108***	- 0.0963***	-0.0865**	-0.0852**	-0.132**
	(0.0446)	(0.0434)	(0.0561)	(0.0416)	(0.0398)	(0.0337)	(0.0395)	(0.0418)	(0.0571)
In utero in crisis	-0.0594				-0.0599				
	(0.0385)				(0.0390)				
Crisis 10 to 24 months before birth	-0.044 (0.033)				-0.046 (0.034)				
Constant	-1.262*** (0.00427)	-1.072*** (0.0140)	-2.341*** (0.0707)	-9.111*** (0.373)	-1.263*** (0.00428)	-1.070*** (0.0145)	-2.340*** (0.0699)	-9.107*** (0.372)	- 1.332*** (0.00425)
Controls	Additional crises	Birth size	Weight at birth	Mother's Height	Additional crises	Birth size	Weight at birth	Mother's height	Mother Fixed effect
N	1,006,452	911,269	519,384	803,234	1,006,452	911,269	519,384	803,234	489,070
adj. R-sq	0.148	0.160	0.166	0.178	0.148	0.160	0.166	0.178	0.311

Note : In all columns, the outcome variable is the HAZ of children under 5 and the controls are (except model (9)): the child's gender, the highest years of education of the mother, her age at birth and whether the household is rural or urban. Two sets of fixed effects are included, an age-country set and a year of survey set of fixed effects. Columns (1) and (5) controls for crises occurring in utero period and between 10 to 24 months before birth (and column (1) also controls for crises starting between birth and one year before survey). Columns (2) and (6) control for a subjective measure of a child's birth size reported by the mother while column (3) and (6) controls for the weight at birth of the child. Column (4) and (8) control for children's mother height. For model (9), we do not include any of the previous controls but rather include a mother fixed effects in order to compare two children who did not experience the same currency crisis and who are born from the same mother, as well as the child's gender, the *birth order* and the product of these controls. Regressions are weighted based on the child's mother's weight in the survey. Standard errors clustered at the country level in parentheses. * p<0.10, ** p<0.05, *** p<0.01

5. Transmission channels of currency crises to children height

Results from the previous section documents a negative effect of currency crises on children height. In this section, we provide insights on the mechanisms at stake in the transmission of currency crises to children's health outcomes, paying particular attention to the role of food consumption. Indeed, an individual's growth during childhood depends crucially on its cumulative food intake, and many emerging and developing countries are dependent on food imports (notably through international food markets), whose prices tend to increase after a depreciation of local currencies. The combination of a currency crisis and a significant level of dependence on imported food might hinder population ability to consume said products. It is therefore likely that, in these countries, household consumption of food might be affected, at least in the short run, by a currency crisis.

Currency crises might affect food consumption through two main channels (Bogmans et al. 2021): *affordability* and *availability*. The affordability channel relates both to the price of goods (*price* effect) and the income of the population (*income* effect). In our context, an increase in prices can lead to too expensive products for populations who can no longer buy them in sufficient quantities (price effect)[26]. However, to the extent that currency depreciations affect growth or social

[26] This effect can be reinforced if some food products are subsidized, and the government is forced to reduce the amount of subsidies due to fiscal constraints, exposing products to higher prices.

expenditures, this might affect households' income, and thus act either as a buffer if GDP growth or social expenditure increase, or an amplifier if GDP growth or social expenditure decrease (income effect). The availability channel effect could also play a role, through several channels. For instance, it could be that higher imported prices trigger more social unrest, thus creating disruptions in the supply chains. On the other hand, currency crises might increase official development assistance (ODA), which could temporarily sustain food availability. On top of these two channels, individual level heterogeneity may play significant role in the shaping of the consequences of currency crises. Because of either their localization, their wealth levels or their education levels, households may adopt different coping strategies in the face of a currency crisis.

Given these elements, we explore to which extent food products intake explain our results, leveraging both macroeconomic and microeconomic approaches. The following sections rely exclusively on the analysis of currency crises occurring during the 12 months prior to the survey date as it presents several significant benefits. First, choosing the year of survey as reference allows us to properly account for the macroeconomic factors that may play as transmission channels of currency crises. In fact, using such anchor facilitates the use of macroeconomic variables as the timing of the shock is clearly and explicitly defined. Second, our baseline results show that the health consequences are concentrated during the year following the currency crisis: relevant channels might therefore be more easily uncoverable in a setting where the baseline effect is stronger. Finally, because of data availability, this timing of treatment appears appropriate to conduct an analysis on the food consumption of surveyed individuals, as the latter is measured on the day before the survey.

5.1 Macroeconomic evidence of transmission channels

We start our analysis by testing whether currency crises have a stronger effect in countries and environments in which access to food is the most difficult. In Table 6, we run our baseline estimation on several groups of observations capturing such heterogeneity.

Table 6 – Heterogeneity along types of countries and wheat prices

	(1)	(2)	(3)	(4)	(5)	(6)
Crisis one year before survey	-0.0377	-0.165***	-0.131	-0.174***	-0.135**	-0.216***
	(0.0883)	(0.0441)	(0.0905)	(0.0417)	(0.0560)	(0.0684)
Constant	-1.239***	-1.280***	-1.115***	-1.430***	-1.268***	-1.284***
	(0.00169)	(0.00118)	(0.000970)	(0.00111)	(0.00245)	(0.000600)
N	253,793	752,657	448,436	482,240	465,626	520,080
adj. R-sq	0.152	0.148	0.112	0.158	0.150	0.150
Sample	Non-NFIDC	NFIDC	Under nourishment <median	Under nourishment > median	Years with low wheat prices growth	Years with high wheat prices growth

Note: In all columns, the outcome variable is the HAZ of children under 5 and the controls are the child's gender, the highest years of education of the mother, her age at birth and whether the household is rural or urban, age-country fixed effects and year of survey set fixed effects. Columns (1) and (2) respectively focus on sample of countries that are not NFDIC and on countries that are. Columns (3) and (4) respectively focus on countries with average undernourishment below and above median. Columns (5) and (6) respectively focus on years with low and high wheat price growth in the two years preceding survey. Regressions are weighted based on the child's mother's weight in the survey. Standard errors clustered at the country level in parentheses. * p<0.10, ** p<0.05, *** p<0.01

We first test whether the effect of currency crises differ between countries that are Net Food Importing Developing Countries (NFIDC) or not (columns (1) and (2)). Intuitively, we expect children in NFIDC countries to be more exposed to the consequences of currency crises, which would translate in larger loss in their HAZ. We find that children living in NFIDC are significantly and negatively affected by currency crises while those of non-NFIDC are not. Relatedly, in columns (3) and (4), we find that children are more affected in countries that display an average level of undernourishment between 2001 and 2021 above the global median, based on FAO annual data. Finally, in columns (5) and (6), we test whether currency crises occurring during periods of high growth of global wheat prices display larger consequences. We consider a period of high growth of wheat prices if the latter grew by more than 10 percent during the two years before the survey date (this threshold corresponds to the median two-year price increase observed in the sample). To the extent that currency crises mostly affects the health of children in countries depending on imported food, our expectation is that a strong depreciation of local currencies against the USD might have stronger detrimental effects when global wheat prices in USD increase more strongly. Our results confirm this intuition, as we find stronger effects of currency crises on children's HAZ when wheat prices entail strong growth than when they do not (even though both are significant).

All these results tend to support the hypothesis of a channel of more expensive imported goods, and notably food, between a currency crisis and the reduction in height of children. Importantly, in EMDEs, food represents a sizable share of the inflation basket (Lemaire and Vertier, 2023). Therefore, to further document the contribution of higher imported (food) prices to our results, we assess the role of inflation. A large literature documented strong exchange rate pass-through to inflation, and we do observe such a pass-through in our setting[27]: we therefore expect inflation to be one of the main macroeconomic channel of currency crisis to individuals. In Table 7, we compare our baseline estimate with that obtained from a specification in which we control for the variation of annual inflation between the year of survey and two years before it. We also compare the mediating effect of inflation with that of other country-level economic or non-economic factors that could be affected by currency crises, namely simultaneous banking or debt crises[28], GDP growth and the occurrence of conflicts (both measured in the two years preceding the survey date). We expect the mediating effect of these variables to be smaller than that of inflation, since, as documented in Table B.10 in Appendix, they are not significantly correlated with the occurrence of a currency crisis in our sample.

In order to make the contribution of each variable comparable, all regressions of Table 7 are based on a single sample, on which all country-level variables are available. We first run our baseline model without controlling for country-level variable (column (1)), and find an effect of -0.17 SD, similar to our baseline. We then include each country-level variable as a control separately (columns (2) to (5)), and simultaneously (column (6)). Two facts stand out. First, among the country-level variables, the only significant coefficient is on inflation (considered separately or jointly with other variables). The coefficient is negative, suggesting that higher inflation is indeed associated with reduced children height. Second, while, conditional on inflation, the coefficient on currency crises remains significant, it is lower than in the baseline (-0.13 SD), by about 20 %. Conversely, controlling for other factors does not change the estimated effect of currency crises.

In Table B.11 in Appendix, we provide further evidence on the role of inflation. First, we document that its role is non-linear: controlling for a dummy variable indicating whether the inflation variation in the two years preceding survey was above 5 pp (corresponding roughly to the top decile of inflation variation), we find that the effect of currency crises further decreases to 0.11 SD, i.e. 35 % lower than the baseline. Second, we estimate separately these non-linear effects between NFIDC and non-NFIDC countries. Doing so, we find a lower estimated effect of currency crises when controlling for inflation only in NFIDC countries (in non-NFIDC countries, the estimated effects of currency crises is non-significant regardless of the presence of inflation in the controls). The mediating effect of inflation is therefore higher in NFIDC countries, suggesting that it primarily comes from food inflation.

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[27] We report evidence of the existence of a significant currency crisis pass through to inflation in table B.10 in the Appendix.

[28] This variable is also constructed using annual records of banking and debt crises by Laeven and Valencia (2020): it is a dummy indicating whether a banking or debt crisis occurred in the calendar year preceding that of the survey.

Table 7 : Effects of currency crises on HAZ controlling for country-level factors

	HAZ					
	(1)	(2)	(3)	(4)	(5)	(6)
Crisis one year before survey	-0.166***	-0.132**	-0.164***	-0.166***	-0.165***	-0.130**
	(0.0450)	(0.0492)	(0.0460)	(0.0445)	(0.0459)	(0.0504)
$\Delta\pi_{[y_{s-2},y_s]}$		-0.471***				-0.472***
		(0.134)				(0.150)
Banking or debt crisis one year before survey			0.00952			0.0179
			(0.0697)			(0.0653)
$\Delta GDP_{[y_{s-2},y_s]}$				-0.059		-0.125
				(0.212)		(0.232)
Conflict before during the two years before survey					0.0268	0.0208
					(0.0364)	(0.0348)
Constant	-1.286***	-1.288***	-1.286***	-1.283***	-1.294***	-1.290***
	(0.00118)	(0.00136)	(0.00265)	(0.00866)	(0.0121)	(0.0168)
N	945,688	945,688	945,688	945,688	945,688	945,688
adj. R-sq	0.150	0.150	0.150	0.150	0.150	0.150

Note: In all columns, the outcome variable is the HAZ of children under 5 and the controls are the child's gender, the highest years of education of the mother, her age at birth and whether the household is rural or urban, age-country fixed effects and year of survey set fixed effects. All models are regressed on a sample for which all macro variables are available. The macroeconomic control we consider are the following: variation of inflation and GDP between the survey year and two years before (both winsorized at the 5 % top and bottom level), the occurrence of banking and debt crises in the year preceding the survey based on Leaven & Valencia (2020), and the occurrence of conflicts in the two years preceding the survey. Regressions are weighted based on the child's mother's weight in the survey. Standard errors clustered at the country level in parentheses. * p<0.10, ** p<0.05, *** p<0.01

While the mediating effect of inflation seems important, it only explains part of the effect of currency crises on children height. In Table B.12 in Appendix, we explore additional factors that may also constitute transmission vehicles, namely ODA flows and government debt expressed in percentage of GDP. However, we do not find that these factors affect the effect of currency crises on children height. Regarding ODA, this is in line with the fact that we do not find any correlation between currency crises and increased ODA (Table B.10 in Appendix). Regarding government debt, the absence of mediating effect is more surprising, since the latter increases substantially following a currency crisis (Table B.10, see also Bordo et al. 2010; Bordo and Meissner, 2006). This might reflect the fact that this debt increase both entails aggravating and attenuating factors that balance each other. Indeed while part of the debt increase is likely to be mechanical increase (if foreign debt labeled in USD represents a large share of total debt) and is likely to reduce financial margins, part of it might come from increased social spending, aiming at hedging populations against the effects of currency crises.

Overall, these results suggest that the effects of currency crises on children height are predominantly, though not totally, mediated by a food affordability channel, and within it, a predominant *price* effect, since we find strong mediating effects of inflation especially in NFIDC, but not of GDP or government debt. The availability channel, that might be better captured through variables such as conflict or ODA, is likely to play a more limited role.

5.2 Microeconomic evidence of transmission channels

In order to confirm that food consumption is a major channel of the effect of currency crises, we deepen our analysis by leveraging additional information available from the children sample, related to their food consumption at the extensive margin. DHS data reports, among children, whether they ate different sorts of food on the day before the survey (but not the size of the portions that were ingested, or on the related caloric intake). Our baseline channel analysis focuses on children of 25 to 49 months, who can generally be considered as weaned[29], and for whom we consider the intake of solid food.

We consider 10 types of food products[30], and focus only on children for whom information about the consumption of all these types is available (i.e. children with no missing value for any of these variables). Based on these types of food, we build i) a dummy variable indicating whether the child received any type of solid food on the day before the survey, ii) a variable indicating the number of types of food, among these 10 types, received by the child on the day before the survey. Additionally, we group the types of food products into two distinct categories based on the level of calories they contain. A first group of products contains "starchy" food, i.e. bread and rice, lentils and beans, yams and potatoes. A second group includes the remaining food products available (i.e. fruits and vegetables, meat and dairy), and are considered "non-starchy" food. We then build two dummies indicating whether a child received any product belonging to each of these categories on the day before the survey.

The rationale for these categories is that starchy products usually represent among the highest shares of caloric intake in developing countries (Bricas and Tchamda, 2017b). On the other hand, the food we consider as "non-starchy" represents a lower share of caloric intake in developing countries, notably because of their lack of affordability (Headey and Alderman, 2019; FAO, 2020; Bai et al., 2021; FAO, 2024[31]). While their origin (imported or locally produced) can vary more substantially depending on countries (FAO, 2023), they tend to be more often consumed by households whose basic caloric needs are met, or on a small quantity basis to add taste to meals (FAO, 2020). Even though they provide less calories, these types of foods provide nutrients that are essential to growth (such as vitamins or proteins), and whose lack during childhood tends to cause stunting and lower height at adult age (Prendergast and Humphrey, 2014; Mokhtar et al., 2018; Kuraoka et al., 2022; Endrinikapoulos et al. 2023).

Table 8 – Effect of currency crises on solid food consumption by children

	(1) Child ate any food	(2) Number of different types of food	(3) Child ate starchy food	(4) Child ate non-starchy food
Crisis one year before survey	-0.0700***	-0.655***	-0.058**	-0.145***
	(0.0233)	(0.0841)	(0.0281)	(0.0292)
Constant	0.686***	3.448***	0.635***	0.540***
	(0.000534)	(0.00174)	(0.000644)	(0.000670)
N	224,418	152,898	224,418	224,418
adj. R-sq	0.094	0.294	0.100	0.162

Note: The control variables for all models are the child's gender, the mother's relationship to the household head, her highest year of education, whether the household is rural or urban age-country fixed effects and year of survey fixed effects. The analysis focuses on children 25 to 49 months old. Regressions are weighted based on the child's mother weight in the survey. Standard errors are clustered at the country level in parentheses. * p<0.10, ** p<0.05, ***p<0.01

Using these variables, we estimate the effects of crises occurring in the 12 months preceding the survey on solid food consumption by children between 25 and 49 months old, using the same set of

[29] WHO recommends that "*children should begin eating safe and adequate complementary foods while continuing to breastfeed for up to two years of age or beyond.*"
[30] The 10 types of food products are the following: i) bread and rice, ii) potatoes and yams, iii) meat, iv) eggs, v) carrots and pumpkins, vi) green vegetables, vii) mango and papaya, viii) other fruits and vegetables, ix) beans and lentils, x) cheese and other milk products.
[31] See also the Food Prices for Nutrition Dataset

controls and fixed effects as those presented in equation (2). Results are presented in Table 8. While 68.6 % of children ate any of the 10 selected types of food on the day before the survey, this proportion drops by 7.0 pp (i.e. about 10 %) if a currency crisis occurred in the year preceding the survey (column (1)). While, among children who ate at least one type of food, the number of consumed products was on average of 3.4 in normal times, this ratio dropped by 0.7 in times of currency crisis, i.e. by about 20 % (column (2)). These results point not only to a reduction of children's probability to consume food, but also to a reduction of their diet diversity which may have longer term consequences as we will discuss further below. Finally, while starchy food is on average consumed by more children (63.5 %) than non-starchy food (54.0 %), currency crises induce a more severe reduction in the consumption of the latter (-14.5 pp, i.e. -27 %) than of the former (-5.8 pp, i.e. -9.1 %)[32].

Importantly for the interpretation of these results, we do not observe for each household the extent to which each category of food is imported, what is their ex ante price, and what share it represents in children's diet, which are all likely to affect how households reallocate their consumption in case of a shock. We therefore resort to two simple assumptions. First, that a currency crisis, by increasing the price of imported products, tightens households' budget constraints. Second, that starchy food represents a higher share of caloric intake than non-starchy products, which are *ex ante* more expansive and more likely to be consumed only if basic caloric needs are filled. Against this backdrop, the stronger and more significant decrease estimated for non-starchy food suggests that, facing a tightening of their budget constraint, households may prioritize the consumption of starchier, less expansive products, in order to guarantee a minimum caloric intake for their children (Torlesse et al., 2003; Jensen and Miller, 2008; D'Souza and Jolliffe, 2014; Bogmans et al., 2021)[33]. This heterogeneity between effects on starchy and non-starchy food intake might explain why we observe effects on height but not on weight-to-height: households might maintain the daily caloric requirements of their children (thus maintaining their weight), but reduce at the same time the intake of key nutrients contained in starchy food (thus inducing a higher prevalence of stunting).

These results are however unlikely to be homogenous across households, and notably across levels of income and location, given their likely different consumption habits and budget constraints. Here again, affordability and availability of food products might play a role, with uncertain implications regarding the effects of currency crises. While populations with greater purchasing power should appear better prepared to respond to crises, the extent to which richer or poorer households should be most affected is an open question, since their diets differ strongly in terms of calories, diversity and food quality, which can represent various margins of adjustment. In the advent of a price increase, households with higher income might be able to keep their food consumption unchanged. Conversely, if they have to reduce their consumption, they might be able to do it without threatening their livelihood since they have higher initial caloric intake, but the extent to which they would prioritize starchy or non-starchy food is uncertain. Poorer households with already low levels of caloric intake might not be able to reduce their consumption of starchy food, and might instead reduce food diversity in order to maintain their calories or adopt non-food coping strategies (Maxwell et al., 2003; Jensen and Miller; 2008, D'Souza and Jolliffe, 2014; Biadgilign, 2023).

[32]In Table B.13 in the Appendix, we show that the results are robust to using a logit model rather than a linear probability model.

[33] In Appendix, Table B.14 we also analyze the effect of currency crises on the food intake of children 24 months or less. For these children, we study the effect of the crisis on their intake of milk products (whether from breastfeeding, tinned, fresh or powdered) and infant formula. Overall, we find that currency crises have no significant effects on intake of both milk and their substitutes. Several offsetting factors could explain this absence of results. Regarding breastfeeding, while currency crises might force mothers to keep breastfeeding if access to alternative sources of nutrition for their baby is limited, or while breastfeeding could also be made more difficult if mothers themselves have a lower access to food, we do not find evidence of such habits changes. Regarding milk, while powdered or tinned milk are generally highly processed and more often imported, fresh milk tends to be locally produced (Knips, 2005). Finally, regarding infant formula, while it is also a highly processed product, it might be subject to international cooperation programs, aiming at securing their access in emerging and developing countries, and their distribution to the most vulnerable populations (UNICEF, 2021).

Table 9 - Effect of currency crises on food consumption depending education, wealth and rural status

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Child ate any food			Child ate starchy food			Child ate non-starchy food		
Interaction variable	Unschooled mother	Among poorest households	Rural household	Unschooled mother	Among poorest households	Rural household	Unschooled mother	Among poorest households	Rural household
Crisis one year before survey	- 0.0925***	- 0.0938***	-0.102***	- 0.0710***	- 0.0739***	- 0.0880***	-0.181***	-0.199***	-0.207***
	(0.0204)	(0.0211)	(0.0233)	(0.0255)	(0.0270)	(0.0290)	(0.0257)	(0.0256)	(0.0268)
Interaction variable	-0.0335***	-0.0238***	- 0.0158***	-0.0313***	-0.0236***	-0.0218***	- 0.0652***	- 0.0563***	- 0.0641***
	(0.00595)	(0.00432)	(0.00365)	(0.00594)	(0.00431)	(0.00516)	(0.00781)	(0.00645)	(0.00602)
Crisis#Interaction Variable	0.0633**	0.0412***	0.0522***	0.0351**	0.0260***	0.0456***	0.0959***	0.0939***	0.0928***
	(0.0242)	(0.00794)	(0.00375)	(0.0150)	(0.00535)	(0.00880)	(0.0313)	(0.0255)	(0.0252)
Constant	0.698***	0.698***	0.696***	0.647***	0.647***	0.650***	0.564***	0.568***	0.583***
	(0.00212)	(0.00221)	(0.00255)	(0.00217)	(0.00219)	(0.00350)	(0.00273)	(0.00320)	(0.00389)
N	224,469	224,469	224,418	224,469	224,469	224,469	224,469	224,469	224,469
adj. R-sq	0.094	0.094	0.094	0.100	0.100	0.099	0.162	0.162	0.160

Note : In columns (1) to (3) the explained variable is a dummy indicating whether the child ate any type of solid food on the day before the survey. In columns (4) to (6), the explained variable is a dummy indicating whether the child ate any type of starchy food on the day before survey. In columns (7) to (9), the explained variable is a dummy indicating whether the child ate any type of non-starchy food on the day before survey. The control variables for all models are the child's gender, the mother's relationship to the household head, the highest year of education of the mother and whether the household is rural or urban. All models include age-country fixed effects, and year of survey fixed effects. Starchy food products include bread, rice, lentil and potatoes. Non-starchy food include fruits, vegetables, eggs, meat and cheese. The analysis focuses on children aged between 25 and 49 months. The variable interaction variable labeled "Among poorest households" is defined on the basis of the wealth index computed by DHS, we include individuals if they fall in the category of "Poorest" or "Poorer". Regressions are weighted based on the child's mother's weight in the survey. Standard errors clustered at the country level in parentheses. * p<0.10, ** p<0.05, *** p<0.01

As regards the effect of location of the population, if might first be largely correlated with that of income, since rural populations are on average poorer. However, it might also play through availability effects. From this standpoint, one can hypothesize that the effects of a crisis is higher in rural areas, because of lower accessibility of imported food. Indeed, urban population may benefit from easier access to imported products (Bricas and Tchamda, 2017a), because they are located in better connected areas within the country, but also internationally, especially since many large cities are in fact ports. This might help find alternative food sources if the prices of imported food increases. Additionally, if social buffers (in kind or in money) are put in place by local governments, or NGOs, to tackle the consequences of currency crises, they may benefit more easily and quickly the best-connected populations, such as those in cities. They could therefore suffer less than rural populations in meeting their food needs. To the contrary, while rural areas depend strongly on the market for food supply (Bricas et al., 2016), the more immediate availability of locally-grown food can act as a buffer in case of disruption of internal or external supply chains.

To test the mediating effects of household wealth and location on access to food when a currency crisis, we interact the treatment with variables indicating whether child's mother had some schooling or not, the wealth level of the household and the rural or urban status of the household. In the next paragraphs, we refer to households where the mother has no schooling, or are rural, or among the poorest, as "poorer" households. Several facts stand out from this analysis. First, children belonging to poorer households have a lower initial probability to access any food products, of about -2 to -3 pp (columns (1) to (3)). This reduction in the probability of eating non-starchy products is stronger (about -6 pp, columns (7) to (9)) than for starchy products (about -3 pp, columns (4) to (6)). This indicates that poorer groups tend to favor more caloric and less expensive products than non-starchy and more expensive products in their food basket. Second, facing a currency crisis, all types of households reduce more their children's consumption of non-starchy food than that of starchy food (columns (4) to (9)). For poorer households, the probability of consuming non-starchy food decreases by about 10 pp, against about -5 pp for starchy food. Likewise, for other households, the probability of consuming non-starchy food decreases by about 20 pp, against about -8 pp for starchy food. Third, these results also show that, facing a currency crisis, poorer households decrease less their children's consumption than others, across all types of food. Overall, while the probability of eating any type of food decreases by about 10 pp for non-poor households, it decreases by about 3 to 5 pp for the poorer ones (columns (1) to (3)).

These results therefore suggest, in line with earlier results from the literature, that the reduction of food intake is stronger for richer households. When the price of their food basket increase following a currency crisis, they tend to decrease their children's food intake across all categories of products, which is possible since they are likely to have a higher initial caloric intake and a more diversified diet. The reduction is the strongest for more expensive, less caloric non-starchy products, and is lower for starchy products, in order to maintain children's caloric intake brought by the latter. Poorer households, which have an initially lower caloric and less diversified diet, are less able to significantly reduce their food intake across the board. This lower reduction in food consumption might explain why we do not observe any heterogeneity of height effects along income. The fact that poorer households adjust less their food consumption at the extensive margin while they are more budget constrained suggests that their adjustment might also occur through non-food coping strategies, that we do not observe. The fact that the effect is overall lower in rural areas might reflect both these mechanisms due to income, and a higher share of local food in consumption, which is likely to be less affected by the effects of currency crises.

Finally, we also leverage the rich information contained in DHS to test an alternative channel through which currency crises might play a role, namely children's intake of pharmaceutical products, with a focus on medication and vaccines, which are highly imported in emerging and developing countries, as their local production are largely insufficient (WHO, 2023; Kumraj et al., 2022). In Table 10, we conduct several analyses regarding children's medication intake in case of illness and vaccination schemes, based on information contained in the women's DHS survey. In columns (1) and (2), we consider whether children received any treatment against diarrhea or fever. Since this information is available only for children who actually contracted diseases, we build variables interacting these two information. First, we create a binary variable equal to 1 if the child had diarrhea in the two weeks before the survey and if she did not receive any treatment, and 0 otherwise. We then create an analogous variable for children ill with fever. We then test, in columns (1) and (2), whether the start of a currency crisis in the 12 months preceding the survey date affect these dummy variables[34], and find no significant effect. In column (3), we focus on the effect that currency crises might have on the completion vaccination scheme of children and hence restrict our sample to children of at least 3 years old. We construct a binary variable equal to 1 if the child received vaccines for all rounds of DPT, Polio, BCG and measles, and test whether the occurrence of a currency crisis between child's birth and the survey affected the probability to be fully vaccinated. As completing the vaccination schedule takes several years, we use a wider exposition of children to currency crises, spanning from their date of birth to the date of survey.

Table 10 – Effects of currency crises on access to pharmaceutical products and vaccines

	(1)	(2)	(3)
	Diarrhea no treatment	Fever no treatment	Complete vaccination
Crisis one year before survey	0.00805	-0.0227	
	(0.00719)	(0.0138)	
Crisis between birth and survey			0.0045
			(0.0514)
Constant	0.0280***	0.0264***	0.396***
	(0.000185)	(0.000355)	(0.00319)
N	1,687,221	1,687,221	602,674
adj. R-sq	0.018	0.051	0.3113

Note: The control variables for all models are the child's gender, the relationship of the mother to the household head, her highest year of education and whether the household is rural or urban. All models include age-country fixed effects, and year of survey fixed effects. For model (1) and (2) endogenous variable are variables indicating whether, in the 15 days preceding the survey, the survey child had diarrhea/fever *and* has access to a treatment for the disease. Column (3) restrict the sample to children that are at least 3 years old. The endogenous variable in model (3) is a variable synthetizing information about the completeness of vaccination schedule and constructed using vaccination dates relative to the initially prescribed scheme. Regressions are weighted based on the child's mother's weight in the survey. Standard errors clustered at the country level in parentheses. * p<0.10, ** p<0.05, *** p<0.01

The results indicate no significant effects of currency crises on the completion of vaccination of schedule. One potential explanation for this lack of effect regarding consumption of pharmaceutical products in developing countries, is that the latter often relies on internationally funded programs, notably regarding children's vaccination (GAVI, 2022).

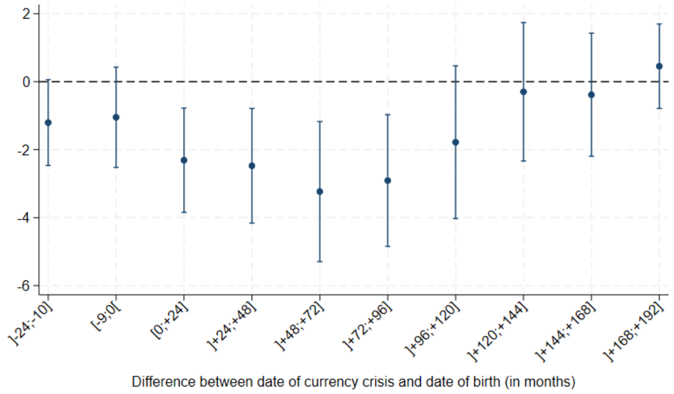
6. Persistence of the effects of currency crises

In this last section, we test whether currency crises experienced during childhood have persistent effects on height. Estimating our baseline equation (3), we find that adults who experienced a currency crisis during childhood are on average shorter than their peers with a peak effect of about - 3.2 mm for individuals who experienced a currency crisis when they were 5 to 6 years old.

[34] Since several vaccines are required for the completion of vaccination schedule, and as such vaccines are prescribed to children at different ages, our preferred treatment variable regarding the completion of vaccination schedule is whether a crisis occurred between the child's month of birth and the month of survey. To the contrary, since the variables regarding access to medication are based on the occurrence of diarrhea or fever in the two weeks preceding the survey, our preferred treatment variable for studying these dummy variables is whether a currency crisis started in the year preceding the survey.

However, these effects are negative and significant for similar events occurring between the date of birth and the 8 following years. In line with estimated effects for children, we do not find evidence of significant effects for events occurring in utero or during the year prior to the conception of the individual. Additionally, we do not find significant effects for events occurring during adolescence.

Figure 1- Effect of an exposure to a currency crisis during childhood on adult height



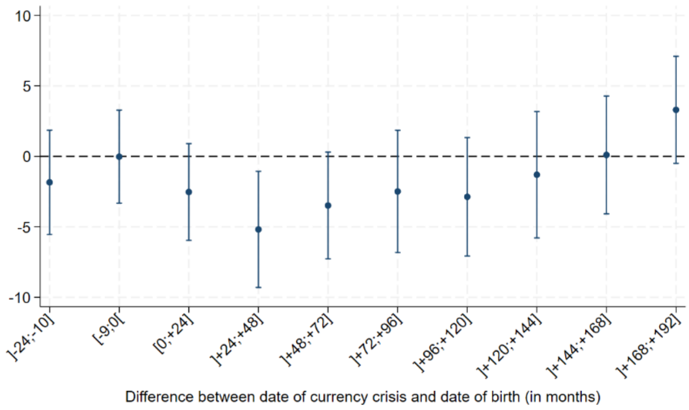
Note: the figures displays, the effect of a currency crisis on adults height (in mm), depending on the distance between the start of the crisis and the individual's month of birth. The sample includes adults between 20 and 30 years old. The regressions includes controls for gender, maximum years of education, relationship to head of household, and whether the respondent lives in a rural or urban area. A positive number on the x-axis means that a currency crisis occurred *after* the birth of the respondent, and a negative number on the x-axis means that a currency crisis occurred *before* the birth of the respondent. Regressions are weighted based on respondent's weight in the survey. Confidence intervals are at the 95 % level and are based on standard errors clustered at the country level.

While these effects can appear small when expressed in comparison with average height, it is much larger when comparing to the average variation existing in the data. For instance, conditional on gender, the difference between the median height of the tallest and smallest populations of our sample is 126 mm. From this standpoint, the maximum estimated effect explains about 2.5 % of this variability. Furthermore, the standard deviation in the data being of 76 mm, the maximum estimated effect corresponds to 0.04 standard deviations of height. From this standpoint, the effects are comparable, albeit slightly smaller, to some results of the literature. For instance, Adserà et al. (2021) find an effect of -0.6/-1 cm of the USSR transition on adults' height.[35] Markevich and Zhuravskaya (2018) find an effect of 1 cm of the abolition of serfdom on the height of Russian soldiers. Batinti et al. (2022) find an effect of 0.7 to 1.7 cm of the extension of suffrage in Europe in the 19th century[36]. Finally, the effect appears non-negligible even compared to those of some control variables. For instance, in the setting of our regression, the coefficient associated to the variable characterizing the adult respondents not having followed any years of schooling (instead of at least one) is of -9.1 mm, the effect of living in a rural area of -11.0 mm, and the effect of being a woman of -109.5 mm. Therefore, our maximum estimated effect (-3.2mm) corresponds to 35 % of the effect of having no years of education, 29 % of the effect of living in a rural area, and 2,9 % of the gender gap. Interestingly, the magnitude of the maximum effect is close to that of the estimated effect of crises occurring between birth and one year before the survey (-0.05 SD, which was insignificant though). This confirms that part of the negative effects of a currency crisis might be compensated later, potentially through "catch-up growth" or "compensatory growth", which may originate from growth inhibiting conditions such as deficits in caloric and nutrient intake (Boersma and Wit, 1997).

[35] In line with this study, we find that effects are mostly concentrated on young children, and not on *in utero* or adolescence period. Contrarily to it, however, we find that the effects are observed not only for events occurring during the 2 first years of life, but during the first 8 ones.

[36] Some contributions find much stronger effects, but they arguably correspond to massive real shocks, such as famine (-3 cm on adult height in the case of European of Europe in the 20th century [Van den Berg et al., 2016]; -5 cm in the case of the Ethiopian famine of 1984 [Dercon and Porter, 2014]), air pollution (-2.2 cm in the case of the Industrial Revolution in Great Britain [Bailey et al., 2018]), or the Korean divide (6-7 cm [Schwekendiek et al., 2009]).

Figure 2 - Effect of a currency crisis on adult height, controlling for siblings fixed effects



Note: the figure displays the effect of a currency crisis on adults height (in mm), depending on the distance between the start of the crisis and the individual's month of birth, for adults between 20 and 30 years old. The coefficients on distance between the start of the crisis and respondent's birth are interacted with the gender of the respondent. The regression includes country-year-of-survey fixed effects and year-of-survey-year-of-birth fixed effects, siblings fixed-effects, as well as controls for an interaction of gender and birth rank, and the group the siblings belong to (either household head and her siblings, or sons and daughters of household head). A positive number on the x-axis means that a currency crisis occurred *after* the birth of the respondent, and a negative number on the x-axis means that a currency crisis occurred *before* the birth of the respondent. Regressions are weighted based on respondent's weight in the survey. Confidence intervals are at the 90 % level and are based on standard errors clustered at the country level.

Importantly, our results are also robust to controlling for selection effects. In Figure 2, we consider only individuals who are brothers or sisters, in order to control for potential selection biases into the decision of having children during economic hardships. This can occur for two groups of respondents. First, the household heads and their siblings living under the same roof. Second, the children of the household head. We therefore include a fixed effect for each group of siblings. In this specific case, we also control for an interaction of gender and birth order (among the known siblings), as these factors are correlated with height (Jayachandran and Pande, 2017), and for the group the siblings belong to (either the household heads and their siblings living under the same roof, or the children of household head). We also drop controls for years of education and rural areas, since the latter factors were proxy of household wealth. Finally, we keep only group of siblings in which all siblings are born with strictly more than one year of difference. The results still indicate a lower height for those born right after the beginning of a currency crisis, of broadly the same magnitude as the one estimated in the baseline analysis, and if anything with stronger effects (-5 mm), albeit with lower statistical significance, due to a strong drop in sample size (only 37,935 observations). Additionally, as for the results on children, our results are robust across specifications and different samples, as emphasized in Figures B.2 and B.3 in Appendix. We also find some of the main heterogeneities documented for children. In particular, we find strongly negative height effects of exposure to a currency crisis during childhood among citizens of NFIDC, but muted effects among citizens of non-NFIDC (Figure 3.a). Likewise, controlling for the inflation rate at the age at which children faced a currency crisis reduces the size of our estimates and their significance, (Figure 3.b), confirming that inflation is an important channel through which currency crises affect the height of individuals.

Finally, in Figure 4, we provide evidence that early exposure to currency crises have long-term socio-economic effects. In this figure, the explained variable is the probability of having attained secondary or higher education (as opposed to having primary or no education), using the baseline adult specification. We find that currency crises occurring during childhood overall reduce the probability of attaining secondary or higher education, with a maximum effect of -2.8 pp (against a baseline probability of 50.7 %, i.e. a lower probability of about -5 %).

Figure 3 – Heterogeneity depending on country classification (NFIDC or not), and comparison of the baseline with an estimation controlling for inflation

Figure 3.a – Heterogeneity depending on country classification (NFIDC or not)

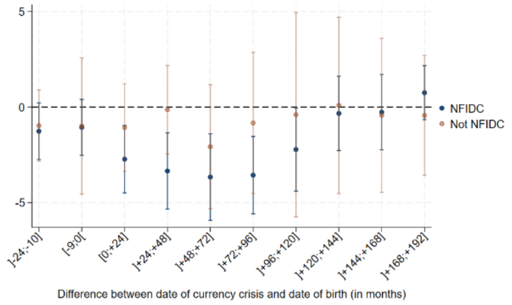
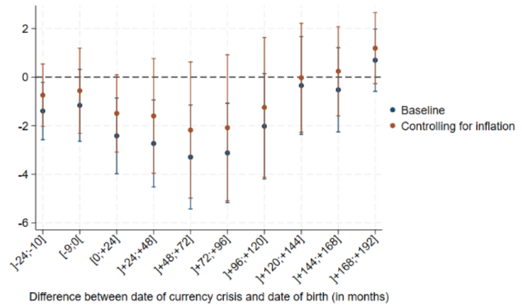
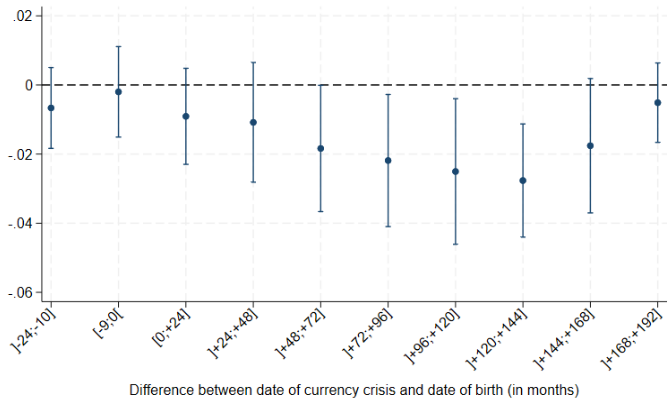


Figure 3.b – Comparison of the baseline with an estimation controlling for inflation



Note : Panel a) displays the effects of a currency crisis on adults height (in mm), depending on the distance between the start of the crisis and the individual's month of birth, for countries that are net food importing developing countries according to the FAO in blue, and those that are not, in brown. Panel b) shows the effects of our baseline estimates in comparison to the same specification controlling for inflation over two-year bins from two years before or to 16 years after the individual's birth year (in brown). The sample includes adults between 20 and 30 years old. Regressions in both panels includes country-year-of-survey fixed effects and year-of-survey-year-of-birth fixed effects, as well as controls for gender, maximum years of education, relationship to head of household, and whether the respondent lives in a rural or urban area. A positive number on the x-axis means that a currency crisis occurred *after* the birth of the respondent, and a negative number on the x-axis means that a currency crisis occurred *before* the birth of the respondent. Regressions are weighted based on respondent's weight in the survey. Confidence intervals are at the 95 % level and are based on standard errors clustered at the country level.

Figure 4 - Effect of a currency crisis on the probability of completing secondary or higher education



Note: the figures displays, the effect of a currency crisis on adults height (in mm), depending on the distance between the start of the crisis and the individual's month of birth. The sample includes adults between 20 and 30 years old. The regressions includes controls for gender, relationship to head of household, and whether the respondent lives in a rural or urban area. A positive number on the x-axis means that a currency crisis occurred *after* the birth of the respondent, and a negative number on the x-axis means that a currency crisis occurred *before* the birth of the respondent. Regressions are weighted based on respondent's weight in the survey. Confidence intervals are at the 95 % level and are based on standard errors clustered at the country level.

7. Conclusion

In this paper, we take advantage of a large dataset provided by DHS to measure the impact of currency crises on the height of individuals in more than 50 developing countries. Focusing on several hundreds of thousands of children and adults, we assess the short and long term effect of currency crises on the height of individuals facing such event during their childhood. Using data on surveyed children under 5, we find that those who have been exposed to a currency crisis between their birth and the time they got surveyed tend to be shorter than their peers by about -0.1 SD. This effect is stronger when the crisis is closer to the survey date, and homogeneous across the characteristics of children. The results are robust to several alternative specifications, but also unlikely to reflect selection effects.

As food products constitute major import expenditures for developing countries, and as food intake is key to child growth, we test several potential mediating effects of food expenditure through both macro and micro approaches. In our macro approach, we first show that the estimated effects are larger in countries that are net food importers or where undernourishment is more prevalent, and when global wheat prices in USD increase strongly. We then show that, among several macroeconomic variables that could mediate our results, inflation is the only one that plays a significant role, and that it does so in a non-linear way, and only in net food importing developing countries (NFIDC) suggesting a food affordability channel. In our micro approach, we leverage information on food intake at the extensive margin in the DHS questionnaire. We document that children who experienced a currency crisis in the last 12 months have a reduced and less diversified food intake on the day before the survey. Non-starchy food is the type of food whose consumption is the most reduced, suggesting household prioritize starchy food in order to maintain caloric intake. As non-starchy food contains nutrients that are key to child growth, this heterogeneity might explain why we observe an effect on height but not on weight-to-height. Additionally, poorer households overall reduce less their consumption, while having a tighter budget constraint and a lower initial caloric intake, suggesting they might adopt non-food coping strategy. Exploring an alternative channel, namely access to healthcare we do not find that children facing currency crises are less likely to receive either vaccines or medication when they are ill.

Finally, we document that the shocks experienced during childhood have persistent effects at adult age. We find a maximum height loss of about 3 mm (-0.04 SD) for adults who experienced a crisis between 5 and 6 years old, but no effects when the crisis occurred before their birth or in their adolescence. The effect is smaller than the average effect estimated during childhood, and suggests that part of the negative effect is compensated. We find, in line with results obtained on the children sample, that the effect is stronger in NFIDC, and lower when controlling for inflation. Eventually, we show that persistent effects on adult height also translates into lower educational outcomes, as adults that faced currency crises as a child have a lower probability of completing secondary or higher education.

While these results provide evidence that currency crises affect children's health outcomes, and have socio-economic implications later in life, they also leave open research questions. In particular, while food affordability seems to be a major channel, it is unlikely to be the only one, as it explains only partially our findings. Furthermore, additional data on consumption habits regarding non-food items and food consumed at the intensive margin (size of portions, calories, nutritional quality) would help better understanding of potential additional coping strategies implemented by households (in rural and urban areas). Finally, while we find persistent effects of currency crises on height and educational outcomes, additional research would be necessary to understand the precise mechanisms behind these effects.

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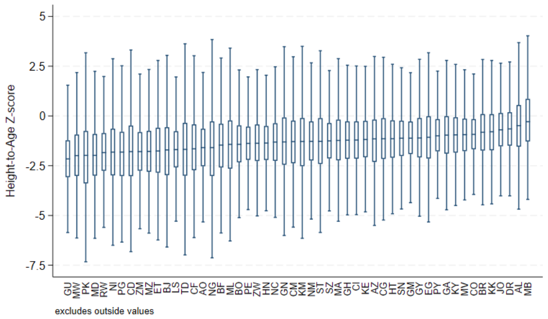
APPENDIX

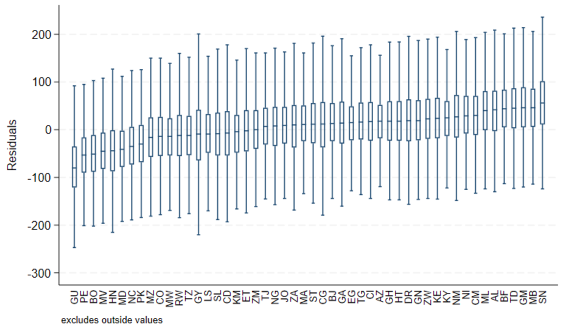
Appendix A - Descriptive statistics

Figure A.1: HAZ across countries – children



Note: this boxplot is based on the restricted sample of children, composed of 1,080,773 observations. The edges of the boxes represent top and bottom quartiles. The edges of the whiskers represent the top and bottom deciles.

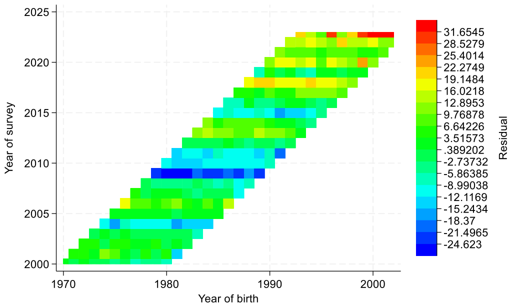
Figure A.2 – Height across countries - adults, residualized on gender (in mm) – Adults



Note: this boxplot is based on the restricted sample of adults, comprising 536,776 observations. The edges of the boxes represent top and bottom quartiles. The edges of the whiskers represent the top and bottom deciles. The plotted data are the residuals of a regression of height on gender, weighted using survey weights.

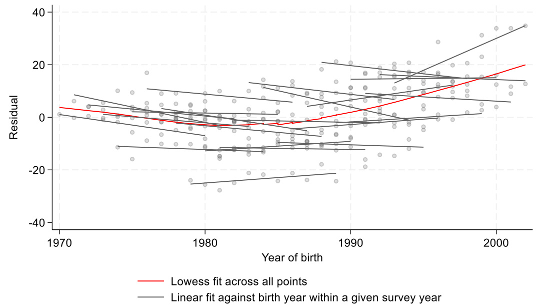
Figure A.3 – Distribution of adult height by year of birth and year of survey, residualized on gender

Figure A.3.a – Contour plot



Note: the contour plot is based on the restricted sample of adults, comprising 536,776 observations. It plots the average residual of a regression of height on gender, weighted using survey weights, within each bin of survey year and birth year.

Figure A.3.b – Estimated trends



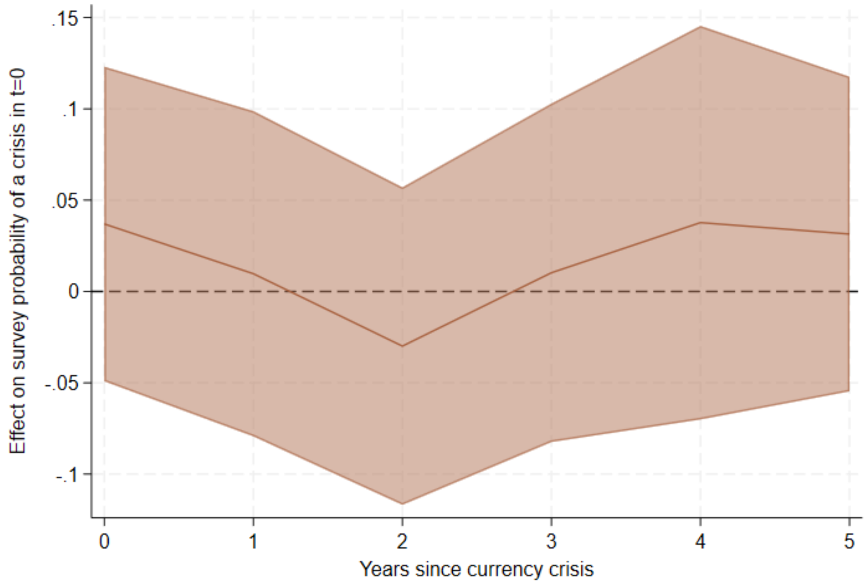
Note: the plot is based on the restricted sample of adults, comprising 536,776 observations. It plots, for each pair of survey year-birth year, the average residual of a regression of height on gender, weighted using survey weights. It plots, within each survey year, the linear regression line of the average residual against birth year with a given survey year (in grey). It also plots the lowess fit in the whole scatterplot (in red).

Table C.1 – Comparison of height-to-age (HAZ), weight-to-age (WAZ), and weight-to-height (WHZ) z-scores, children sample

Indicators	**HAZ**	**WAZ**	**WHZ**	**Stunting HAZ≤-2**	**Underweight WAZ≤-2**	**Wasting WHZ≤-2**	**Overweight WHZ ≥ 2**
Mean	-1.39	-0.58	0.17	0.34	0.09	0.05	0.08
Standard deviation	2.16	1.32	1.87	0.47	0.29	0.23	0.28

Appendix B - Additional results

Figure B.1 – Effect of a currency crisis in *t* on the occurrence of a survey in *t* to *t+5*



Note: we plot the result of regressions in which the explained variables are dummies for the occurrence of a DHS survey in a country in year t+h (with h ranging from 0 to 5), and the explanatory variable is a dummy indicating whether a currency crisis started in year t. The regressions are made on country-year panel data, and include country and year fixed effects. Confidence intervals are at the 95 %, with standard errors clustered at the country level.

Table B.1 – Additional effects on height and weight

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variable of interest	HAZ <=0	Stunting: HAZ <=-2	Weight for age z-score (WAZ)	WAZ <=0	Underweight: WAZ <=-2	Weight for height (WHZ)	WHZ <=0	Wasting: WHZ <= -2
Crisis between birth and survey	0.0185**	0.0215**	-0.0329	0.0144*	-0.0006	0.0001	-0.0004	-0.0034
	(0.0076)	(0.0104)	(0.0276)	(0.0085)	(0.0052)	(0.0263)	(0.0092)	(0.0035)
Constant	0.809***	0.320	-0.587***	0.729***	0.0944	0.0672	0.490***	0.0534
	(0.00049)	(0.00067)	(0.0018)	(0.00054)	(0.0003)	(0.0017)	(0.0006)	(0.0002)
N	1,006,452	1,006,452	1,044,130	1,044,130	1,044,130	1,016,800	1,016,800	1,016,800
adj. R-sq	0.086	0.116	0.151	0,099	0,075	0.106	0.093	0.046

Note: In each regression, we focus on children under 5 years old. In columns (1) and (2), the outcome variables are based on the height-to-age z-score (HAZ), excluding those below 5 in absolute value. In columns (3) to (5), the outcome variables are based on the weight-to-age z-score, excluding those below 5 in absolute value. In columns (6) to (8), the outcome variable are based on the weight-to-height z-scores, excluding those below 5 in absolute value. The controls for every specification are: the child's gender, the highest years of education of by the mother, her age at birth, her relationship to the head of household and whether the household is considered as rural or urban. In the four columns, two sets of fixed effects are included: an age-country set and a year of survey set. Standard errors clustered at the country level in parentheses. * p<0.10, ** p<0.05, *** p<0.01

Table B.2 – Additional robustness checks

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crisis between birth and survey	-0.0963***	-0.0820***	-0.0924***	-0.0723***				
	(0.0324)	(0.0300)	(0.00884)	(0.0261)				
Crisis one year before survey					-0.205***	-0.144***	-0.161***	-0.131***
					(0.0655)	(0.0328)	(0.0141)	(0.0361)
Constant	-1.267***	-1.277***	-1.267***	-0.958***	-1.268***	-1.279***	-1.269***	-0.959***
	(0.00208)	(0.00190)	(0.00189)	(0.00162)	(0.00162)	(0.000793)	(0.00184)	(0.000871)
N	1,006,364	1,007,157	1,006,452	861,369	1,006,364	1,007,157	1,006,452	861,369
adj. R-sq	0.159	0.142	0.148	0.124	0.159	0.142	0.148	0.124
Specification	Control variables* Country	No Weights	Robust SE	HAZ<3	Control variables* Country	No Weights	Robust SE	HAZ <3

Note: In all columns, the outcome variable is the HAZ of children under 5 and the controls are the child's gender, the highest years of education of the mother, her age at birth, her relationship to the head of household and whether the household is rural or urban. Fixed effects include an age-country set and a year of survey set. In columns (1) and (5), control variables are interacted with country fixed effects. In all columns, except (2) and (6), regressions are weighted using survey weights. Standard errors clustered at the country level in parentheses except in columns (3) and (7) in which they are heteroscedasticity-consistent. All columns are restricted to HAZ < 5, except (4) an (8), where it is < 3. * p<0.10, ** p<0.05, *** p<0.01

Table B.3 – Robustness to an estimation using the methodology of Borusyak et al. (2024)

Treatment variable	**Baseline estimate**	**Estimate using Borusyak et al. (2024)**
Currency crisis one year before survey	-0.161*** (0.0438)	-0.144*** (0.0213)
N	1,006,452	1,002,062

Note: This table compares our baseline estimate with an estimate obtained using the methodology of Borusyak et al. (2024). The control variables are the same than in the baseline estimate.

Table B.4 – Placebo test

	(1)	(2)
Crisis one year before survey	-0.165***	
	(0.0471)	
Crisis between birth and survey		-0.0950***
		(0.0349)
Crisis one year after survey	-0.0297	-0.0304
	(0.0914)	(0.0948)
Constant	-1.268***	-1.266***
	(0.00352)	(0.00392)
N	1,006,452	1,006,452
adj. R-sq	0.148	0.148

Note: In all columns, the outcome variable is the HAZ of children under 5 and the controls are the child's gender, the highest years of education of the mother, her age at birth, her relationship to the head of household and whether the household is rural or urban. Two sets of fixed effects are included: an age-country set and a year of survey set. Standard errors clustered at the country level, regressions are weighted using survey weights. * p<0.10, ** p<0.05, *** p<0.01

Table B.5- Baseline effects on specific sample

	Treatment: Crisis one year before survey				**Treatment** : Crisis between birth and survey			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment	-0.237***	-0.175***	-0.260***	-0.169***	-0.226***	-0.0729**	-0.197***	-0.0638*
	(0.0541)	(0.0544)	(0.0484)	(0.0571)	(0.0377)	(0.0347)	(0.0612)	(0.0316)
Constant	-1.233***	-1.271***	-1.270***	-1.266***	-1.227***	-1.270***	-1.268***	-1.265***
	(0.00134)	(0.00150)	(0.000936)	(0.00176)	(0.00196)	(0.00255)	(0.00200)	(0.00312)
Specif.	No countries with uncertain dates	No AMFC and CMA	One crisis	Several crises	No countries with uncertain dates	No AMFC and CMA	One crisis	Several crises
N	685,575	779,652	524,181	482,270	685,575	779,652	524,181	482,270
adj. R-sq	0.145	0.152	0.166	0.131	0.146	0.151	0.166	0.131

Note: In all columns, the outcome variable is the HAZ of children under 5 and the controls are the child's gender, the highest years of education of the mother, her age at birth, her relationship to the head of household and whether the household is rural or urban. In columns (1) to (4) the treatment corresponds to currency crises experienced during the year preceding the survey, while in columns (5) to (8) it corresponds to currency crises occurring between the birth and the survey date. In columns (1) and (5) we drop countries with at least one uncertain date for their currency crises. In columns (2) and (6), we drop countries that are part of the Africa-France Monetary Cooperation (AFMC, i.e. countries of WAEMU, CEMAC and Comoros) and of the Common Monetary Area. Columns (3) and (7) focus on countries with only one crisis, while columns (4) and (8) focus on countries with more than one crisis. The two baseline sets of fixed effects are included: an age-country set and a year of survey set. Standard errors clustered at the country level in parentheses. * p<0.10, ** p<0.05, *** p<0.01

Table B.6 – Dropping countries one-by-one

Treatment variables	**Baseline point estimate**	**Range of estimates when dropping countries one by one**
Crisis 1 year before survey	-0.161	[-0.1913;-0.1362]
Crisis between birth and survey	-0.092	[-0.1108; -0.0731]

Note: In all columns, the outcome variable is the HAZ of children under 5 and the controls are the child's gender, the highest years of education of the mother, the age of the mother at birth, her relationship to the head of household and whether the household is considered as rural or urban. They also include two sets of fixed effects : the year of survey and an interaction between the age of children and the country. The first column reports our baseline point estimates, while the second reports the range of point estimates when dropping countries one by one.

Table B.7 - Heterogeneity with respect to individual characteristics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Type of crisis	**Crisis between birth and survey**				**Crisis one year before survey**			
Interaction variable	Child is a girl	Unschooled mother	Among poorest households	Rural household	Child is a girl	Unschooled mother	Among poorest households	Rural household
Crisis	-0.082**	-0.044	0.016	- 0.050	-0.171***	- 0.158***	-0.113	-0.106*
	(0.037)	(0.037)	(0.070)	(0.047)	(0.047)	(0.053)	(0.149)	(0.061)
Inter. var.	0.129***	-0.351***	- 0.432***	-0.434***	0.127***	-0.360***	- 0.436***	- 0.436***
	(0.001)	(0.041)	(0.044)	(0.047)	(0.009)	(0.043)	(0.045)	(0.046)
Crisis#Inter. var	-0.020	-0.103*	-0.133	-0.058	0.019	0.036	-0.045	-0.070
	(0.016)	(0.059)	(0.096)	(0.051)	(0.020)	(0.064)	(0.072)	(0.0255)
Constant	-1.331***	-1.143***	-1.024***	-0.996***	-1.332***	-1.141***	-1.022***	-0.996***
	(0.006)	(0.016)	(0.020)	(0.030)	(0.005)	(0.016)	(0.020)	(0.029)
N	1,006,452	1,006,668	689,208	1,006,668	1,006,452	1,006,668	689,208	1,006,668
adj. R-sq	0.148	0.136	0.131	0.144	0.148	0.136	0.131	0.144

Note : In all columns, the outcome variable is the HAZ of children under 5 and the controls are the child's gender, the mother's age at birth, her relationship to the head of household. In columns (1) and (4), the mother's highest year of education and whether the household is rural or urban. All models include age -country fixed effects, and year of survey fixed effects. Starchy food products include bread, rice, lentil and potatoes. Non-starchy food include fruits, vegetables, eggs, meat and cheese. Regressions are weighted based on the child's mother's weight in the survey. Standard errors clustered at the country level in parentheses. * p<0.10, ** p<0.05, *** p<0.01

Table B.8 - Crisis heterogeneity

	Crisis one year before survey		Crisis between birth and survey	
	(1)	(2)	(3)	(4)
Depreciation	-0.174**		-0.132**	
	(0.0664)		(0.0527)	
Devaluation	-0.137***		-0.0560	
	(0.0390)		(0.0450)	
High intensity		-0.194***		-0.0899
		(0.0519)		(0.0562)
Low intensity		-0.134**		-0.0851
		(0.0630)		(0.0553)
Constant	-1.269***	-1.269***	-1.267***	-1.268***
	(0.000856)	(0.00101)	(0.00222)	(0.00227)
N	1,006,452	1,006,452	1,006,452	1,006,452
adj. R-sq	0.148	0.148	0.148	0.148

Note: In all columns, the outcome variable is the HAZ of children under 5 and the controls are the child's gender, the highest years of education of the mother, the age of the mother at birth, her relationship to the head of household and whether the household is considered as rural or urban. The treatment in columns (1) to (3) are crises occurring during the year preceding the survey, the treatments in columns (4) to (6) are crises occurring between the birth and the survey date. In all the columns, two sets of fixed effects are included: an age-country set and a year of survey set. Standard errors clustered at the country level in parentheses. * p<0.10, ** p<0.05, *** p<0.01

Table B.9 – Effects of currency crises on birth or pre-birth outcomes

	(1)	(2)	(3)
	Termination one year before survey	Pregnancy complications	Birthweight
Crisis 2 years before survey	0.00139		
	(0.00266)		
Crisis 3 years before survey		0.0241	
		(0.0265)	
In utero in crisis			2.631
			(13.45)
Between 9 months and 2 years prior to birth			7.294
			(15.19)
Constant	0.0149***	0.563***	3185.8***
	(0.0000255)	(0.000441)	(0.928)
N	1,178,229	587,277	775,261
adj. R-sq	0.011	0.167	0.040

Note: The controls for specifications (1) and (2) are mainly at the mother' level and include the relationship to head of household, her highest year of education and whether she is considered rural or urban. We include two sets of fixed effects which are an age-country fixed effect and a year of survey set of fixed effects. For column (3), we control for the mother's relationship to head of households, her highest year of education and whether the child lives in a rural or urban area. We include two sets of fixed effects which are an age in years-country fixed effects and a year of survey fixed. Regressions are weighted based on the child's mother's weight in the survey. Standard errors clustered at the country level in parentheses. * p<0.10, ** p<0.05, *** p<0.01

Table B.10 - Pass through of currency crises to various country-level aggregates

	(1)	(2)	(3)	(4)	(5)	(6)
	$\Delta\pi_{[y_s-2,y_s]}$	Alternative crises	$\Delta GDP_{[y_s-2,y_s]}$	Occurrence of conflict	$\Delta ODA_{[y_s-2,y_s]}$	$\Delta Debt_{[y_s-2,y_s]}$
Crisis one year before survey	0.0744***	-0.0559	-0.0102	-0.0846	-0.364	28.47***
	(0.0263)	(0.0527)	(0.0334)	(0.149)	(0.340)	(5.520)
Constant	-0.0130***	0.0180***	0.0373***	0.289***	0.167***	-1.975***
	(0.000633)	(0.00171)	(0.00110)	(0.00246)	(0.0161)	(0.176)
N	291	309	302	302	148	188
adj. R-sq	0.396	-0.006	0.245	0.444	0.208	0.258

Note: We restrict our sample to keep only one observation per country and per survey year, which is equivalent to forming an unbalanced panel. In column (1), the endogenous variable is the evolution of inflation during the two years preceding the survey. In column (2), the explained variable is a dummy equal to one if either a banking crisis or a sovereign debt crisis occurred within a year of the survey. Column (3) explains variations in the dynamics of GDP growth during the two years preceding the survey. In column (4) the endogenous variables is a dummy equal to one if a conflict occurred during the two years preceding the survey. Column (5) explains variations in the dynamics of ODA during the two years preceding the survey. Column (6) explains the variations in debt dynamics during the two years preceding the survey All the models include both a country and a year of survey fixed effects. Standard errors are cluster at the country level in parentheses. * p<0.10, ** p<0.05, *** p<0.01

Table B.11 – Additional evidence on the mediating effect of inflation

	(1)	(2)	(3)	(4)	(5)	(6)
Crisis one year before survey	-0.166***	-0.109**	-0.168***	-0.124***	0.0323	0.0870
	(0.0450)	(0.0508)	(0.0451)	(0.0520)	(0.113)	(0.125)
$\Delta\pi_{[y_{s-2},y_s]}$ > 5 pp		-0.110***		-0.097***		-0.095***
		(0.0233)		(0.0255)		(0.0307)
Constant	-1.286***	-1.271***	-1.299***	-1.285***	-1.252***	-1.242***
	(0.00118)	(0.00326)	(0.00129)	(0.00343)	(0.00223)	(0.00397)
N	945,688	945,688	699,587	699,587	246,100	246,100
adj. R-sq	0.150	0.150	0.150	0.150	0.153	0.153
Sample	All		NFIDC		Non-NFIDC	

Note: In all columns, the outcome variable is the HAZ of children under 5 and the controls are the child's gender, the highest years of education of the mother, her age at birth and whether the household is rural or urban, age-country fixed effects and year of survey set fixed effects. All models are regressed on samples for which all macro variables are available. Columns (3) and (4) are restricted to NFIDC countries, while columns (5) and (6) are restricted to non-NFIDC-countries. In columns (2), (4) and (6), we add as a control a dummy indicating whether the inflation of inflation rate between the year of survey and two years before it was higher than 5 pp. Regressions are weighted based on the child's mother's weight in the survey. Standard errors clustered at the country level in parentheses. * p<0.10, ** p<0.05, *** p<0.01

Table B.12 - Contribution of ODA and debt in the transmission of currency crises to health

	(1)	(2)	(3)	(4)
Crisis one year before survey	-0.145*	-0.140*	-0.163*	-0.166*
	(0.0722)	(0.0747)	(0.0803)	(0.0829)
$\Delta ODA_{[y_{s-2} y_s]}$		0.00844		
		(0.0256)		
$\Delta Debt_{[y_{s-2}, y_s]}$				0.000193
				(0.000623)
Constant	-1.270***	-1.272***	-1.232***	-1.231***
	(0.00271)	(0.00681)	(0.00213)	(0.00278)
N	460,222	460,222	652,977	652,977
adj. R-sq	0.164	0.164	0.155	0.155

Note: In all columns, the outcome variable is the HAZ of children under 5 and the controls are the child's gender, the mother's age at birth, relationship to the household head, highest year of education, and whether the household is rural or urban. All models include age x country fixed effects, and year of survey fixed effects. ODA measure is winsorized at the 2 % level at the top and bottom and distribution. Regressions are weighted based on the child's mother's weight in the survey. Standard errors clustered at the country level in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Table B.13 - Logit models of food access

	(1) Child access to food	(2) Chill access to starchy food	(3) Child access to non starchy food
Crisis one year before survey	-0.292***	-0.226*	-0.562***
	(0.104)	(0.130)	(0.107)
Constant	0.958***	1.094***	0.445***
	(0.0884)	(0.0935)	(0.0857)
N	224,415	235,630	224,515
Pseudo R2	0.0789	0.0788	0.1273

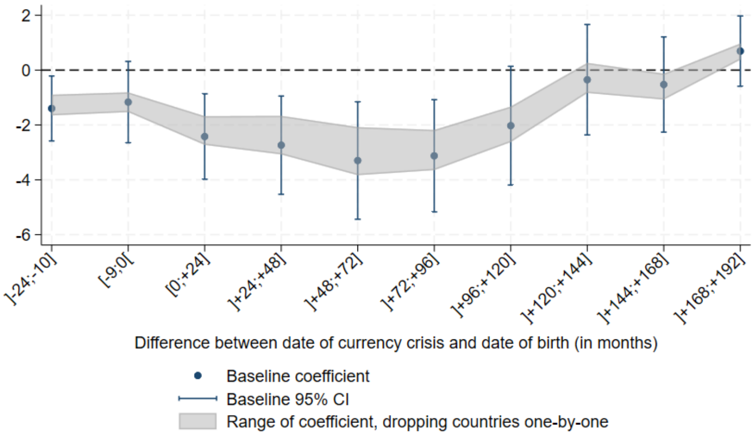
Note: The three columns report similar estimation than in Table 8 above using a logit model instead of a linear projection model. The controls are similar across columns and include, the child's gender, the mother's relationship to head of household, her highest level of education, and whether the household is rural or urban, year of survey fixed effect and age-country fixed effects. The analysis focuses on children 25 to 49 months old. Standard errors are cluster at the country level in parentheses. *p<0.10, **p<0.05, ***p<0.01

Table B.14- Effect of a currency crisis on the milk and baby food intake of children under 24 months

	(1) Still breastfed	(2) Any type of milk	(3) Instant formula
Crisis one year before survey	0.00615	0.00180	0.0188
	(0.00952)	(0.0324)	(0.0218)
Constant	0.728***	0.186***	0.105***
	(0.000252)	(0.000902)	(0.000603)
N	648,490	451,705	444,515
adj. R-sq	0.386	0.181	0.171

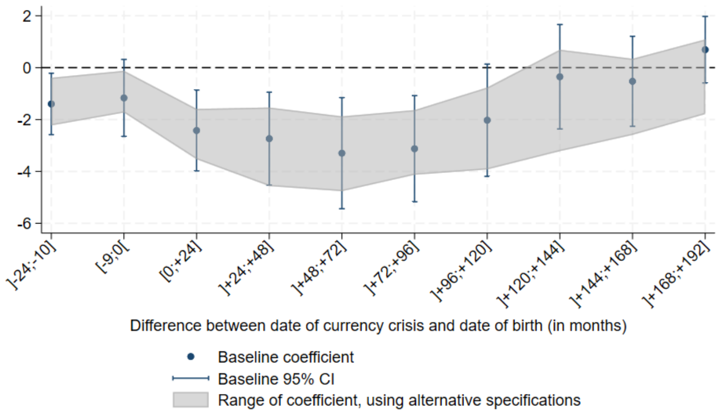
Note: The control variables for all models are the child's gender, the mother's relationship to the household head, the highest year of education achieved by the mother and whether the household is considered rural or urban. All models include age x country fixed effects, and year of survey fixed effects. The analysis focuses on weaned children aged 24 months or less. Regressions are weighted based on the child's mother's weight in the survey. Standard errors clustered at the country level in parentheses. * p<0.10, ** p<0.05, *** p<0.01

Figure B.2 Effects of currency crises on adult height dropping countries one by one



Note: the figure displays, in blue, the effect of a currency crisis on adults height (in mm), depending on the distance between the start of the crisis and the individual's month of birth, for adults between 20 and 30 years old. The regression includes country-year-of-survey fixed effects and year-of-survey-year-of-birth fixed effects, as well as controls for gender, maximum years of education, relationship to head of household, and whether the respondent lives in a rural or urban area. A positive number on the x-axis means that a currency crisis occurred *after* the birth of the respondent, and a negative number on the x-axis means that a currency crisis occurred *before* the birth of the respondent. Regressions are weighted based on respondent's weight in the survey. Confidence intervals are at the 95 % level and are based on standard errors clustered at the country level. The grey area corresponds to the range of estimated coefficients from baseline regressions estimated by dropping countries one-by-one.

Figure B.3 Effects of currency crises on adult height - alternative specifications

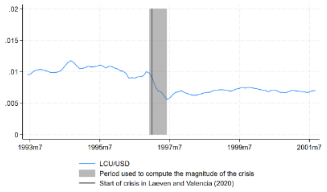


Note: the figure displays, in blue, the effect of a currency crisis on adults height (in mm), depending on the distance between the start of the crisis and the individual's month of birth, for adults between 20 and 30 years old. The regression includes country-year-of-survey fixed effects and year-of-survey-year-of-birth fixed effects, as well as controls for gender, maximum years of education, relationship to head of household, and whether the respondent lives in a rural or urban area. A positive number on the x-axis means that a currency crisis occurred *after* the birth of the respondent, and a negative number on the x-axis means that a currency crisis occurred *before* the birth of the respondent. Regressions are weighted based on respondent's weight in the survey. Confidence intervals are at the 95 % level and are based on standard errors clustered at the country level. The grey area corresponds to the range of estimated coefficients from baseline regressions estimated using several alternative models. The first model do not impose an age restrictions on adults, the second model restrict the analysis on adults of more than 20 years old. The third model uses simple fixed effects which are the country, the year, the year of birth, the gender, the relationship to head of household and whether the individual is rural or urban. The fourth model includes a country-year of birth trend in addition to the baseline fixed effects and controls. Model 5 controls for a region-country-survey wave fixed effect. In model 6, every control variables are interacted with the country of survey. In model 7, we do not use sample weights. Model 8 drops currency crises dates we consider as "uncertain".

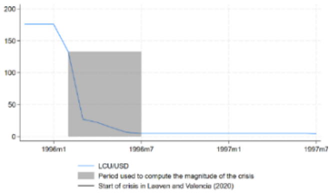
Appendix C: Currency crises and DHS data

Figure C.1 – Timing and intensity of crises

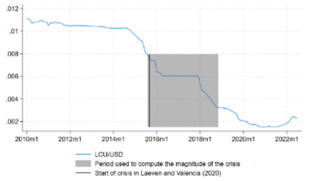
Albania – 01/1997



Angola – 03/1996

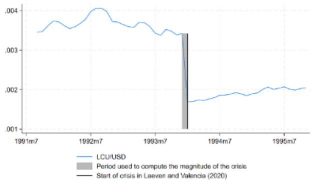


Angola – 09/2015

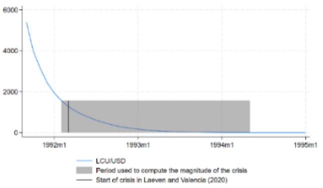


Azerbaijan – 02/2015

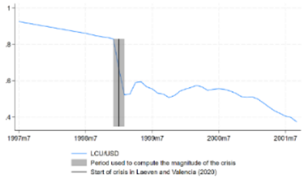
WAEMU - Benin, Burkina Faso, Côte d'Ivoire, Senegal, Togo– 01/1994



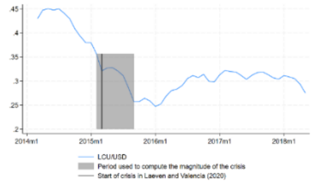
Brazil – 03/1992



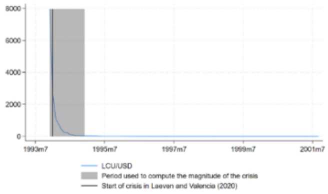
Brazil – 01/1999



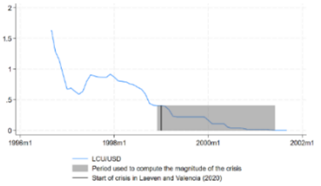
Brazil – 03/2015



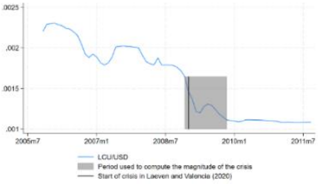
DRC – 01/1994



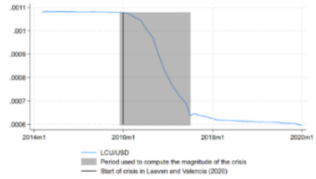
DRC – 01/1999



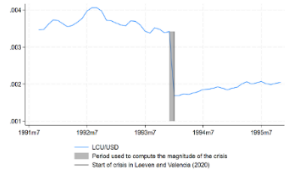
DRC – 01/2009



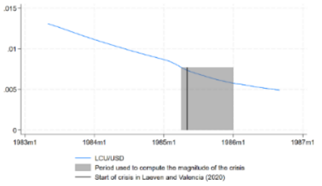
DRC – 01/2016



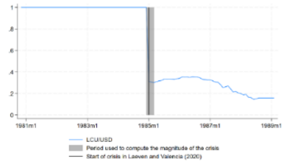
CEMAC (Congo, CAR, Cameroon) – 01/1994



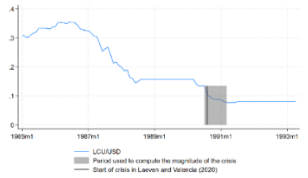
Colombia – 05/1985



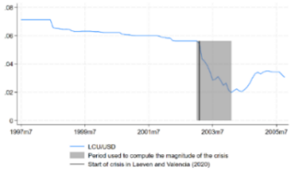
Dominican Republic – 01/1985



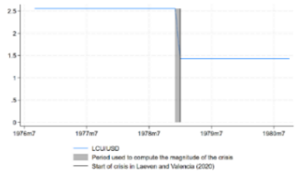
Dominican Republic – 08/1990



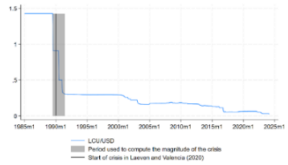
Dominican Republic – 02/2003



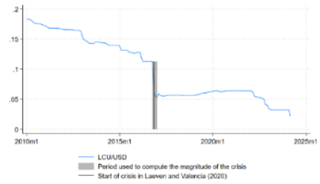
Egypt – 01/1979



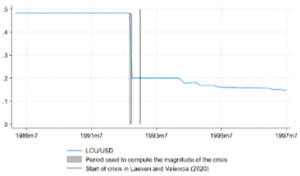
Egypt – 01/1990



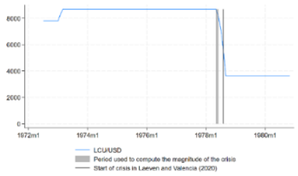
Egypt – 11/2016



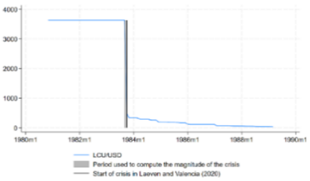
Ethiopia – 01/1993



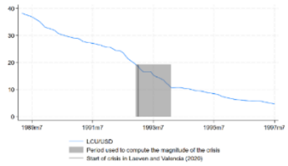
Ghana – 08/1978



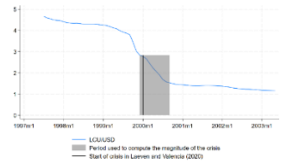
Ghana – 10/1983



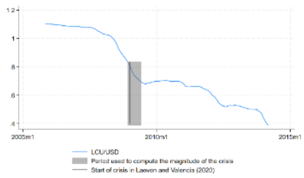
Ghana – 01/1993



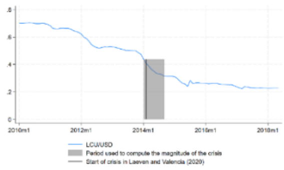
Ghana – 01/2000



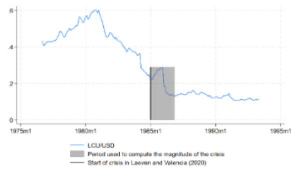
Ghana – 01/2009



Ghana – 02/2014



Gambie – 01/1985

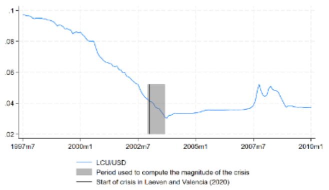


Gambie – 01/2003

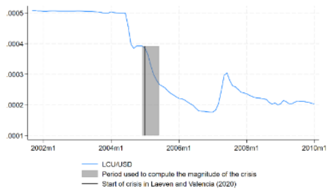
Guinée – 01/2005

Guatemala – 06/1986

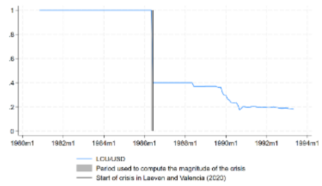
Guyana – 01/1987



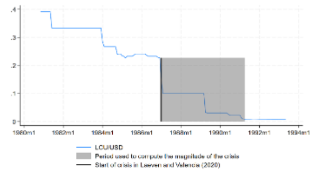
Haiti – 01/1992



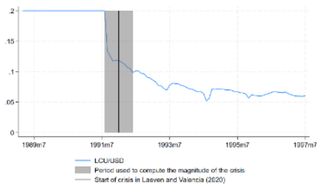
Haiti 01/2003



Jordan – 01/1989

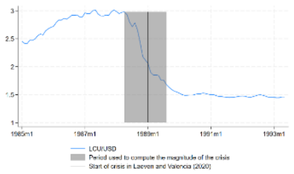


Kenya – 03/1993

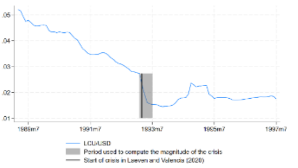


Kazakhstan – 04/1999

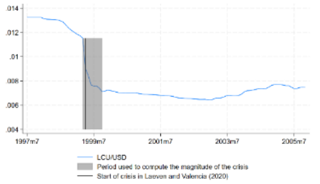
Kazakhstan – 08/2015



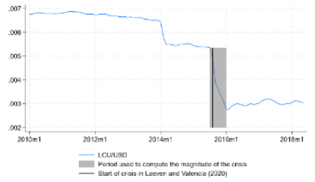
Comoros – 01/1994



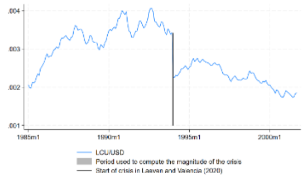
Kyrgyz Republic – 01/1997



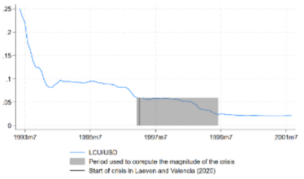
Lesotho – 01/1985



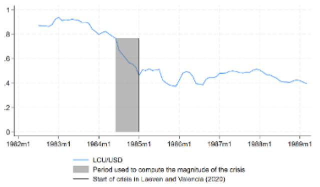
Lesotho - 11/2015



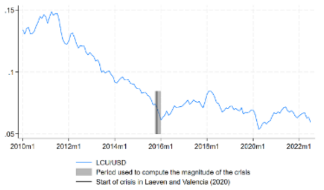
Moldova – 01/1999



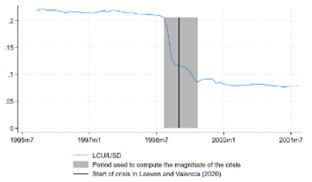
Madagascar – 05/1984



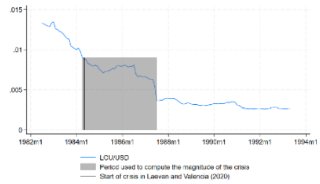
Madagascar – 05/1994



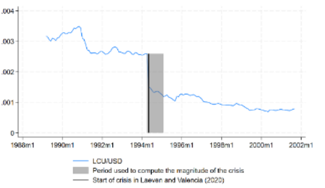
Madagascar – 03/2004



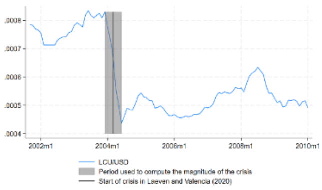
Morocco – 05/1981



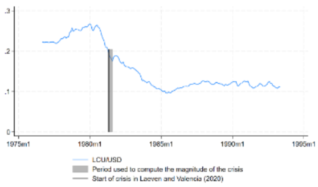
Maldives – 01/1975



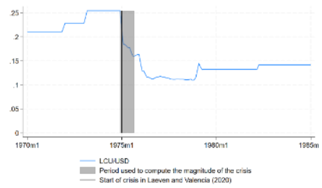
Malawi – 03/1994



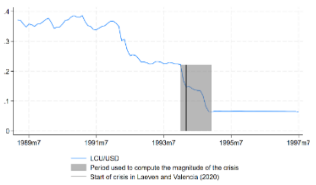
Malawi – 05/2012



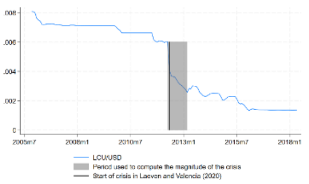
Mozambique – 01/1987



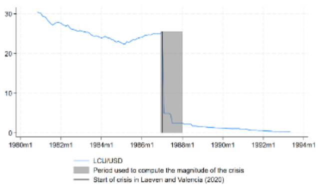
Mozambique – 08/2015



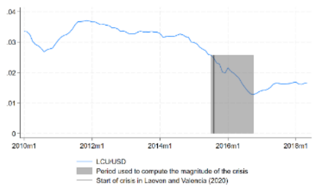
Nicaragua – 11/1990



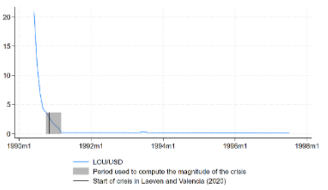
Nigeria – 01/1989



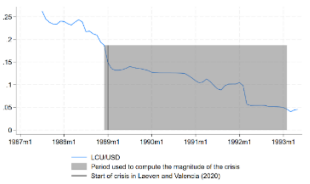
Nigeria – 06/2016



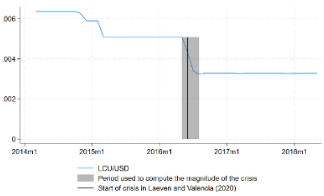
Namibia – 07/1984



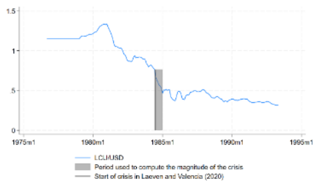
Namibia – 11/2015



Papua New Guinea – 04/1995

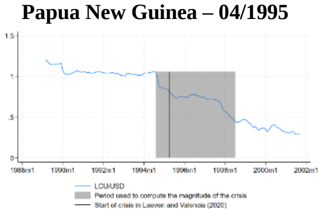


Paraguay – 06/1984

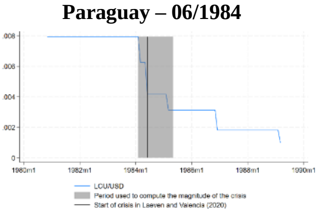


Paraguay – 03/1989

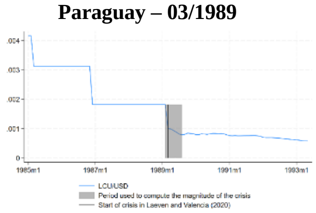
Paraguay – 01/2002



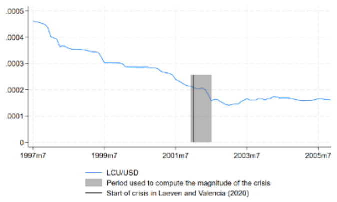
Pakistan – 05/1972

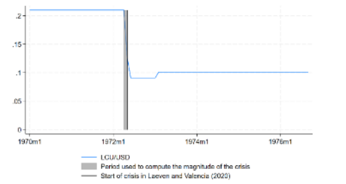


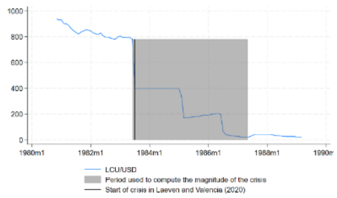
Sierra Leone – 07/1983

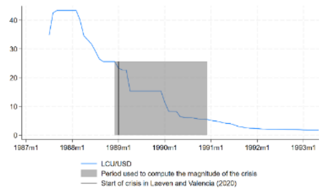


Sierra Leone – 01/1989

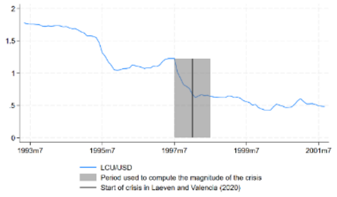




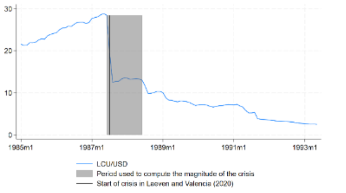




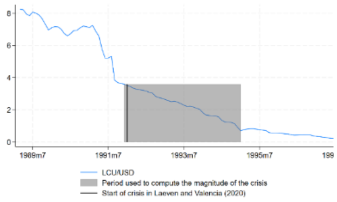
Sierra Leone – 08/1997



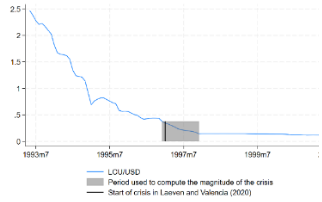
Sao Tome and Principe – 07/1987



Sao Tome and Principe – 01/1992

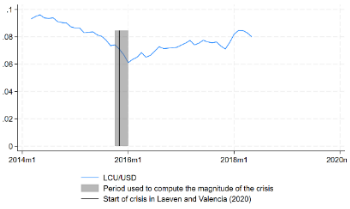


Sao Tome and Principe – 01/1997

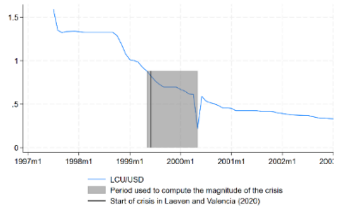


Eswatini – 01/1985

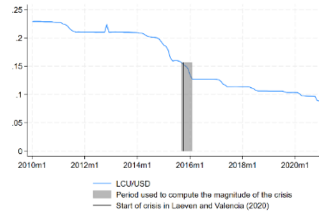
Eswatini – 11/2015



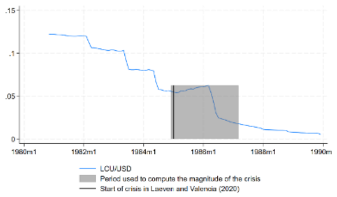
Tajikistan – 06/1999



Tajikistan – 10/2015

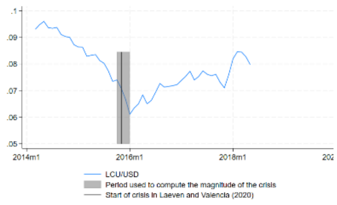


Tanzania – 01/1985

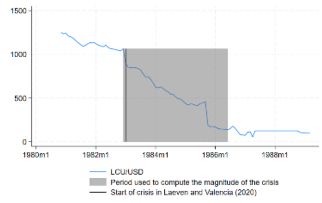


South Africa – 07/1984

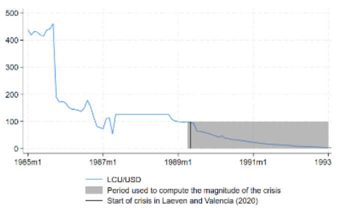
South Africa – 11/2015



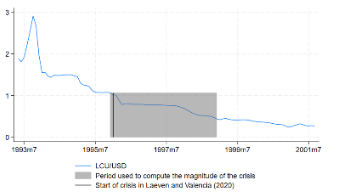
Zambia – 01/1983



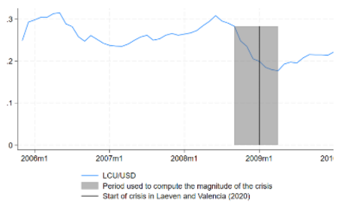
Zambia – 05/1989



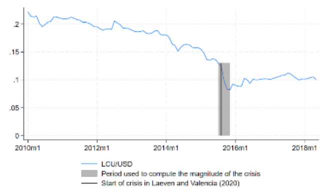
Zambia – 01/1996



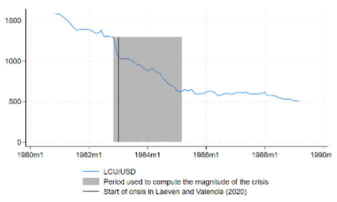
Zambia – 01/2009



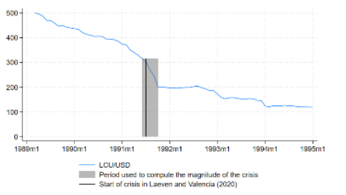
Zambia – 08/2015



Zimbabwe – 01/1983



Zimbabwe – 07/1991



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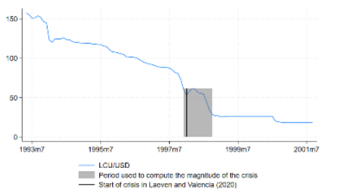

Zimbabwe – 03/2003

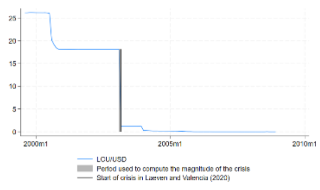

Table C.1 – Timing and duration of crises

Country	Income category (2023-2024)	Start date (Laeven and Valencia, 2020)	Modified start date	Duration (in months)	Severity	Devaluation	Transition
Albania	UMIC	1997-01		6	-43,0%		Freely falling to freely falling
Angola	LMIC	1991-03					Freely falling to freely falling
		1996-03		5	-96,3%	1	Freely falling to freely falling
		2015-09		39	-59,4%	1	Freely falling to freely falling
Azerbaijan	UMIC	2015-02		12	-50,4%	1	Peg to dual market
Benin	LMIC	1994-01		1	-50,6%	1	Peg to peg
Botswana	UMIC	1973-01					Band to freely falling
Brazil	UMIC	1976-04					Freely falling to freely falling
		1982-01					Freely falling to freely falling
		1987-06					Freely falling to freely falling
		1992-03		27	-99,9%		Freely falling to freely falling
		1999-01		2	-37,0%	1	Crawling peg to freely falling
		2015-03		7	-27,9%		Band to band
Burkina Faso	LIC	1994-01		1	-50,6%	1	Peg to peg
CAR	LIC	1994-01		1	-50,6%	1	Peg to peg
Cameroon	LMIC	1994-01		1	-50,6%	1	Peg to peg
Chad	LIC	1994-01		1	-50,6%	1	Peg to peg
Colombia	UMIC	1985-05		9	-25,4%		Band to band
Comoros	LMIC	1994-01		1	-34,1%	1	Peg to peg
Congo	LMIC	1994-01		1	-50,6%		Peg to peg
Côte d'Ivoire	LMIC	1994-01		1	-50,6%	1	Peg to peg
DRC	LIC	1976-03					Freely falling to freely falling
		1983-09					Freely falling to freely falling
		1989-01					Freely falling to freely falling
		1994-01		12	-99,6%		Freely falling to freely falling
		1999-01		30	-99,3%		Freely falling to freely falling
		2009-01		11	-32,6%		Band to freely falling
		2016-01		19	-40,9%		Peg to crawling peg
Dominican Republic	UMIC	1985-01		3	-69,9%	1	Band to freely falling
		1990-08		8	-42,7%		Freely falling to freely falling
		2003-02		13	-64,8%		Crawling peg to crawling peg
Egypt	LMIC	1979-01		1	-44,1%	1	Band to band
		1990-01	1989-08	23	-78,6%	1	Band to band
		2016-11		3	-52,4%	1	Crawling peg to crawling peg
Eswatini	LMIC	1985-01	1984-07	7	-39,7%		Peg to peg
		2015-11		3	-17,4%		Peg to peg
Ethiopia	LIC	1993-01	1992-10	1	-58,6%	1	Freely falling to peg
Gabon	UMIC	1994-01		1	-50,6%	1	Peg to peg
Gambia	LIC	1985-01		23	-54,9%		Dual market to dual market
		2003-01		9	-27,6%		Crawling peg to crawling peg
Ghana	LMIC	1978-08	1978-06	1	-58,2%	1	Managed floating to managed floating
		1983-10		1	-92,9%	1	Freely falling to freely falling
		1993-01		14	-44,4%		Band to band
		2000-01		9	-45,9%		Band to freely falling
		2009-01		6	-17,2%		Crawling peg to crawling peg
		2014-02		8	-28,2%		Band to band
Guatemala	UMIC	1986-06		1	-60,0%	1	Freely falling to band
Guinea	LIC	2005-01		6	-31,8%		Crawling peg to band
Guyana	HIC	1987-01		52	-96,5%	1	Crawling peg to crawling peg
Haiti	LMIC	1992-01	1991-09	10	-50,7%		Band to freely falling
		2003-01		2	-17,8%		Freely falling to freely falling
Honduras	LMIC	1990-03					Band to freely falling
Jordan	LMIC	1989-01	1988-05	16	-43,6%	1	Freely falling to band
Kazakhstan	UMIC	1999-04		7	-38,4%	1	Crawling peg to crawling peg
		2015-08		6	-48,9%	1	Crawling peg to freely falling
Kenya	LMIC	1993-03		5	-44,0%	1	Freely falling to freely falling
Kyrgyz Republic	LMIC	1997-01		30	-60,4%		Freely falling to freely falling
Lesotho	LMIC	1985-01	1984-07	7	-39,7%		Peg to peg

		2015-11		3	-17,4%		Peg to peg
Madagascar	LIC	1984-05		39	-59,6%	1	Crawling peg to crawling peg
		1994-05		10	-54,2%	1	Band to freely falling
		2004-03	2004-01	6	-47,4%		Band to freely falling
Malawi	LIC	1994-03	1994-02	11	-71,1%		Managed floating to freely falling
		2012-05		11	-57,3%	1	Crawling peg to freely falling
Maldives	UMIC	1975-01		9	-37,1%	1	Peg to peg
Mali	LIC	1994-01		1	-50,6%	1	Peg to peg
Moldova	UMIC	1999-01	1998-10	9	-58,6%	1	Peg to freely falling
Morocco	LMIC	1981-05		4	-14,2%		Band to band
Mozambique	LIC	1987-01		13	-90,3%	1	Freely falling to freely falling
		2015-08		15	-50,2%		Crawling peg to freely falling
Namibia	UMIC	1984-07		7	-39,7%		Peg to peg
		2015-11		3	-15,5%		Peg to peg
Nicaragua	LMIC	1979-04					Crawling peg to managed floating
		1985-02					Freely falling to freely falling
		1990-11		5	-94,0%	1	Freely falling to peg
Niger	LIC	1994-01		1	-50,6%		Peg to peg
Nigeria	LMIC	1989-01		50	-75,5%		Managed floating to managed floating
		2016-06		3	-36,4%	1	Freely falling to peg
Pakistan	LMIC	1972-05		1	-56,8%	1	Peg to peg
Papua New Guinea	LMIC	1995-04	1994-09	47	-58,2%	1	
Paraguay	UMIC	1984-06	1984-03	15	-60,6%	1	Band to band
		1989-03		6	-56,6%	1	Band to freely falling
		2002-01		7	-26,0%		Band to band
Peru	UMIC	1976-06					Freely falling to freely falling
		1981-01					Freely falling to freely falling
		1988-01					Freely falling to freely falling
Rwanda	LIC	1991-01	1990-11	57	-77,2%	1	Crawling peg to crawling peg
Sao Tome and Principe	LMIC	1987-07		12	-56,1%	1	Crawling peg to freely falling
		1992-01		37	-80,7%		Freely falling to band
		1997-01		12	-62,2%		Freely falling to freely falling
Senegal	LMIC	1994-01		1	-50,6%	1	Peg to peg
Sierra Leone	LIC	1983-07		47	-97,5%	1	Crawling peg to crawling peg
		1989-01		24	-78,8%	1	Freely falling to freely falling
		1998-01	1997-08	12	-49,2%		Freely falling to band
South Africa	UMIC	1984-07		7	-39,7%		Band to band
		2015-11		3	-17,4%		Managed floating to managed floating
Tajikistan	LMIC	1999-06		12	-75,7%		Freely falling to freely falling
		2015-10		5	-18,7%	1	Crawling peg to crawling peg
Tanzania	LMIC	1985-01		27	-71,6%	1	Band to band
Togo	LIC	1994-01		1	-50,6%	1	Peg to peg
Zambia	LMIC	1983-01		42	-87,2%	1	Band to band
		1989-05		45	-97,3%	1	Freely falling to freely falling
		1996-01		36	-58,9%		Freely falling to freely falling
		2009-01	2008-10	7	-37,5%		Band to band
		2015-08		4	-36,9%		Band to freely falling
Zimbabwe	LMIC	1983-01	1982-12	28	-52,2%	1	Crawling peg to band
		1991-07		4	-37,1%		Band to freely falling
		1998-01		10	-53,9%		Band to freely falling
		2003-03		1	-100,0%	1	Freely falling to freely falling

Table C.2 – Number of individuals considered per selected country in the DHS data, unrestricted

Country	DHS Phase	Children	Adults
Albania	5	1,616	2,699
	7	2,762	5,025
Angola	5	9,938	0
	7	14,322	0
Azerbaijan	5	2,297	3,477
Burkina Faso	2	5,828	0
	3	5,953	0
	4	10,645	4,961
	6	21,880	5,823
	8	6,060	3,244
Benin	3	3,011	0
	4	5,349	2,600
	5	16,075	10,221
	6	13,407	6,564
	7	13,589	3,282
Bolivia	0	5,804	0
	3	10,958	0
	4	10,448	6,273
	5	8,605	6,054
Brazil	0	3,573	0
	2	3,159	0
	3	5,045	0
DRC	5	8,992	3,932
	6	18,716	6,806
CAR	3	2,816	0
Congo	5	4,835	3,213
	6	9,329	2,221
Ivory Coast	3	5,990	0
	5	3,633	0
	6	7,776	3,779
	8	10,641	2,887
Cameroon	2	3,350	0
	3	2,317	0
	4	8,125	2,380
	6	11,732	3,225
	7	9,733	2,842
	8	4,504	0
Colombia	0	2,714	0
	2	3,751	0
	3	5,141	0
	4	19,291	14,191
	5	17,756	17,116
	7	11,756	0
Dominican Republic	0	4,767	0
	2	4,164	0
	3	5,240	0
	4	11,362	0
	5	12,068	0
	6	4,632	8,566
Egypt	0	8,647	0
	2	8,764	0
	3	12,135	0
	4	31,979	15,922
	5	10,872	6,276
	6	15,848	8,303
Ethiopia	4	20,734	0
	6	11,654	13,159
	7	16,394	12,272
Gabon	6	6,067	3,530
	7	6,376	4,204
Ghana	0	4,136	0
	2	2,204	0
	3	3,298	0
	4	3,844	2,252
	5	2,992	1,975
	6	5,884	3,330
	7	6,237	0

Country	DHS Phase	Children	Adults
Morocco	0	6,102	0
	2	5,197	0
	4	6,180	5,905
Moldova	4	1,552	2,486
Madagascar	2	5,273	0
	3	3,681	0
	4	5,415	2,944
	5	12,448	6,059
	6	11,725	0
	7	19,477	3,885
Mali	0	3,358	0
	3	6,031	0
	4	13,097	4,634
	5	14,238	6,011
	6	18,070	2,428
	7	19,401	2,147
Maldives	5	3,817	2,556
	7	3,109	5,801
Malawi	2	4,495	0
	4	22,840	10,785
	5	19,967	3,144
	6	4,360	0
	7	19,663	3,376
Mozambique	3	4,122	0
	4	10,326	4,961
	6	16,280	5,224
	7	4,577	0
Nicaragua	3	8,454	0
	4	6,986	4,679
Nigeria	2	7,902	0
	4	6,029	3,296
	5	28,647	13,773
	6	43,981	14,983
	7	33,924	5,762
	8	10,986	0
Niger	2	6,899	0
	3	4,798	0
	5	9,193	3,375
	6	12,558	3,701
	7	5,119	0
Namibia	2	3,916	0
	4	3,989	0
	5	5,168	3,909
	6	5,168	3,593
Peru	0	3,131	0
	2	9,362	0
	3	17,549	0
	4	13,697	0
	5	17,189	9,607
	6	38,336	30,996
Papua New Guinea	7	9,514	0
Pakistan	2	6,428	0
	5	9,177	0
	6	11,763	2,161
	7	12,708	2,402
Paraguay	2	4,246	0
Rwanda	2	5,510	0
	4	16,571	6,018
	5	5,489	0
	6	19,962	10,046
	7	11,037	2,351
Sierra Leone	5	0	2,930
	6	0	5,441
	7	0	5,344
Senegal	0	4,287	0
	2	13,017	0
	4	10,944	2,054

	8	9,350	5,086
Gambia	6	8,088	2,211
	7	8,362	2,471
Guinea	3	5,834	0
	4	6,364	1,564
	6	7,039	3,081
	7	12,080	2,065
Guatemala	0	4,627	0
	3	14,895	0
	6	12,440	9,622
Guyana	4	929	0
	5	2,178	3,223
Honduras	5	10,800	8,060
	6	10,888	9,048
Haiti	3	3,564	0
	4	6,685	3,536
	5	6,015	3,546
	6	7,247	6,683
	7	6,530	3,516
Jordan	2	8,364	0
	3	6,490	0
	4	6,073	3,239
	5	20,076	7,112
	6	10,360	4,724
	7	10,658	0
Kenya	0	6,980	0
	2	6,115	0
	3	3,531	0
	5	6,079	3,517
	6	24,578	6,198
	7	3,626	0
	8	19,526	12,307
Kazakhstan	3	2,191	0
Comoros	3	1,145	0
	6	3,149	2,359
Kyrgyz Republic	3	1,127	0
	6	4,363	3,093
Lesotho	4	3,697	1,263
	5	3,999	2,808
	6	3,138	2,424
	5	20,403	0
	6	32,965	4,454
	7	0	5,004
Sao Tome and Principe	5	1,931	1,704
Swaziland	5	2,812	0
Chad	3	7,408	0
	4	5,635	0
	6	18,263	4,795
Togo	6	0	3,205
Tajikistan	6	0	3,861
	7	0	4,223
Tanzania	4	0	4,451
	5	0	3,974
	7	0	5,276
	8	0	5,136
South Africa	7	0	3,405
Zambia	2	6,299	0
	3	7,248	0
	4	6,877	3,356
	5	6,401	3,170
	6	13,457	6,694
	7	9,959	0
Zimbabwe	0	3,358	0
	3	2,438	0
	4	3,643	0
	5	5,246	5,739
	6	5,563	7,222
	7	6,132	7,052
Total		1,759,750	619,871