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From climatic to international shocks: Where does the evidence stand on income changes and child labor

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Abstract

Children in developing countries are vulnerable to shocks and adversities and child labor is often seen as a direct consequence of poverty and economic downturns. While such univocal causality may appear obvious, its empirical basis has not been systematically evaluated. To understand the linkages between shocks, changes in the economic situation of families and child labor, we therefore conduct a systematic literature review on the impact of income-related shocks on child labor. We evaluate empirical studies of weather events and natural disasters, agricultural shocks such as crop failures, family shocks like parental illness, price shocks and transnational shocks through trade, migration, and remittances. Focusing on the literature that identifies causal effects, we find that the relationship between shocks and child labor is far from univocal. While in most cases adverse shocks increase child labor, we find that favorable shocks that improve earning opportunities may also cause *more* child labor. Policies to tackle child labor should therefore

develop safety nets that minimize the probability of children being used as buffers in adverse economic downturns, but also consider the risk that positive economic shocks may attract children into labor due to changes to the value of children's time spent working.

KEYWORDS
child labor, household labor supply, income shocks

JEL CLASSIFICATION
J13, J22, O13

1 | INTRODUCTION

Child labor affects millions of children, mostly in developing countries, and is typically associated with poverty and deprivation. More than one in four children has been engaged in child labor in the world's poorest countries between 2010 and 2018 (UNICEF, 2019). The COVID-19 pandemic has not only exacerbated this situation but threatens to undo years of achievements in the fight against child labor (ILO and UNICEF, 2020). Climate change is also endangering children's livelihood, especially in rural economies, aggravating exposure to weather shocks and enhancing financial vulnerabilities.[1]

The response of families to income changes triggered by unexpected shocks is a fundamental driver of children's time allocation and a key element for understanding how to eradicate child labor. But does a shock that brings about more poverty always induce a rise in child labor? Conversely, is a positive shock that increases family income sufficient to stop children's work? The goal of this article is to provide a first systematic review of existing evidence to answer these questions, by examining the literature that establishes a causal link between various types of shocks linked to income changes and thus changes in child labor.

The main motivation behind our analysis is that, while the evidence on how children's education and schooling is affected by shocks is richer and relatively well consolidated (Alam et al., 2022), studies that focus explicitly on child labor and shocks have received less systematic attention thus far. Yet, existing evidence shows that child labor is not just the flip side of education, but a significant issue in itself, which even when it does not substitute for education still presents problematic consequences for millions of children affected (Ibrahim et al., 2019). Extant studies have considered a broad range of factors underlying child labor, mostly of economic nature—such as poverty, market imperfections, inequality, lack of opportunities (Fors, 2012)—but also cultural and individual ones, such as social norms and parental preferences (Abdullah et al., 2022). The theoretical and empirical research evidences no unique root cause for the phenomenon and thus no single policy instrument that can eradicate child labor (Dammert et al., 2018; Thévenon & Edmonds, 2019).

Within this broad landscape of studies on child labor, we chose to focus on a more homogenous subset of the literature, which examines the microeconomic consequences of weather, agricultural, family, price, and transnational shocks, to better understand children's vulnerability in the face of key risks for families' livelihood. The significance of analyzing this specific literature resides in the fact that, despite their heterogeneity, most of these studies exploit shocks

as exogenous drivers of income changes, and so they allow to identify the causal effect of economic fluctuations on child labor. These shocks affect families' economic conditions, and thereby their need to use children's work, while also affecting children's opportunities and time allocation. We focus on these shocks because they all pose a genuine economic threat to households living in high child labor prevalence contexts.

Moreover, we choose to focus on the evidence from unexpected shocks since it provides an interesting lens to inform policymaking, for at least three reasons. First, while the analysis of policies and anti-poverty interventions provide important insights about the effect of sudden *increases* in income, they cannot measure the consequences of *decreases* in income. The evidence about shocks, instead, covers both circumstances, allowing for a complete mapping of the child labor-income nexus. Second, there is abundant evidence that relatively mild short-term shocks early in life can have substantial negative impacts over the whole lifetime of an individual (Almond et al., 2018). Third, in a world of increasing climate change, rapid diffusion of pandemics, and highly interconnected and volatile value chains, it is crucial for stakeholders at all levels to understand how shocks of different nature affect children's living conditions.

Because of the pervasive threat that these types of shocks pose to children in or at risk of child labor, policymakers need to understand their possible consequences on family livelihoods and children's work engagement to put in place relevant and effective protection mechanisms. Other systematic literature reviews on the effect of income-support policies on child labor have shown that interventions that help households cope with risk usually benefit children, while there is a risk of unfavorable outcomes from some anti-poverty measures that affect households' productive opportunities, thus warranting more exploration of different forces at play (Dammert et al., 2018; Saran et al., 2020).

The systematic literature review shows that the effects of shocks on child labor do not follow a single pattern but depend on the context examined, the nature of shocks (and thus the sources of income changes), and importantly on the direction of the income change. The existing evidence uses highly heterogeneous approaches, methodologies, samples, and mechanisms, which are difficult to reconcile in a single uniform trend. As a primary issue, most studies use different definitions of child labor activities, which not always match the official ILO definition of "child labor."[2] Thus, throughout the article, we refer generically to "child work," indicating whatever definition is applied in each study reviewed, and compare them explicitly in our results.

Nonetheless, despite the challenges in integrating results from these different empirical approaches, we find two broad trends related to the effect of different shocks on children's work. The evidence reviewed shows that, typically, a negative shock that reduces the earning capacity of families increases child labor, which is used as a "buffer" against unexpected income losses. Out of 31 shocks with negative effects on families' economic conditions, only two showed a reduction in child labor, three had no effect, and the absolute majority caused an increase in child labor. However, for positive income shocks, the effect is not always reversed: out of 24 cases, 9 found a decrease in child labor, 2 no effect, but the majority (13) found an increase in child labor, indicating that extra income does not always automatically eradicate this practice. On the contrary, shocks that increase income often led to more earning opportunities that make child labor more valuable. This is quite different from the evidence on the effects of anti-poverty programs and policies, such as cash transfers, which typically show no adverse effects on child labor, despite some heterogeneity (Churchill et al., 2021; Dammert et al., 2018; Garcia-Mandicó et al., 2021; Prifti et al., 2021; Quimbo et al., 2021).

The article is organized as follows. Section 2 reviews the economic theories that model the relation between changes in income, shocks, and child labor. Section 3 describes the

methodology applied in the systematic review. Section 4 discusses our findings, organized by the type of shock behind the income changes. Section 5 discusses the implications of the results of the literature review and concludes.

2 | INCOME SHOCKS AND CHILD LABOR: THEORETICAL PERSPECTIVE

Child labor is determined by a complex array of factors at the individual, household, community, and societal level. In theoretical frameworks that model the determinants of child labor, poverty always features prominently, next to a variety of other economic factors such as uncertainty, market failures, net returns to schooling, local labor market conditions, and non-economic factors such as community structures, family interactions and individual preferences, as well as the socio-cultural context (Abdullah et al., 2022; Basu & Tzannatos, 2003; Cigno & Rosati, 2005; Edmonds, 2008; Fors, 2012; Frempong & Stadelmann, 2021). For this review, as we are focusing on shocks that have direct economic consequences for families, we do not enter into the details of the literature on non-economic causes of child labor, but rather focus on how income changes at the household level relate to child labor.

There is a rich theoretical literature that models the channels through which income changes affect child labor (Basu, 1999; Basu & Van, 1998; Bhalotra & Heady, 2003; Bonilla Mejía, 2020; Colmer, 2021; Dumas, 2020). Several mechanisms underpin families' choice to make their children available for work in exchange for money (market activities) or in unpaid tasks (non-market activities, such as helping in the family business, working on the household farm, etc.). Thus, the effect of shocks that impact household poverty and income on child labor is not straightforward, since there are two opposite forces at play. On the one hand, a sudden increase in income can reduce child labor by making it less "necessary" to support the basic needs of the family. On the other hand, the same income increase could actually raise the value of child work if new productive earning opportunities emerge, and thus increase child labor (Roger & Swinnerton, 2004). These two opposite mechanisms identified in the literature can be broadly summarized as "pure income effects" for the first type of dynamics and "substitution effects" for the latter.

The *pure income effect* is based on the notion that foregoing child labor can be afforded only after other basic needs are met (Basu & Van, 1998). The key underlying assumption is that parents prefer minimizing child labor and sending their children to school. However, due to financial constraints, families cannot forego the additional income generated by child labor. As income from other sources rises, basic needs can be afforded without the revenues generated by children, and child labor is reduced. This mechanism is defined as the "poverty hypothesis," which implies that child work should disappear as soon as household income rises sufficiently (Basu & Van, 1998). However, this "luxury" hypothesis can be challenged if benevolent parents desire some amount of child work, believing it provides valuable skills to their children, or in the presence of market imperfections (Dumas, 2006). In this context, income shocks and child labor move counter-cyclically, and favorable shocks should be followed by a fall in child labor, while adverse shocks should lead to an increase in it.

The *substitution effect* (sometimes also called *price effect*), instead, looks at the allocation of tasks and activities among household members. Activities are a function of relative productivity and opportunity costs for each family member (André et al., 2021; Doran, 2013; Ray, 2000), with children's time usually allocated between schooling and work.[3] In theory, parents should invest in schooling if the benefits of their children's education are greater than the costs—including

foregone earnings from child work. The relative costs and benefits depend on several factors, such as school fees, transport, books, stationery, as well as the long-run returns to education, the demand for child labor and unskilled workers in the local (formal or informal) labor market, and returns to work (e.g., wages). Thus, an increase in income-generating opportunities for a household could potentially increase child labor by making it more valuable. In this context, income shocks and child labor move pro-cyclically, and favorable shocks should be followed by a rise in child labor, while adverse shocks should lead to a scarcity of work opportunities and thus a decrease in child labor.

To summarize, from a theoretical perspective, the net effect of an income change on child labor is driven by opposing mechanisms (income versus substitution effects), and ultimately needs to be estimated empirically. Most empirical articles cannot disentangle precisely the income effect and the substitution effect, but the net effect shows which one dominates following the shock and it is important to know that both effects could be at play. Figure 1 schematically presents the main channels linking shocks and child labor: on the one hand there are numerous non-economic factors that fall outside of the scope of this review and are usually part of the controls or fixed effects of empirical models or fall under a ceteris paribus assumption. On the other hand, among economic factors, the focus of this review, we are chiefly interested in the changes occurring at a microeconomic household level, where pure income and

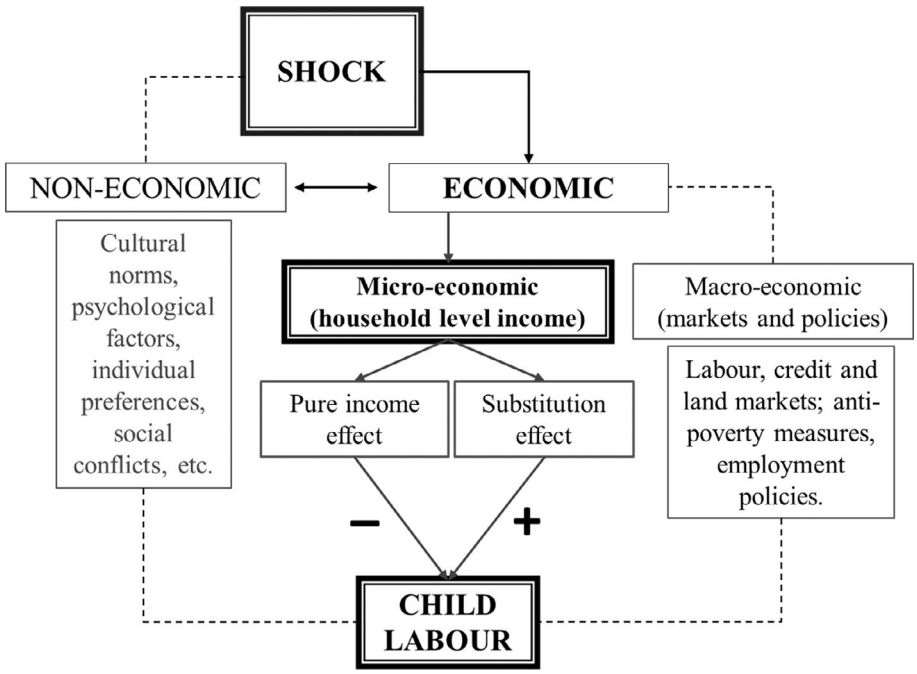

FIGURE 1 Summary of key channels from shocks to child labor and focus of the review (bold). The pure income effect is marked by a minus (−) sign since it has a counter-cyclical role (a shock that increases income decreases child labor and vice versa), while the substitution effect is marked by a plus (+) sign since it acts pro-cyclically (a shock that raises income raises the value of work and thus child labor). We select articles for this review that argue for a plausible mechanism of microeconomic causality linking the shock to child labor outcomes (as seen in the three framed boxes); however, other non-economic factors and macroeconomic conditions are also plausible channels.

substitution effects occur. The relationship between economic and non-economic factors is bidirectional: whenever the shock impacts non-economic components such as preferences, cultural values or conflicts, these factors are interlinked with economic ones, and can consequently affect the households' decisions either directly or through the economic channel. Other macroeconomic elements can theoretically mediate the relationship between shocks and child labor (market and policy conditions), and therefore several empirical studies test whether they can mitigate or counter the effect of shocks on children.

The seemingly inconsistent impact of shocks on child labor can arise from the opposite sign of income and substitution effects, but also possibly from the influence of macroeconomic and non-economic channels.

The rest of the article focuses on the existing empirical estimates of the effect of income changes driven by shocks in different contexts.

3 | METHODOLOGY

In compiling our sample of articles, we followed the recommendations of the "Systematic Reviews and Meta-Analyses Guidelines" proposed by the Cochrane Collaboration (Higgins et al., 2021). Systematic reviews originated in the biomedical field but are now more frequently applied also to development research. This section presents the key methodological considerations for our study and discusses the selection criteria applied to the literature search.

3.1 | Search strategy

Our initial search for relevant publications began with a broad screening of the literature, using the keywords' string "*hild labor*" *AND income* in Google Scholar. This combination yielded almost 120,000 results. This preliminary search provides an indication of how frequently the topic has been mentioned across documents on the scholarly web, but it is too broad for meaningful analysis. Thus, for our baseline sample, we first conduct a search in Elsevier's Scopus, one of the most influential and widely used databases of peer-reviewed literature for bibliometric analysis, by adding the requirement that the string "*child lab*r*" *AND income* should appear in the title, abstract or keywords.[4] We use the asterisk wildcard "*" in "child lab*r" for American and British spelling (labor/labour).[5] We then cross-check the initial search in both databases by using alternative keywords and strings, to capture different sources of shock or income change. The full list of keywords' strings used and the number of search results for each combination is presented in Appendix A.1. Following the Cochrane Collaboration guidelines, the search terms are chosen to reflect the research question as precisely as possible (to ensure specificity), while also targeting as many relevant studies as possible (to ensure sensitivity). As of 31st December 2023, the closing date of our search, we find 626 peer-reviewed articles in Scopus. We then integrate this search with an equivalent one of Web of Science, another well-known repository of peer-reviewed articles, which yields 351 articles. The union of these two groups of articles constitutes the initial universe of peer-reviewed literature that we consider for the analysis, with an overlap of 240 articles. Furthermore, an iterative "snowballing" approach was also used (Longhi et al., 2005), to identify additional articles by screening the bibliography of the most relevant papers found through the database searches.

3.2 | Screening of relevant literature: Inclusion criteria

In the review, we want to identify a comparable set of articles that implement rigorous quantitative methodologies to answer similar research questions on the impact of income-related shocks on children's work. With this overarching motivation in mind, we apply the following set of criteria to identify relevant articles.

1. We focus on published peer-reviewed articles only: interesting working papers exist on the topic and could be in the press in the future, but there are some instances of working papers that never get published, and therefore do not undergo the scrutiny of peer review, and for those that are eventually published, the peer-review process might modify their results, so we exclude any unpublished documents.
2. We exclude articles not written in English. This linguistic restriction is motivated by the high costs (also in terms of time and expertise) to represent all publications in non-English languages. This exclusion criterion is quite standard in meta-analyses and systematic reviews (Higgins et al., 2021).
3. We concentrate on those articles that belong to the realm of social sciences, and exclude those pertaining to natural sciences, such as medical studies, psychology, pharmacology, engineering, and earth sciences, due to the lack of relevant economic indicators on income, earnings, consumption, or similar measures that can unambiguously indicate the effect of the shock on households' finances and labor allocation decisions.
4. To be included, a study needs to have a direct measure of child labor, and not only proxies or supposed correlates such as school attendance. This criterion is needed because child work is often a complement to schooling, and the extent to which it hinders human capital accumulation depends on the context. Moreover, many children also spend time not in school or at work, in idle time/leisure, so it is not possible to accurately extrapolate from measures of schooling the time allocation to children's work.
5. We select studies that measure the causal relation (instead of correlation) between income changes and child labor. Non-causal studies can provide interesting insights on the link between child labor and economic fluctuations, but we choose to exclude them because income and child labor are often determined jointly. For example, if a family expects a period of low income, it might choose to use more child labor, but this choice of child labor will in turn influence their income. This issue leads to concerns about simultaneity and reverse causality, as income determines the labor supply, but also depends on it (Maitra & Ray, 2002). Additionally, many unobservable (and thus omitted) factors can affect the choice of child labor. Therefore, we prioritize studies that use a methodology that disentangles the direction of causality from income onto child labor, typically because the income change occurred due to the exogenous shock in a quasi-experimental setting. We exclude qualitative studies and any study based on cross-sectional evidence (only one time period), unless some credible identification technique is implemented to construct a counterfactual group, indicating what would have happened without the income change.
6. We cover studies of shocks with a direct microeconomic link to child labor, so to examine the income channel as discussed by the authors. We therefore focus on economic fluctuations driven by weather, natural disasters, agricultural, health, family, price, and transnational shocks because these types of events pose a significant menace to the livelihood of all households living in areas with high child labor prevalence. Some types of events fall outside of the scope of our review, such as conflicts and civil wars, because they do not apply to all

regions with high child labor prevalence and come with a more complex set of mechanisms potentially affecting specific forms of child labor (e.g., child soldiers, child labor in refugee camps, population shocks from refugee inflows). Similarly, as mentioned in the Introduction, we exclude income changes driven by explicit anti-poverty or income-support policies, which have been reviewed before, and legal changes (such as modifications to inheritance or marriage laws, or minimum legal working age).

We performed a detailed read of the text of the core 84 articles, especially their methodological approach to ensure compliance with criteria (e). A minimum of two co-authors read each article in this list. Regular meetings of the research group and the opinion of a third co-author resolved disagreements regarding the inclusion of a specific article in our review and clarified other issues such as the most appropriate way to interpret findings and methodological categorizations. Figure 2 provides an outline of the selection process for articles to be included through a "Preferred Reporting Items for Systematic Reviews and Meta-analyses" (PRISMA) flow diagram (Moher et al., 2009).

While this process ensures that the selected papers thoroughly investigate the potential economic impacts arising from the shocks, it is important to note that the review does not establish that the effects on child labor result solely, or even partially, from the microeconomic income channel. The evidence does stress the plausibility of a micro-income channel playing a role in the overall narrative, yet it is crucial to recognize that other factors impacted by the shock may also contribute to the observed effects, as illustrated in the theoretical framework in Figure 1. Due to the focus on a single instrument, the shock, we cannot disentangle the relative contribution of the microeconomic channel to the overall impact, but rather reduced-form effects linking the shock to child labor. Despite this limitation, the established criteria ensure a high likelihood that the microeconomic channel is influencing child labor, given the demonstrated economic impacts reviewed.

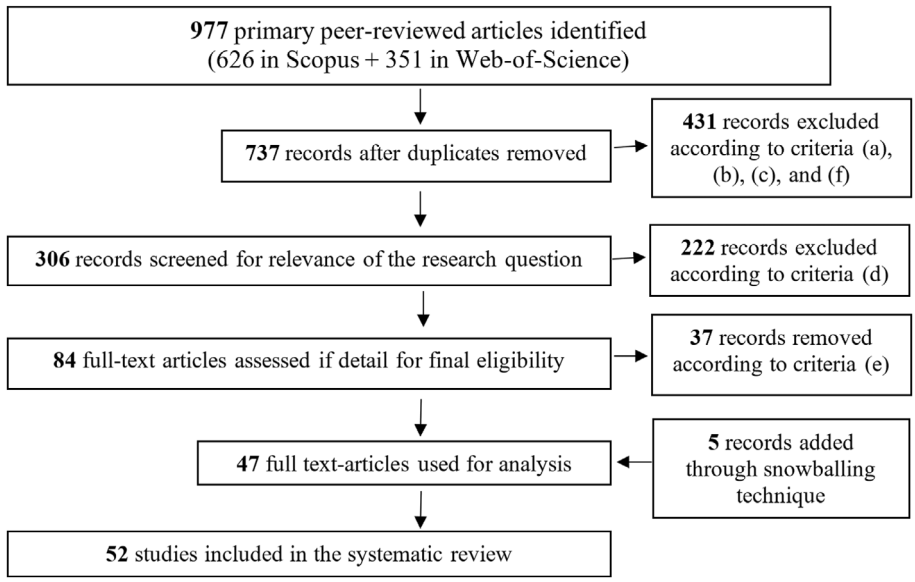

FIGURE 2 Preferred reporting items for systematic reviews and meta-analyses (PRISMA) flow diagram. *Source*: Adapted from Moher et al. (2009).

3.3 | Classification

We identified 52 articles that met all the inclusion criteria, covering 55 income shocks. We then classified these articles according to the type of shock triggering the income changes: 9 for weather shocks and natural disasters, 6 for agricultural shocks, 10 for family shocks to caregivers such as illness or death, unemployment, or departure of income earners, 12 for price shocks, and 12 for transnational shocks. These categories are often interrelated. For example, an extreme weather event may trigger large crop losses in a location (crop shocks) which may cause, at least locally, price shocks. While acknowledging this complexity, we use the main causal relation emphasized by the authors of the studies for assigning each paper to one category. Moreover, two studies (Bandara et al., 2015; Nguyen et al., 2020) examine the effect of more than one shock, so we discuss them in different shock categories.

The definition of the scope of the analysis regarding relevant income shocks and framework of classification was developed on the basis of extensive consultations within the Working Group on Child Labor and Living Income under SWISSCO and with consultation with technical experts at the International Trade Centre (ITC), International Cocoa Initiative (ICI), UNICEF, and with product certifiers. As recommended by the Cochrane Collaboration (Higgins et al., 2021), multiple rounds of stakeholder engagement ensure the relevance of the systematic review, promoting mutual learning and uptake. A report on the state of this literature up to 2019 was reviewed with this group of stakeholders. Recommendations and inputs by the stakeholders to this study helped interpret the findings in the context of the evolving policy and economic environment.[6]

4 | FINDINGS

This section presents the key findings of the 52 articles selected for the systematic literature review on child labor and income shocks, organized following the classification from Section 3.3. Figure 3 illustrates the distribution of studies across the world: the review covers

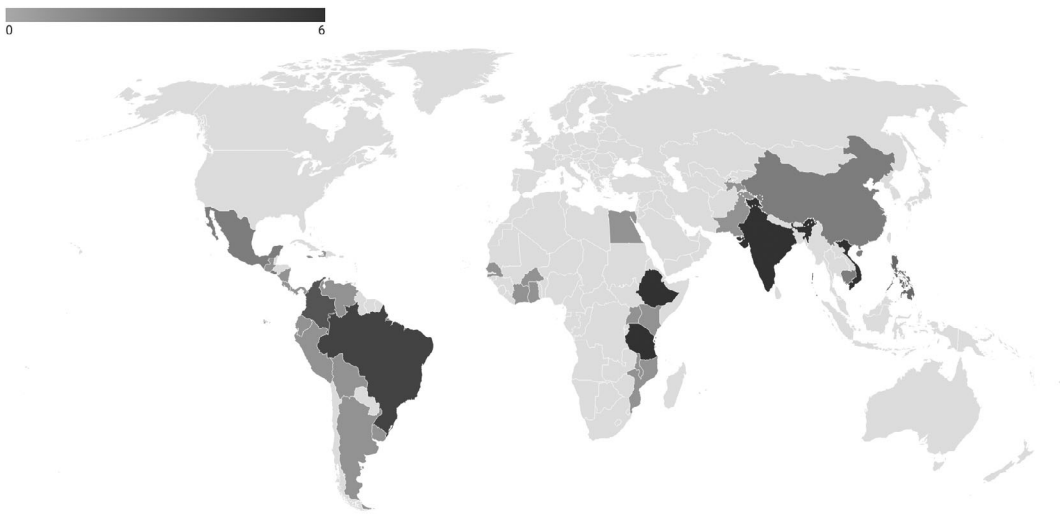

FIGURE 3 Geographic distribution of the number of studies identified in the systematic review.

34 countries worldwide: the country with more relevant articles are Vietnam, Tanzania, Ethiopia, and India followed by Brazil and Colombia.[7]

The countries covered in the study are mostly middle-income countries, with only two high income ones (Panama and Uruguay) five low-income countries (Burkina Faso, Ethiopia, Malawi, Mozambique, and Uganda), following the World Bank classification (Figure 4).[8] The graph shows that is still much scope for research across new geographic areas, since even in the most well-studied country group, lower-middle income countries, just about one quarter (15 out of the overall 54 countries in the world in this income range) have been studied.

The number of studies that correspond to our search criteria shows an increasing trend over time, with a significant peak in 2020 (Figure 5). Our results identify articles published within the past 15 years, since older ones typically did not apply methodologies that allowed for solid

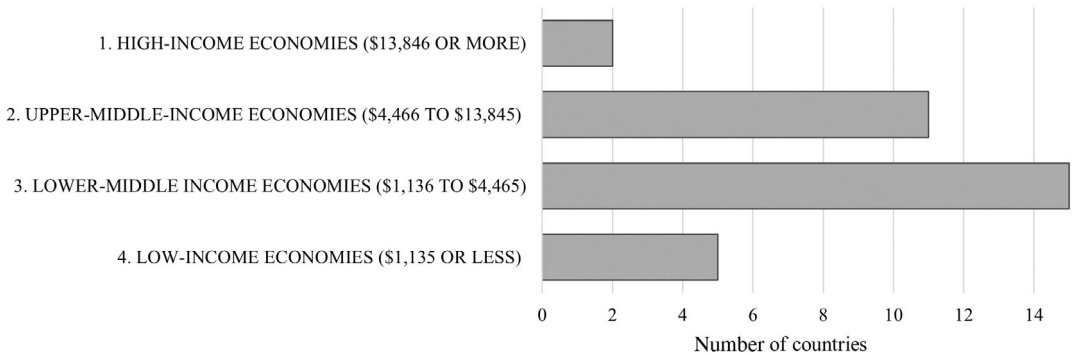

FIGURE 4 Countries covered by the review in each World Bank income category.

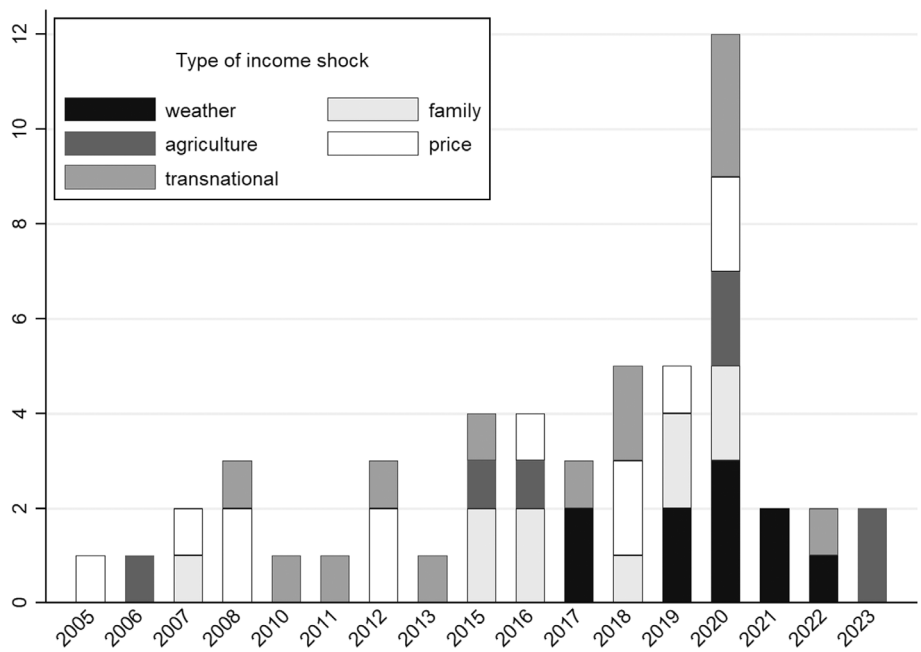

FIGURE 5 Number of core studies identified by year of publication and type of income shock.

causal inference. In particular, studies about weather shocks with rigorous causal evidence have become more popular in recent years (darkest bars). In the bar chart we report the publication year of each study. However, the time period examined by each article always refers to data from earlier years, so in the results tables we report for each article the period under consideration.

Next, we present a detailed comparison of articles organized by the type of shocks and an assessment of the main dynamics of each sub-literature.

4.1 | Climatic events and natural disasters

The use of meteorological shocks to study income variation, especially rainfall shocks in rain-fed agricultural contexts, is a well-established technique to identify the effect of exogenous income changes on socio-economic outcomes (Carleton & Hsiang, 2016; Dell et al., 2014). Its application to child labor, however, is more recent, as the older studies focused mostly on education as the key outcome (Maccini & Yang, 2009). In this category, we identify 11 relevant studies that fulfill our selection criteria. Three of these analyze countries in Sub-Saharan Africa, three are in the context of Latin America, and five in Asia.

We separate studies of shocks deriving from rainfall variations from the two studies of natural disasters (both in the Latin American context), to distinguish the most extreme and intense shocks from those representing somewhat more marginal changes. While natural disasters unambiguously worsen households' economic conditions, rainfall deviations typically increase agricultural yields in positive rainfall shocks and decrease them during droughts. Some disasters are closely related to anomalous precipitations (in the case of tropical storms and floods), just with more extreme manifestations, but there are also other categories of disasters like earthquakes, landslides, or volcanic eruptions that are worth considering. We start examining the rainfall literature (Table 1), followed by natural disasters (Table 2).

In sum, this literature on weather shocks and natural disasters demonstrates that, in most cases, positive shocks through increased rainfall support agricultural production but also increase labor demand and thus, unless adult labor markets are liquid (Dumas, 2020), they attract more child labor through a substitution effect, even though families are relatively richer when rain is abundant. Most articles use a single indicator to capture both positive and negative deviations in rainfall. However, articles looking specifically at droughts find mixed results: either increases in child work due to greater poverty, indicating a dominance of the income effect (Gebregziabher et al., 2023; Nguyen et al., 2020), or a reduction in child work as a diversification response to uncertainty (Colmer, 2021).

The article of Ajefu and Abiona (2019) is the only one with opposite effects: the income effect dominating in wet shocks and the substitution effect dominating during droughts (child work always falling). In line with the findings of Dumas (2020), this result is probably mediated by labor market dynamics and the mediating role of adult employment responses, which could crowd-out child labor in economic downturns. More evidence is needed on the interplay between adult work and child labor outcomes.

Natural disasters, which are unambiguously harmful to the populations' economic situation, always increase child labor to cope with poverty (income effect always prevails). For each of these categories, there are still too few studies to draw definitive conclusions, but the risk of higher child labor following agricultural productivity shocks should be noted, as these

TABLE 1 Climatic shocks—Rainfall.

Study and country	Data	Child labor definition and prevalence within sample	Income definition and relation between shock and income	Shock definition	Methodology	Results and interpretation/ mechanisms
Colmer (2021) Ethiopia Rural	Panel, 2 waves: 2004 and 2009. 7142 child obs.	Children aged 4–21 (results robust for children aged 4–16, 4–18). *Continuous* measure of child work: hours spent on farm work, HH chores, work for pay. Rate of child work: 89%.	Rainfall *variability* used as proxy for income uncertainty. Test effect of rainfall variability on agricultural yields, income, or wealth. find no effect. Income not included in regressions of shock on child work.	Rainfall variability: deviation from village mean in past 5 years at (*continuous*). Robustness check with top/bottom quintile of rainfall and temperature (*binary*).	Panel with individual FE, year FE, cohort FE, month of survey FE. Control for rainfall and temperature.	*Effects on child work*: 1 *SD* increase in rainfall *variability* ⇒likelihood of child farm work decreases by 2.2 pp, likelihood of wage labor decreases by 0.38 pp. No effect on domestic chores. *By age/gender*: No differences in time-use effects between boys and girls. Young children substitute away from leisure/ idle time, older children from farm work. *Education*: 1 *SD* increase in rainfall *variability* ⇒ increase in schooling time by 1 h/week, likelihood of home study increases by 2.8 pp, and school attendance increases by 2.4 pp. *Interpretation/mechanisms*: diversification, i.e., families allocate children's time to more education and less work to mitigate damages from uncertainty (substitution effect dominates).
Dumas (2020) Tanzania Rural	Panel, 3 waves: 2008/09, 2010/11 and 2012/13. 10,102 child obs., 2197 HH.	Children aged 5–15. *Continuous* measure of child work: days working on farm (broken down by task) in previous year. Rate of children aged 5–15 in employment: 24%.	Test effect of rainfall: 1 *SD* increase in rainfall ⇒ 25% increase in farm production, no effects on prices, wages, assets. Income is not included in regression of shock on child work.	Rainfall deviations (positive and negative) from long-term mean (*continuous*). Robustness check using *categorical* shocks (1, 0, −1).	Linear model with HH and year FE, or Tobit with village FE and spatial trends.	*Effects on child work*: 1 *SD* increase in rainfall ⇒ with no local labor market, child farm workdays increase by 42%–74%, and likelihood of child farm work increases by 6.8 pp. If local labor markets exist, no effect on child work, or even decrease. No mediating effect of access to credit services. *By age/gender*: Effect is stronger for children over age 10 and girls.

(Continues)

TABLE 1 (Continued)

Study and country	Data	Child labor definition and prevalence within sample	Income definition and relation between shock and income	Shock definition	Methodology	Results and interpretation/ mechanisms
						Education: 1 *SD* increase in rainfall ⇒ school attendance falls by 2 pp. *Interpretation/mechanisms*: without a local labor market, substitution dominates income effect of rainfall shock. If local labor market exists, income effect dominates.
Gebregziabher et al. (2023) Ethiopia Rural and urban	Panel, 4 waves: 2014–2017. 1083 child obs.	Children aged 5–17. *Continuous* measure of child work: total hours spent on HH chores and economic activity. Rate of children aged 5–17 in CL in Ethiopia: 45%.	HH wealth level (livestock units held, wealth index) included as controls in regressions of shock on child work.	Binary indicator for whether HH experienced the loss of an income source (job, business, etc.); and experienced drought.	Panel with survey round FE. Feasible GSL estimation.	*Effects on child work*: Experience of drought ⇒ hours worked on economic activity increase by approximately 10%; experience of loss of an income source increases hours worked on economic activity by approximately 8%. *Interpretation/mechanisms*: resource or asset ownership (land, access to credit, livestock) are positively related to child work; however, wealth index is negatively related to child work.
Fitz and League (2021) Brazil Rural and urban	Panel, 2 waves: 2005 and 2009. 2009 children.	Children aged 6–17 years. *Binary* indicator for paid work or HH chores. Rate of children in paid work: 6% (3% ages 6–14, 13% 15–17). Rate of HH chores: 45% (40% aged 6–14, 58% aged 15–17).	Test effect of positive rainfall shock ⇒ agricultural production increases. Include wealth as control in regressions of shock on child work. Test effect of conditional cash transfer (Bolsa Família)	Rainfall deviation (annual) from long-term average (*continuous*).	Panel regressions with state FEs, control for HH wealth. To test the cash transfer: propensity score matching.	*Effects on child work*: 1 *SD* increase in rainfall ⇒ likelihood of paid child work increases by 4.6 pp (50% increase from mean of 9.2%). Substitute away from HH chores. *By age/gender*: Impact is stronger for boys and older children, and in rural areas. HH chores decrease especially for girls. *Education*: Positive rainfall shock ⇒ school attendance decreases (more among cash recipients); likelihood of grade progression rises by 2.8 pp.

TABLE 1 (Continued)

Study and country	Data	Child labor definition and prevalence within sample	Income definition and relation between shock and income	Shock definition	Methodology	Results and interpretation/ mechanisms
						Mechanisms/Interpretation: The substitution effect dominates. Cash transfer acts as a safety net protecting human capital investments: rainfall shock ⇒ 6.3 pp increase in child work among HH without cash transfer, insignificant among cash recipients.
Shah and Steinberg (2017) India Rural	Repeated cross-sections, 4 waves, 2004 and 2009. 2ML children.	Children aged 5–16. *Binary* indicator for work as primary activity.	Test positive rainfall shock ⇒ wages and crop yields increase; droughts ⇒ wages and crop yields decrease. Wages and crop yield not included as controls in regressions of shock on child work.	Rainfall shock: annual rainfall >80th percentile or < 20th percentile of district-level long-term mean (*binary*).	Regressions with district and age FE.	*Effects on child work*: Positive rainfall shocks ⇒ likelihood of child work increases by 1 pp (20%), likelihood of school attendance decreases by 2 pp, relative to a drought year. *By age/gender*: No statistically different effects for boys or girls. Effects are stronger for older children (11–16 years). *Education*: Positive rainfall shock ⇒ concurrent school attainments and school enrolment decrease, drop-out rate increases. *Mechanisms/Interpretation*: Higher wages for low education jobs have the counterintuitive effect of lowering human capital investments in children. Substitution effect dominates.
Ajefu and Abiona (2019) India Rural	Repeated cross-section, 3 waves: 2004/05, 2007/08, 2009/10.	Children aged 5–18. *Continuous* measure of child time allocation: time spent on wage work past week, time spent on schooling. Mean time spent on wage work: 0.9 days/week.	Include HH expenditure as control in regressions of child work on shock. Test effect of National Rural Employment Guarantee Scheme (NREGS) as buffer.	Rainfall shock: separate positive and negative deviation of annual rainfall in previous agricultural year from long-term average within district (*continuous*).	Difference-in-differences estimation with year and district FE.	*Effects on child work*: Positive rainfall shock 1 *SD* above mean ⇒ child work decreases by 6 pp. Negative shock: same reduction, but less significant. *Education*: Positive rainfall shock ⇒ school attendance increases, effect larger for older children,

(Continues)

TABLE 1 (Continued)

Study and country	Data	Child labor definition and prevalence within sample	Income definition and relation between shock and income	Shock definition	Methodology	Results and interpretation/ mechanisms
	316,000 children.					significant only for girls. Negative rainfall shocks ⇒ no significant effect on education. *Interpretation/mechanisms*: Income effect dominates in positive shocks, substitution during drought. Droughts significantly reduce demand for adult labor for both men and women, and ultimately for children. NREG creates an opportunity cost against human capital accumulation, absorbing women and children into the informal labor market.
Nordman et al. (2022) India Rural	Panel data, 2 waves: 2004/05 and 2011/12. 46,225 children.	Children aged 5–16. Binary indicators for children engaging in farm work, paid work, family business. Rate of children engaging in any work: 21%.	Test rainfall deviation ⇒ agricultural productivity; positive rainfall shock ⇒ productivity of main crops increases.	Rainfall shock: deviation of rainfall during 12 months preceding the survey from long-term average (*continuous*).	Panel regressions with survey month-year FE and household FE.	*Effects on child work*: 10% increase in rainfall ⇒ likelihood of child work on farm increases by 17% over sample mean; no effect on participation in wage work; likelihood of ana child work increases by 14.5% over sample mean. *Education*: 10% increase in rainfall ⇒ education expenditure decreases by 2.3%. *Interpretation/mechanisms*: Substitution effect of rainfall exceeds the income effect. Various heterogeneity tests show that land ownership and access to credit increase the effect of positive rainfall shocks on child work, suggesting that productivity-enhancing investments can have a perverse effect on children.

TABLE 1 (Continued)

Study and country	Data	Child labor definition and prevalence within sample	Income definition and relation between shock and income	Shock definition	Methodology	Results and interpretation/ mechanisms
Nguyen et al. (2020) Cambodia Rural	Panel data, 2 waves: 2013 and 2014. 567 HH.	Children aged ≤15. *Binary* indicator for any children in HH in employment. Rate of HH with children in employment: 9%.	Test floods ⇒ total and food consumption fall; no effects of droughts. Consumption not included as control in regressions of shocks on child work.	Various shocks: droughts, and flood experienced in last 12 months (*binary*).	OLS with HH and village controls. Checks with random and FE models.	*Effects on child work*: Droughts ⇒ likelihood of child work increases by 0.03 pp. Floods ⇒ no significant effect. *Education*: Floods and livestock disease ⇒ education expenditure falls. *Interpretation/mechanisms*: Income effect dominates in droughts. Shocks which affect multiple HH at the same time reduce the ability to rely on other risk-sharing mechanisms beyond child labor.
Trinh et al. (2020) Vietnam Rural	Panel data, 3 waves: 2006/07, 2009, 2013/14. 3000 children.	Children aged ≤15. *Continuous* measure: hours of agricultural and non-agricultural work, HH chores in last 14 days. *Binary* indicator for child employment or HH chores. Rate of agricultural and non-agricultural work 10%; HH chores: 50%.	Include HH wealth as control in regressions of child work on shock.	Rainfall shock: negative and positive rainfall deviation 3 months before interview from long-term (15 year) mean at commune level (*continuous*).	Panel data with child and time FE; Tobit model for work intensity.	*Effects on child work/by gender*: 1 *SD* increases in rainfall ⇒ likelihood of child work in agriculture increases by 1.2% (for boys 1.7%, while for girls 0.8%); no effect on non-agricultural work; likelihood of HH chores increases by 0.4%. Intensive margin: increase in time spent on work and HH chores. *Interpretation/mechanisms*: Effects are small at extensive and intensive margin, children's time is relatively inelastic. Substitution effect dominates.

TABLE 2 Climatic shocks: Natural disasters.

Study and country	Data	Child labor definition and prevalence within sample	Income definition and relation between shock and income	Shock definition	Methodology	Results and interpretation/ mechanisms
Baez et al. (2017) Guatemala Urban and rural	Repeated cross-sections, 2 waves: 2006 and 2011. 21,623 children.	*Children aged 7–15. Binary* indicator for child employment or HH chores. Rate of children in employment within sample: approx. 29%.	Test hurricane shock ⇒ consumption decreases by 7.7%; food expenditure decreases by 12%, poverty increases by 16% in urban areas. Consumption not included as control in regression of child work on shock.	Whether a municipality was affected by tropical storm, i.e., rainfall at least 2 *SD* above or below long-term (1980–2010) mean (*binary*). Alternative measure: low, medium, high intensity rainfall deviation, positive or negative, from long-term mean (*categorical*).	Pooled cross section, DiD estimation.	*Effects on child work*: Excessive rainfall shock ⇒ likelihood of child work increases by 11% (in rural areas 13%). *By age/gender*: Child work increase is strongest for boys aged 12–15 years. *Education*: Excessive rainfall shock ⇒ school participation decreases by 2.2 pp (2.7%). *Interpretation/mechanisms*: Urban HH overall more vulnerable to the disaster, as they experienced the strongest shocks; possibly also because HH in rural areas have adapted using children's labor as a coping mechanism.
Caruso (2017) 15 Latin American countries	Cross-sections of national census data, varying number of	*Children aged ≤ 16. Binary* indicator for child	Test effects of natural disaster on unemployment and wealth. Unemployment and	Natural disaster within district: 10 or more people died, or >100 people were affected, or affected country	DiD estimation, incl. district, gender, and cohort FE and regional time-trends.	*Effects on child work*: Parents affected by disaster ⇒ likelihood of child work increases. Fathers affected by disaster ⇒ no effect on child

TABLE 2 (Continued)

Study and country	Data	Child labor definition and prevalence within sample	Income definition and relation between shock and income	Shock definition	Methodology	Results and interpretation/ mechanisms
Rural and urban	waves for different countries, 1900–2000. 528,790 child-level obs.	employment. Varying rates of children in employment depending on country.	wealth not included as controls in regression of child work on shocks.	declared a state of emergency or called for international assistance (*binary*). Alternative: disaster intensity—share of people affected or killed, or damage in USD (*continuous*); "large disasters" defined as affecting more than average individuals for the type of disaster (*categorical*).		work. Mothers affected by flood, earthquake, landslide or volcano while pregnant, or by tropical cyclone or landslide during (pre-) school age ⇒ likelihood of child work increases. *Education*: Parents affected by large disasters during childhood ⇒ total years of education decrease, effect is stronger when child is exposed in utero. Effect stronger from mother's exposure than father's exposure. *Mechanism/Interpretation*: Disaster leads to reduced education of mothers and loss of wealth.

Abbreviations: DiD, Difference-in-Differences; FE, fixed effects; HH, household; pp, percentage point; *SD*, standard deviation.

short-term climatic shocks can have long-lasting and even intergenerational effects (Caruso, 2017; Shah & Steinberg, 2017).

4.2 | Shocks to agricultural production

Agricultural production volatility is another source of significant uncertainty for many poor households around the world, but as in the case of climatic shocks, most of the evidence has historically focused on their effect on other types of child outcomes, such as education (Jensen, 2000). In this category, we identify eight relevant peer-reviewed studies, one already mentioned in the previous section, Nguyen et al. (2020), that fulfilled our selection criteria. Seven of them focus on Sub-Saharan Africa and one on Asia (Table 3).

These studies demonstrate that negative shocks on agricultural production (crop loss) generally result in increased use of child labor, thus with a predominance of the income effect, but sometimes the same happens with positive productivity shocks that improve agricultural techniques and thus the value of child labor, as per the substitution effect. The identification strategy for these articles looking at positive productivity shocks, however, is still in its infancy, with ample scope for future research to inquire into these effects further and to use dataset that span longer time periods. This literature suggests a possible role for policy interventions to improve buffers for farmers against adverse shocks and market functioning, for example reducing agricultural labor market frictions for temporary adult workers, as already suggested within the rainfall literature. Also, any initiative encouraging technological innovation and the adoption of agricultural practice climate-smart and that reduce the spread of pests and weeds should carefully consider any possible spillover to children in cases where these techniques are labor-intensive.

4.3 | Family shocks to income earners

Any unexpected event that affects income-earning family members can have severe repercussions on children. Health shocks and unexpected parental death are particularly topical in the context of emerging pandemics that can swiftly reach entire regions of the world. Like unexpected illness, the departure of a family member emigrating away from the household or the unforeseen job loss of a key adult member of the family may affect the informal workload allocation, decision-making processes, and the budget available, among other things. In this category, we identify 10 relevant peer-reviewed studies—one by Nguyen et al. (2020) already mentioned in the previous Section 4.1 on weather and Bandara et al. (2015) in Section 4.2 on agricultural shocks—that fulfill our selection criteria. Four of these analyze countries in Sub-Saharan Africa, one Latin America, while the other five focus on Asian countries (Table 4).

The papers reviewed in this section almost unambiguously find that an adverse event affecting a family member (typically mother or father) increases child labor, indicating a general predominance of the income effect. The only hint of substitution effect is found in Dinku et al. (2018), with maternal illness reducing child employment, especially for girls, but still accompanied by an increase in household chores. Almost all papers work with binary indicators on whether any family member was affected by a shock (illness, unemployment, death). The only exception is Liu (2016), who works with a continuous variable of the number of days of sickness. The large majority of papers which rely on binary indicators hence do not distinguish

TABLE 3 Agricultural shocks.

Study and country	Data	Child labor definition and prevalence within sample	Income definition and relation between shock and income	Shock definition	Methodology	Results and interpretation/ mechanisms
Beegle et al. (2006) Tanzania Rural	Panel data, 4 waves: 1991–94. 800 HH, 5591 child obs.	*Children aged 7–15. Continuous* measure of child work: hours spent in different types of agricultural work and HH chores. Rate of child work: 91%.	Test effect of crop loss ⇒ decrease in asset holdings. Control for land holding, other asset holdings interacted with shock in regression of child work on shock.	Crop loss due to insects, rodents, and other calamities such as fire (*binary*).	Panel regressions with wave and season FE	*Effects on child work*: Crop loss ⇒ hours worked increase by 30% (6 h/week). Asset holding (even though positively associated with child labor) absorbs up to 87% of the shock effect on child work. *Effects on education*: Crop shock ⇒ school enrollment decreases by 20 pp (70% decrease), effect is offset by asset holding. *Interpretation/mechanisms*: HH use assets both as buffer stocks and as collateral for borrowing. Poorer HH use assets as buffer stock, whereas wealthier HH tend to use assets as collateral to take loans when hit by shocks.
Bandara et al. (2015) Tanzania Rural and urban	Panel data, 2 waves: 2008/09, and 2010/11. 3755 children.	*Children aged 7–15. Continuous* measure of child work: hours spent in paid employment, family business, family farming, HH chores. Mean child work: 62 h/month.	Parental education used as proxy for income. Parental education, HH land value, assets included as control in regressions of child work on shocks.	Crop loss (HH losing any of its crops after harvest) between survey round 1 and 2 (*binary*).	Panel regressions with season and region FE	*Effects on child work/by gender*: Crop shock ⇒ hours worked in agriculture increase by 7 h/ month (22%), hours worked on HH chores increase by 3.5 h/ month (36%), wage work decreases by 3.5 h/month (by 3.8 h [17%] for boys and by 3.3 h [16%] for girls). *Effects on education*: Crop loss ⇒ school drop-out increases significantly for girls but not for boys. *Interpretation/mechanisms*: HH asset holdings increase rather than attenuate the effect of agricultural shocks on children's work hours. Having access to a bank account acts as a buffer against shocks.

(Continues)

TABLE 3 (Continued)

Study and country	Data	Child labor definition and prevalence within sample	Income definition and relation between shock and income	Shock definition	Methodology	Results and interpretation/ mechanisms
Kazianga and Makamu (2017) Burkina Faso Rural	Pooled cross-section, 3 waves: 1994, 1998, 2003. 13,361 HH obs.	*Children aged 7–15. Binary* indicator for child employment, and farm work only. Rate of children in employment within sample: 42%.	HH being affected by policy reform to promote adoption of cotton production used as a proxy for income increase. Test effect of policy reform on HH expenditure (reform leads to expenditure increase).	HH experiencing the option to adopt cotton production due to policy reforms (*binary*).	DiD and linear probability model	*Effects on child work/by gender*: HH affected by reform ⇒ probability of child work decreases by 23.5% for girls, driven by decrease in farm work. No effect on boys. *Effects on education*: HH affected by reform ⇒ school enrolment increases by 3.9 pp for girls, years of education increase by 0.15 years for girls. No significant effect for boys. *Interpretation/mechanisms*: Being affected by policy reform has larger positive effects on girls in terms of education increase and child labor decrease than interventions specifically designed to increase girls' enrollment.
Fontes (2020) Ethiopia Rural	Cross section, 1 wave: 2005. 1458 obs., 1000 farm HH	*Children aged 0–15. Continuous* measure of child work: number of days worked in a plot.	Test technology shock: Adopters of Soil and Water Conservation (SWC) technology => higher yields of both cereals and legumes	Adoption of Soil and Water Conservation (SWC) technology (*categorical*)	Endogenous switching regression model (IV: perceptions of soil erosion)	*Effects on child work*: Average treatment effect of SWC productivity shock ⇒ 29% increase in child work per plot, i.e., about 1.26 extra days per plot. When fewer than 3 adults in the HH, increase of 78% (3.4 days per plot). *By age/gender*: HH with large numbers of children under the age of 6 tend to use less child labor, whereas those with a larger number of children between the ages of 11 and 15 tend to use larger amounts of child labor. Older children are

TABLE 3 (Continued)

Study and country	Data	Child labor definition and prevalence within sample	Income definition and relation between shock and income	Shock definition	Methodology	Results and interpretation/ mechanisms
						likely to be preferred to carry out farm labor. *Interpretation/Mechanisms*: Impacts on child labor depend on the number of adults in the HH.
Martey et al. (2023) Ghana Rural	Cross section, 1 wave: 2016/17. 3251 farm HH	*Children aged 0–15. Continuous* measure of child work: working hours on the farm	Invasion of pests and diseases ⇒ crop and agricultural productivity losses ⇒ farm income reduction.	Crop loss due to ecological shocks of insect pest infestation and invasion of a parasitic weed	Multinomial endogenous switching regression model (MESR)	*Effects on child work*: double shocks (pests and weeds) ⇒ increase in children's on-farm working hours by 0.75 h. Weed invasion increases children's on-farm working hours by 0.05 h while pest invasion reduces children's on-farm working hours by 0.08 h. *Interpretation/Mechanisms*: an increase in children's working hours on the farm implies a trade-off between present gains and intergenerational transfer of poverty.
Miller et al. (2023) Ethiopia	Panel data, 5 waves: 2002, 2007, 2009, 2013, 2016. 2879 individuals, 10,225 obs.	*Young People aged 5–22. Binary* indicator and *Continuous* measure of child work (hours spent in farm and paid work). Mean Hours of Farm and Paid Work: 1.6 (HH with no agricultural shock) 2.5	HH wealth is examined as a potential buffer against negative impacts of agricultural shocks on child welfare. HH wealth is captured by an index based on sub-indices of housing quality, access to services, and consumer durables.	*Binary* indicator if the HH experiences agricultural shocks in the previous 5 years. *Categorical variable* 0–8 depending on the number of shocks experienced by the household	Dynamic panel instrumental variable regressions (GMM-IV). IV: lagged differences of the dependent variables for the difference equation; lagged treatment variable for the level equation	*Effects on child work*: children from wealthier households have a higher likelihood of joining agricultural labor during shocks, but the number of hours spent in labor activities of child labor is significantly lower compared to poorer households. *Interpretation/Mechanisms*: There is a substitution from hired labor to own household labor for wealthy households, but there is also a wealth cushion effect at the intensive margin.

(Continues)

TABLE 3 (Continued)

Study and country	Data	Child labor definition and prevalence within sample	Income definition and relation between shock and income	Shock definition	Methodology	Results and interpretation/ mechanisms
		(HH with agricultural shock)				
Montt and Luu (2020) Ethiopia, Kenya, Malawi, Mozambique, Tanzania Rural	Cross section, 2013. Sample: 5305 plots	*Children's age group not specified*. *Continuous* measure of child work: persons days/ha. Child work average for full sample: 34.1 person days/ha.	The second-stage of the Multiple endogenous switching regression model estimates the relationship between each conservation agriculture practice and labor and maize yield.	Adoption of conservation agriculture (*categorical*)	Multinomial Endogenous Switching Regression Models (IV: access to agri-tech information, number of government contacts, number of NGO contacts, HH distance to market).	*Effects on child work*: conservation agriculture increases farms' labor input requirements. Increases in labor requirements are in certain cases met by children, i.e., child labor increases significantly under residue retention and decreases under other CA practices
Nguyen et al. (2020) Cambodia Rural	Panel data, 2 waves: 2013 and 2014. 567 HH.	*Children aged below 15*. *Binary* indicator for any children in employment. Rate of HH with child employment: 9%.	Test effect of different shock types ⇒ no effects of crop pests or livestock diseases on consumption. Consumption not included as control in regressions of child work on shocks.	Various shocks. Livestock disease and crop pest in last 12 months (*binary*).	OLS with HH and village controls. Checks with random and FE models.	*Effects on child work*: Crop pests ⇒ no significant effect; Livestock diseases ⇒ no significant effect. *Effects on education*: Livestock disease ⇒ education expenditure decreases. *Interpretation/mechanisms*: Shocks which affect multiple HH at the same time reduce the ability to rely on risk-sharing mechanisms.

Abbreviations: DiD, Difference-in-Differences; FE, fixed effects; HH, household; pp, percentage point; *SD*, standard deviation.

TABLE 4 Shocks to family members.

Study and country	Data	Child labor definition and prevalence within sample	Income definition and relation between shock and income	Shock definition	Methodology	Results and interpretation/ mechanisms
Alam (2015) Tanzania Rural	Panel data, 5 waves: 1991–1994 and 2004. 800 HH.	*Children aged 7–15*. *Continuous* measure: hours spent working, broken down by employment and HH chores. Rate of children working: 91%.	Test effects of shock on HH income, consumption expenditure, value of HH savings/cash holdings and livestock owned. Income not included as control in regressions of child work on shocks.	Mother's or father's illness (at least 1 day unable to conduct usual activities) last 4 weeks (*binary*).	Panel regression with child and survey round FE	*Effects on child work/by age group*: Father illness ⇒ child work not affected globally, but employment for children aged 14–15 increases. Mother illness ⇒ child employment increase by 11% (2 h/week), mainly driven by increase in HH chores. *By gender*: no differences by child's gender. *Education*: Father illness ⇒ school attendance falls by 4.3 pp (5%), educational attainment long-term fall. Mother illness ⇒ no effect. *Interpretation/mechanisms*: Father's illness decreases consumption expenditure but has no effect on children's time allocation; effect on school attendance goes through income channel.
Bandara et al. (2015) Tanzania Rural and urban	Panel data, 2 waves: 2008/09, and 2010/11. 3755 children.	*Children aged 7–15*. *Continuous* measure: hours spent in paid employment, family business, family farming, HH chores. Mean child work: 62 h/month.	Parental education used as proxy for income. Parental education, HH land value, assets included as control in regressions of child work on shocks.	Death of a family member between survey round 1 and 2 (*binary*).	Panel regressions with season and region FE	*Effects on child work*: Sudden death of a family member ⇒ total hours worked increase by 24 h/month for boys (35% increase), but not for girls; effect on boys is driven by increase in agricultural work, no effects on other types of work. For girls, death ⇒ HH chores decrease by 4 h/month (40% decrease).

(Continues)

TABLE 4 (Continued)

Study and country	Data	Child labor definition and prevalence within sample	Income definition and relation between shock and income	Shock definition	Methodology	Results and interpretation/ mechanisms
						Asset ownership decreases average level of child work but increases hours worked after shock. *Education*: No effect on school drop-out.
Dinku et al. (2018) Ethiopia Rural and urban	Panel data, 2 waves: 2006 and 2009. 2269 children (in two age cohorts).	*Children aged 5–16*. *Continuous* measure: h spent on employment, HH chores, play, schooling (through time diary). *Binary* indicator. Rate of children in paid employment: 30% in first wave, 43% in second wave.	Test effect of parental illness on HH expenditure (paternal illness ⇒ non-food expenditure decreases by 15%). HH wealth included as control in regressions of child work on shocks.	Mother's or father's serious illness in last 3 years (*binary*).	Panel regressions, Poisson-model, with child and year FE	*Effects on child work*: Maternal illness ⇒ children's time spent on HH chores increases by 30%, time in employment decreases by 17% (no effect on schooling). Paternal illness ⇒ child time in employment increases by 28% (schooling time decreases by 9%; no effect on other play time and HH chores). *By gender*: Effects on boys: paternal illness ⇒ time in employment increases by 29% and schooling time decreases by 14% decrease; no effects on girls. Effects on girls: maternal illness ⇒ time spent on HH chores increases by 31% and time in employment decreases by 34%. Effects on prevalence of child labor: Maternal illness ⇒ child labor increases by 13 pp for girls, by 5 pp for boys. Paternal illness ⇒ child labor increases by 7 pp for boys.

TABLE 4 (Continued)

Study and country	Data	Child labor definition and prevalence within sample	Income definition and relation between shock and income	Shock definition	Methodology	Results and interpretation/ mechanisms
						Interpretation/mechanisms: Parental illness affects HH welfare through children's time re-allocation, especially mothers' illness affects girls' time spend on HH chores, independent of an income channel.
Vreyer and Nilsson (2019) Senegal Rural and urban.	Panel data, 2 waves, 2006/07 and 2010/11. 6496 children.	*Children aged 6–17*. *Continuous* measure: hours spent on HH chores. *Binary* indicators for current child employment and HH chores, and whether child has ever been employed. Rate of children currently in employment: 18% in first wave, 24% in second wave.	Summary statistics of different coping mechanisms: most HH deal with shocks reducing consumption. Not controlled for in analysis of shock on child labor.	Death of adult in the HH, broken down by relationship to child (*binary*).	Panel regressions with time and child FE	*Effects on child work/by gender*: Adults' death ⇒ increase in employment and HH chores. For girls: death of a female adult ⇒ increase in time spent on HH chores by 10 h/week. For boys: death of a male adult ⇒ increase in probability of employment by 27 pp. HH chores among boys increase only if their direct caregiver died, girls' HH chores increases independent of the relationship to the deceased adult. *Education*: death of any adult in the HH ⇒ no effect measured; but death of a main caregiver of the child ⇒ strong adverse effect on schooling. *Interpretation/mechanisms*: burden of adult deaths, at least in a context of frequent polygamy and large extended HH, is very heterogenous

(Continues)

TABLE 4 (Continued)

Study and country	Data	Child labor definition and prevalence within sample	Income definition and relation between shock and income	Shock definition	Methodology	Results and interpretation/ mechanisms
						and depends on the child's relationship with the deceased adult; children whose main caregiver dies face a high risk of withdrawal from school and increased employment.
Duryea et al. (2007) Brazil Urban	Panel data (rotating sample): 1982–1999. >100,000 children.	*Children aged 10–16. Binary indicator* for child employment. Rate of children in employment in 1982: 20% for boys ≥14, 10% for girls age ≥14.	Test that unemployment shock ⇒ joint husband–wife income fell an average of 69%. Not controlled for in analysis of shock on child labor.	Transition from employed to unemployed by male HH head (*binary*).	Panel regressions, probit, with cities, year and month of interview FE.	*Effects on child work*: Unemployment of male head of HH ⇒ increase in probability of entering employment and dropping out of school. *By gender*: for a 16-year-old girl enrolled and not behind at school at baseline, parents with no education, probability of entering employment increases from 24% to 36%; for boy with same characteristics, from 38% to 52%. *Education*: Unemployment of male head of HH ⇒ probability of school drop-out increases by >50%, grade failure increases by 27%, for both boys and girls, but slightly smaller effects for boys.
Mendolia et al. (2019) Vietnam Rural and urban	Panel data, 3 waves: 2004, 2006, 2008.	*Children aged 11–23. Continuous* measure: hours spent working. Binary indicators for child employment, and entry into the	Control for proxies of household wealth (house ownership, number of houses, living area,	Mother's or father's illness (unable to carry out regular activities) in last 12 months (*binary*).	Panel with child FE	*Effects on child work*: Parental illness ⇒ likelihood of entering employment increases by 4 pp, hours worked increase by 1 h/week. *By gender*: Mother's illness ⇒ larger effect, likelihood of entering

TABLE 4 (Continued)

Study and country	Data	Child labor definition and prevalence within sample	Income definition and relation between shock and income	Shock definition	Methodology	Results and interpretation/ mechanisms
	5000 children.	labor market. Rate of children in employment: 38.5%.	availability of safe water, computer).			employment increases by 5 pp, hours worked increase by 1.7 h/ week. *Education*: Parental illness ⇒ school enrolment decreases by 2.5 pp, effect is larger from maternal illness (3 pp), and effect is larger on girls than on boys.
Liu (2016) China Rural.	Panel data, 7 waves: 1993, 1997, 2000, 2004, 2006, 2009, and 2011. 4961 HH.	*Children aged 7–18*. *Binary indicator* for child employment. Rate of children in employment: 16%.	Test effect of health shocks affecting different HH members on HH income (find that health shock is absorbed by labor supply from other HH members). Income not included as control in regressions of child work on shocks.	Days of HH head's or spouse's illness during last 4 weeks (*continuous*). Test interaction between illness and access to health insurance.	First-differenced regression (equivalent to including HH FE) with county-by-year FE	*Effects on child work*: 10 pp increase in share of days of severe illness by HH head or spouse ⇒ likelihood of child employment increases by 8 pp (effect larger for older children). Effect is insignificant if public health insurance is present. *Education*: 10 pp increase in share of days of severe illness by HH head or spouse ⇒ school enrolment decreases by 6 pp. *Interpretation/mechanisms*: HH respond to illness shocks by taking children out of school and increasing HH labor supply, including through child employment. Total HH income and consumption are fully insured against health shocks through HH labor supply; even without access to health insurance.

(Continues)

TABLE 4 (Continued)

Study and country	Data	Child labor definition and prevalence within sample	Income definition and relation between shock and income	Shock definition	Methodology	Results and interpretation/ mechanisms
Pörtner (2016) Philippines Rural and peri-urban	Panel data, 2 waves: 1982 and 1985. 695 children.	*Children aged 8–16*. *Continuous measure*: hours spent on employment, HH chores, school and leisure. Rate of child employment: 11% (girls aged 10–13), 52% (boys 14–16).	Parental education used as proxy for income. Include land ownership and parental education as controls in regressions of child work on shocks.	Mother's or father's absence at time of the survey: deceased parents and parents who temporarily or permanently left the HH (*binary*).	Panel regressions with HH FE. Adjust for correlation across types of time use	*Effects on child work/by gender*: Absence of father ⇒ for boys, hours worked increase by almost 10 h/ week. *Education*: Absence of father ⇒ for girls, hours spent on schooling decrease by 7 h/week. Absence of mother ⇒ for girls, time spent on schooling decreases by 26 h/week. *Interpretation/mechanisms*: Results are consistent with an income effect from fathers' education; higher education level of fathers results in less time boys spend working and higher spending on education. For mothers, direction of effect on girls' time allocation depends on mother's education level: at lower education levels, opportunity cost of mother's time dominates—girls work more, study less; at higher education level, income effect dominates—girls work less and study more.
Takasaki (2020) Cambodia Rural	Cross-sectional data, 2010. 72 villages,	*Children aged 10–19*. *Continuous measure*: hours spent working, studying. Rate of	Test effect of adult disability ⇒ consumption decreases by 16%, income decreases by	Limb amputation in adults caused by landmines (*binary*).	Matching: adults with amputation matched to adults with	*Effects on child work*: Disability ⇒ likelihood of child work increases by 15%, time spent on work increases by >30% (from the control mean).

TABLE 4 (Continued)

Study and country	Data	Child labor definition and prevalence within sample	Income definition and relation between shock and income	Shock definition	Methodology	Results and interpretation/ mechanisms
	529 working-age adults, of which 87 treated.	child employment in control group: 58%	35%. Income or consumption not included as control in regression of child work on shock.		no disability in the same village.	*Interpretation/mechanisms*: Disability triggers a vicious circle of reduced work, low earnings, limited accumulation of productive assets and low human capital. This work-cum-asset channel leads to adverse intergenerational effects of disability on child schooling and child work.
Nguyen et al. (2020) Cambodia Rural	Panel data, 2 waves: 2013 and 2014. 567 HH.	*Children aged ≤ 15. Binary indicator* for any children in HH in employment. Rate of HH with children in employment within sample: 9%.	Test different shock, no effects of illnesses on consumption. Consumption not included as control in main regressions.	Illness of a HH member (*binary indicator*).	OLS with HH and village controls. Checks with random and FE models.	*Effects on child work*: Illness of a HH member ⇒ no effect on child work. *Education*: Illness of a HH member ⇒ no effect on education expenditure.

Abbreviations: DiD, Difference-in-Differences; FE, fixed effects; HH, household; pp, percentage point; *SD*, standard deviation.

between shocks of different levels of gravity and are largely blind to the causes of the health or family shock (except Takasaki, 2020, who limit their analysis to landmine accidents), and therefore miss out on any potential non-linearities or differential effects.

Several papers do examine differences in effects by the gender of the affected adult (Alam, 2015; Dinku et al., 2018; Pörtner, 2016), or their relationship with the child (Vreyer & Nilsson, 2019). All these papers find that indeed effects of shocks differ in size or even in direction, depending on whether mothers or fathers are affected, and that the effects also interact with the gender of the child, suggesting that family dynamics underlying effects of shocks to parents on children's work engagement are complex and merit further analysis.

Lastly, a weakness of several papers is that they do not sufficiently unpack the economic channel (or other mechanisms) to address the potential endogeneity of health shocks (one exception is Alam, 2015, who empirically test for endogeneity of the health variable). Some argue that the concern is addressed by including fixed effects in their regression, but this is not entirely convincing since health and unemployment situations may evolve fast and in correlation with other drivers of child labor.

4.4 | Price shocks

One of the most relevant shocks that can impact household's economic situation is a change in local food prices, in the value of the commodity that local farmers cultivate, or in other primary resources extracted locally, such as minerals. We identified 12 suitable studies that established the effect of a price shock on child labor. Two of them analyze countries in Sub-Saharan Africa, six Latin American countries, and four Asian countries. We separate those looking at the price of a specific commodity (Table 5) from the two examining more generally local prices following the 2008 global food crisis (Table 6).

Overall, the results from the price shocks literature are quite strong, since they typically can rely on highly exogenous fluctuations in international prices, matched to local spatial units with some precision. The quality of the analysis has been improving over time, with more and more precise spatial identification techniques, as shown in the case of gold mining. On average, the results show that a negative price shock that reduces the earning capacity of farmers tends to unambiguously increase child labor (pure income effect), but the effect of positive shocks depends on mediating factors like land ownership. Multiple examples in this literature show that higher agricultural prices or mineral revenues can increase child labor, with a predominance of substitution effects. Many articles also highlight how some crops are more gendered, and boys tend to absorb more of the extra farm work; however, more research is needed to confirm this trend.

4.5 | Transnational shocks

As the world economy becomes more globalized through trade, migration, investments and remittance flows, the analysis of sustainable development pathways has considered how international value chains affect the most vulnerable individuals, like children. In this literature, we identify 15 studies, with the one by Edmonds and Pavcnik (2005) for Vietnam already discussed in the price Section 4.4 and the one by Pörtner (2016) on the Philippines in the family shocks Section 4.2. Out of the remaining 13 new studies, three focus on the Indian trade liberalization,

TABLE 5 Price shocks of specific commodities.

Study and country	Data	Child labor definition and prevalence within sample	Income definition and relation between shock and income	Shock definition	Methodology	Results and interpretation/ mechanisms
Cogneau and Jedwab (2012) Cote d'Ivoire Rural	Pooled cross-section. 5 waves: 1985–1988, 1993 5299 HH, 16,978 child-level obs.	*Children aged 7–15. Binary* indicator for child employment (work in the previous 7 days). Rate of child employment: 11.7% for younger boys in cocoa HH, up to 53% for older girls in non-cocoa HH.	Test the effect of shock on consumption per capita as proxy of income; find 8–15% reduction in cocoa-producing HH. Not controlled for in main regressions.	Fall in administered cocoa price by 50%, two periods: pre-shock before 1989 and post-shock after 1990 (*binary*).	DiD with district-year or village-year FE	*Effects on child work/by age and gender*: cocoa price fall ⇒ 12–15 year-old boys are 14-16 pp more likely to work *Effects on education*: cocoa price fall ⇒ 7–11 year-old girls are 9-10 pp less often enrolled in school (same for 12–15 year old boys but less significant and robust result) *Mechanism/Interpretation*: the district and village FE absorb local effects like aggregate market effects as all cocoa farmers getting poorer or labor supply effects; returns to education are not significant in the context; thus, argue that this is a pure income shock.
Kruger (2007) Brazil Rural and small urban	Pooled cross-section. 7 waves: 1992,1993, 1995–1999. 46,402 children.	*Children aged 10–14. Binary* indicator for working at least 1 h during the previous week or in the last 12 months, either in employment outside the home or as a family worker. Rates of child work in sample: 34% for boys, 17.5% for girls.	Parental education as a proxy of income: primary education = low income, up to high school = middle income, ≥high school or more = high income. Controlled for in main regressions, with farm and business ownership. Test coffee value ⇒ positive link to county-level employment.	Fluctuations in county-level value (price times quantity) of coffee production, "coffee GDP" (*continuous*)	Probit with state-year and county FE, value of coffee always interacted with parental education	*Effects on child work/by gender*: increase of 10% in the value of coffee production ⇒ 4% higher employment probability for boys and girls in middle income HH. *Education*: an increase of 10% in the value of coffee production ⇒ school enrollment is unaffected for boys, falls by 2% for low-income girls. *Interpretation/Mechanisms*: poor boys may respond through work intensity, but not at the extensive margin. Children from better-off socio-economic strata are shielded from the potential negative labor market pull-effects of economic booms.

(Continues)

TABLE 5 (Continued)

Study and country	Data	Child labor definition and prevalence within sample	Income definition and relation between shock and income	Shock definition	Methodology	Results and interpretation/ mechanisms
Soares et al. (2012) Brazil Rural and small urban	Pooled cross-section. 9 waves: 1993, 1995–1999, 2001–2003. 26,371 children.	*Children aged 10–14. Categorical* indicator: 0 if child works exclusively (market work in previous week), 1 if works and goes to school, and 2 if only school. Robustness: work = min 15 h weekly in past year. Rates of child work only in sample: 4.25%, work and school 16.9%.	Control in main regressions for income and family wealth (hourly wage of the head of the HH, non-labor income, and ownership of various durables)	Fluctuations in county-level value (price times quantity) of coffee production per capita, "coffee GDP" (*continuous*) (collapse by 55%)	Ordered logit model with year and municipality FE, robustness with state-year trends. IV of coffee value with temperature and rainfall	*Effects on child work (transitions between work and schooling)*: 10% increase in value of coffee ⇒ 1.2% in higher probability of work only; 0.9% higher probability of work and schooling; 0.25% lower probability of schooling only. *By gender/age*: boys' transition from work and school to school only is greater than girls; no effect on older boys and girls (15–18 years old) *Interpretation/Mechanisms*: the coffee shock to the local economy, conditional on family's wealth, captures a substitution effect, and in fact the income effect is the exact opposite. The effect is particularly strong for HH with working children (usually the poorest ones) who are considering whether or not to send the children to school.
Bonilla Mejía (2020) Colombia Rural and small urban	Pooled cross-section. 2007–2011. 403,481 HH, 57,403 child-level obs.	*Children aged 10–14 (also test older age groups). Binary* indicator for work in mining and non-mining sector and number of hours worked. Rates of child work in sample: 0.001% in mining, 0.05% in non-mining.	Control for parents' education level. Test effect of gold mining on HH income (excluding income from individuals <18 years old), increase by 53%.	Interaction between gold deposits and international annual prices (*continuous*) >300% increase in 2011.	Panel with year and month FE, district specific time trends.	*Effects on child work*: price shock ⇒ reduced labor participation of children in the mining sector by −0.002-0.004 pp, similar effect on number of hours worked; no effect on probability of working in non-mining sector. *By gender*: no significant difference by gender. *Effects on education*: price shock ⇒ increases school enrolment by 1.4% in primary school, reduces drop-out rates at all school levels and increases promotion rates in

TABLE 5 (Continued)

Study and country	Data	Child labor definition and prevalence within sample	Income definition and relation between shock and income	Shock definition	Methodology	Results and interpretation/ mechanisms
						primary and lower secondary school (equivalent between genders). But negative effect on grades, reduces likelihood to enroll in college or STEM degrees. *Interpretation/Mechanisms*: only young adults between 19 and 25 are more likely to work in the mining sector. No effect through public investment, corruption or migration. But gold mining increased local violence, possibly disrupting education. Income effect dominates. Since mining is a worst forms of child labor in Colombia, could also be due to policies to deter child work in mining, but no data to confirm this.
Santos (2018) Colombia Rural and urban	Pooled cross-section, 3 census waves: 1985, 1993 and 2005. 1,741,602 children	*Children aged 10–17*. *Binary* indicator for child main activity in previous week was work. Rates of child work: pre-shock 13.5 and 14% in mining and non-mining respectively, post-shock 11.1 and 7.7%.	Test gold boom => decreases local unemployment in the short term by 3.5%. As robustness, add control for permanent income (if the household owns the dwelling) in main regressions of shock on child work.	Time dummies capturing changes in international gold price (boom post 2002) interacted with a dummy for local production of gold, to a have a gold boom shock at the census unit level (*binary*)	IV for presence of gold with water supply, interacted with price of gold. Census unit and time FE	*Effects on child work/by gender*: Gold boom ⇒ probability of child work increases by 9.3%. *Education*: Gold boom ⇒ secondary school attendance decreases by 23.9% in regions that initially produced gold, 9% increase in probability that a child is lagging three or more grades behind *Interpretation/Mechanisms*: in this commodity boom, substitution effect dominates. Results not driven by conflicts (paramilitary and a guerrilla presence) nor by migration.

(Continues)

TABLE 5 (Continued)

Study and country	Data	Child labor definition and prevalence within sample	Income definition and relation between shock and income	Shock definition	Methodology	Results and interpretation/ mechanisms
Angrist and Kugler (2008) Colombia Rural	Repeated cross-section, annual 1992–2000. 22,365 children.	*Children aged 10–16 and teenagers 13–20. Binary* indicator for paid employment and *continuous* one for hours worked. Child employment rates: 1/3 boys and 10% girls working pre-shock.	Test coca boom ⇒ increase self-employment income for adults (no effect on self-employment, employment, or wages). Not controlled for in regressions of shock on child work.	Price shock: year dummies before and after war on drugs (price more than doubled), interacted with dummy for coca growing areas (*binary*)	DiD. Department and year FE.	*Effects on child work/by gender*: Increase in value of coca ⇒ increase in teenage boys' hours of labor supply by around 2%, no robust evidence of an increase in employment rates *Education*: no robust effect on school enrollment *Interpretation/Mechanisms*: booms in unskilled-labor-intensive goods make substitution effect dominate. Especially at the intensive margin (hours worked). Higher income also increased violence in coca growing regions.
Dammert (2008) Peru Rural and urban	Repeated cross-section, three waves: 1994, 1997, and 2000. 5450 children.	*Children aged 6–14. Binary indicator for* market work (paid and unpaid) and domestic chores (>7 h/week), *continuous* for hours of work.	Test that poor and middle-income children (proxy: parental education) more likely to do market work post shock. No change in expenditure. Control for land ownership as a robustness check.	Coca price shock: time dummies around war on drugs (price reduced below production costs), interacted with dummy for coca growing areas (*binary*)	DiD, with state FE.	*Effects on child work/by gender*: Decrease in coca price⇒ child market work increase by 18%–40%, hours worked rose by 2–2.5 h/week. Domestic chores rose by 13%–21%, 28% for girls and 13% for boys (hours increased for boys by 4.1–5.1, for girls 3.3-4 h/week) *Education*: price shock ⇒ no effect on schooling outcomes. *Interpretation/Mechanisms*: Mostly through increases in agricultural work (96% of children are non-remunerated workers on family farm).

TABLE 5 (Continued)

Study and country	Data	Child labor definition and prevalence within sample	Income definition and relation between shock and income	Shock definition	Methodology	Results and interpretation/ mechanisms
Beck et al. (2019) Vietnam Rural	Panel, 5 waves 2006–2014, 2355 household-year obs. for coffee growing HH, 12,763 child level obs.	*Children aged 6–14. Binary* indicator for wage employment, work on HH farm, and HH chores in previous year. Initial child work rates: 1% wage work, 20% agricultural, 41% HH chores.	Test international coffee price increase ⇒ increases coffee revenue, real expenditure and assets	Price shock: international coffee price (average of previous 12 months) interacted with coffee growing regions (*continuous*)	DiD with month-year and individual FE	*Effects on child work*: One standard deviation decrease in international coffee prices (lower coffee revenue by 13%) ⇒ child farm work increases by 16.8%. No effect on chores. *By age*: negative price shock ⇒ adolescents aged 15–20 are 18.5% more likely to undertake wage work, 11.7% less likely to do agricultural work. *Education*: no effect on participation or school attainments. *Interpretation/Mechanisms*: cope with price decline with more adult and adolescent wage labor (wage work is counter-cyclical with coffee prices) and children substituting adults in the farm. Income effect dominates.
Edmonds and Pavcnik (2005) Vietnam Rural	Panel, 2 waves, 1992–93, 1997–98. Around 3000 HH with 4441 children	*Children aged 6–15. Binary* indicators for child work: ≥7 h/week in HH production or wage employment, agriculture, family business in past 7 days. *Continuous*: total h worked. Child work rates: 60% children working pre price shock, average 13.3 h/week	Landowners reduce child labor following positive price shock (land used as instrument for rice production).	Price shock: real price of a kg of rice deflated by the consumer price index, measured at community level (*continuous*)	Linear probability model with community, year, and season FE	*Effects on child work*: Increase in rice price of rice by 30% ⇒ 9 pp decline in child work. Accounts for 45% of the decline in child labor in the early 90s. Agricultural work, HH production and market work decline significantly for net rice producers. *Interpretation/Mechanisms*: net consumers of rice increase child work with higher prices, net producers reduce it (even if they are not wealthier overall). Income effect dominates.

(Continues)

TABLE 5 (Continued)

Study and country	Data	Child labor definition and prevalence within sample	Income definition and relation between shock and income	Shock definition	Methodology	Results and interpretation/ mechanisms
Danzer and Grundke (2020) Tajikistan Rural	Panel 2 waves, 2007, 2011. 11,238 child level obs.	*Children aged ≤17. Binary* indicator for child work in agriculture. Base year, 3% of children child work	Agricultural wages of female laborers in cotton regions increased strongly, no wage or employment effect in non-cotton growing regions.	Price shock: time dummy before and after the cotton price shock (doubling) interacted with geographic variation in cotton cultivations (*binary*)	DiD with individual and interview month FE.	*Effects on child work/by gender*: Cotton price shock ⇒ increases in agricultural child work by 2 pp (67%) both for boys and girls (less significant for boys). *Interpretation/Mechanisms*: Doubling of cotton world price and 40% increase in production in the country led to female adult wage increases only in small businesses. Child work increased in areas dominated by large parastatal companies and not significant in small farms. Indicates labor coercion and not substitution of female adults with children.

TABLE 6 Aggregate price shocks.

Study and country	Data	Child labor definition and prevalence within sample	Income definition and relation between shock and income	Shock definition	Methodology	Results and interpretation/ mechanisms
Frempong and Stadelmann (2019) Uganda Rural and urban	Panel data, 3 waves: 2009/2010, 2010/2011, 2011/2012. 8286 child level obs.	*Children aged 5–14.* *Binary* indicator for child engaged in any paid or unpaid economic activity and number of hours worked (recall from previous 8 days). Rate of child employment in the sample: 31%, average number of hours of work: 2.94	Control in main regressions for total expenditure, asset index, land ownership as proxies for income/ poverty. Test for mediating effect of land ownership interacted with food price shock.	An almost 50% average increase in market level consumer price index, then measured at different times in different regional market levels (*binary*)	Panel with child, season and year FE; IV using international food prices to instrument for local food prices.	*Effects on child work*: 10% rise in food prices ⇒ children 8 pp more likely to work and about a 1.6-h increase in number of hours. *By age*: Larger effect higher for older children (11–14 year-olds) *By gender*: Larger effect of price changes on probability of child work for boys, but on the number of hours worked for girls (boys tending to engage in commercial activities while girls usually perform domestic chores which may require more time) *Interpretation/ Mechanisms*: children in landowning HH are less affected, even if on average they start from higher levels of child work. For them land

(Continues)

TABLE 6 (Continued)

Study and country	Data	Child labor definition and prevalence within sample	Income definition and relation between shock and income	Shock definition	Methodology	Results and interpretation/ mechanisms
						ownership buffers from the shock (it is even possibly a positive shock).
Hou et al. (2016) Pakistan Rural and urban	Panel, 2 waves, 2008 and 2010. 9324 child level obs.	*Children aged 10–14. Binary* indicator for child work (at least 1 h in previous month). 7% working children at baseline, 14% after shock.	Test wealth status: shock interacted with HH asset quintile. Children in HH with agricultural lands not affected by higher food prices.	Price shock: change in district level wheat prices (*continuous*) or self-reported food price shock following doubling of global food prices (*binary*)	Linear probability model with individual and year FE	*Effects on child work/by gender*: 100% food price increase ⇒ increase probability child work, esp. for girls in the lowest wealth quartile (24 pp), and rural areas. *Education*: A 100% increase in food (wheat) price decreased the probability of school enrolment by up to 12 pp (HH in lowest wealth quartile), less for wealthier HH. Driven by boys (19 pp fall) and rural. *Interpretation/ Mechanisms*: Girls substitute idle time with work. Landowning

TABLE 6 (Continued)

Study and country	Data	Child labor definition and prevalence within sample	Income definition and relation between shock and income	Shock definition	Methodology	Results and interpretation/ mechanisms
						agricultural HH unaffected by higher food prices because they consume self-produced foods and/or sell their products for a higher price in the market; landless ones increase child work.

Abbreviations: DiD, Difference-in-Differences; FE, fixed effects; HH, household; pp, percentage point; *SD*, standard deviation.

one on Brazil trade liberalization with China, one on El Salvador and the financial crisis both on trade flows and remittances; all others—five on East Asia, two on Latin America and one on North Africa—focus on remittances (Table 7).[9]

The existing evidence on transnational income shocks shows a range of heterogeneous effects. When a negative trade shock reduces income, we see evidence of increasing child labor, no changes, and even reductions in child labor (in child-labor intensive crops), while a positive trade shock only reduces child labor. For increases in remittances, we also have evidence of a variety of effects (positive, insignificant, and negative) on child labor, depending on whether the parental absence is compensated by the monetary inflow. Reductions in remittances, however, generally increase child labor, showing a dominance of the income effect. More evidence is needed on the national or international origin of remittances, which as discussed by some of these studies (e.g., Binci & Giannelli, 2018), can give important insights in the trade-off between losing a family member and receiving extra income, with potentially exposure to exchange rate fluctuations in the case of international remittances. Migration may also lead to disruption and to the restructuring of roles in the household, increasing non-migrant household members' domestic workload, which increases the opportunity cost of their schooling.

A further channel which has not been examined by existing studies is that of outsourcing, which as it is often driven by the search from cheap unskilled labor could possibly create further demand for child workers. Future research of trade liberalizations could shed light also on this type of transnational effect.

4.6 | Summary of results

The evidence reviewed in the previous sections shows significant heterogeneity in measurements, samples, and methodologies applied by the empirical literature to assess the effect of income-related shocks on child work. Consequently, it is hard to extrapolate a single "big picture" result regarding the dynamics of the evidence, and we must be cautious in drawing comparisons across studies that apply to such different contexts.

However, one pattern worth examining further is the procyclicality or countercyclicality of child work relative to the direction of the income change generated by the shock. Table 8 illustrates how different shocks impact child labor following a negative income shock, and Table 9 the case of positive income shocks. While under adverse conditions child labor increases in most circumstances (thus indicating a predominance of the pure income effect), also with favorable income shocks we observe in more than half of the studies an increase in child labor (thus indicating a predominance of substitution effects).

A key takeaway of this review is therefore that the relationship between shocks and child labor is generally not unidirectional. When a shock causes a decline in a household's income, in most circumstances child labor rises to compensate as a buffer for the financial distress experienced by the family. However, if income increases, only in some cases does child labor decline as the family can afford to keep children in school: we actually find more articles indicating that a positive income shock increases child labor, plausibly by increasing the productivity of children's work, as in the rainfall-drought literature or in the case of agricultural productivity increases. While this result may seem counterintuitive, it is well understood in the context of a tension between pure income effects—getting richer lifts families out of poverty, making child labor no longer a necessity—versus substitution effects—the value of child labor increasing with new income opportunities.

TABLE 7 Transnational shocks.

Study and country	Data	Child labor definition and prevalence within sample	Income definition and relation between shock and income	Shock definition	Methodology	Results and interpretation/ mechanisms
Edmonds et al. (2010) India Rural	Repeated cross section: 2 waves: 1987/88 and 1999/2000. 95,488 child level obs.	*Children aged 10–14. Binary* indicator for work if child principal activity is salaried/ wage employee, casual wage laborer, begging, work in a HH enterprise/farm, or domestic work. Rates of child work in sample: 24.6% work only and 25% work and attend school pre trade-reform.	Loss of tariff protection causes a relative rise in poverty: test that tariff declines attenuate poverty reduction and agricultural wage gains relative to the national trends	Changes in district level employment based on exposure to national tariff rates (*continuous*)	Include a post-reform (i.e., survey round) and district FE. IV of district tariff using district tariff on traded good. Time trends.	*Effects on child work/by gender*: tariff shock ⇒ increase in domestic work (both genders), no other types of work. Girls disproportionately bear the burden of helping their families cope with poverty: increases in work without schooling are largest for girls. For boys, higher poverty is associated with more market work, but for girls less market work. *Education*: larger tariff declines in a district are associated with lower schooling attendance relative to national trends. Average district tariff decline (0.055) associated with a 2 pp decline in schooling. *Interpretation/Mechanisms*: not due to declines in the returns to education, more schooling costs. Gender differences in poverty elasticity of time use.
Ajefu (2018) India Urban and rural	Repeated cross-section, two waves: 1987/88 and 1999/2000. 16,867 child level obs.	*Children aged 5–14. Binary* indicator if the child's work as principal activity and does not attend school (i.e., "work only"). Child work rates: 15%.	Test in main regression effect of tariff shock on paternal income and then on child labor (not reduced form)	Variation in industrial variation and intensity of exposure to India's 1991 trade liberalization (*continuous*)	IV paternal income with parents' industry tariff cut. District and industry FE	*Effects on child work/by gender and age*: Tariff shock in paternal industry (positive income shock)⇒ decline in the probability of child work by 1 pp for work only. Domestic work falls by 4 pp (driven by girls almost 5 pp decline in work only and older children, insignificant for 5–9 years old children). *Education*: Tariff shock in paternal industry (positive income shock) ⇒ Increase in probability of schooling by 6.7 pp. (3.2 for boys, 6.4 for girls). *Interpretation/Mechanisms*: Income effect dominates

(Continues)

TABLE 7 (Continued)

Study and country	Data	Child labor definition and prevalence within sample	Income definition and relation between shock and income	Shock definition	Methodology	Results and interpretation/ mechanisms
Bai and Wang (2020) India Rural	Repeated cross section: 2 waves: 1987/88 and 1999/2000. 95,488 children.	*Children aged 10–14. Binary* indicator for market work or domestic work. Define child-labor intensity of crops: number of work days for adults and children. Child work constitutes 2.4% of HH total labor inputs	Model theoretically income and substitution effect arising from changes in returns to child labor. Not controlled for in the regressions.	1991 Indian trade liberalization leading to variation in tariff rates across crops and districts (*continuous*)	Separate regressions for child-labor and adult-labor intensive crops. Control for HH characteristics, district FE, and time FE (post-reform dummy).	*Effects on child work/by gender*: tariff cut ⇒ no effect on market work, increase domestic work (esp. for girls). Schooling elasticities with respect to returns to child labor is −0.86. *Effects on education*: tariff reduction ⇒ increase schooling, but tariff declines for adult labor-intensive crops decrease schooling by 1 pp, while for child labor-intensive crops increase schooling by 0.5 pp (relative to the national baseline). *Interpretation/Mechanisms*: returns to adult versus child work matter: when tariff shock hurts adult crops, income effect dominates; when child-labor intensive crops, substitution effect dominates.
Figueiredo and Lima (2022) Brazil Urban and rural	Repeated cross-section, 2 waves: 2000–2010. 411 micro-regions observations	*Children aged 5–14. Continuous* indicator: percent change of region's child-labor rate between 2000 and 2010. Child-labor rate is the regions' children percentage that work seven or more hours per week	Test poverty, captured by the percent change of region's poverty rate between 2000 and 2010, as a mechanism of trade-induced economic shocks to child labor.	Grater trade integration with China over the 2000–2010 period, resulting in import and export shocks	Mediation model with IV estimated with 2SLS. Instrument: variation on imports, exports & net imports between China and other countries, excluding Brazil	*Effects on child work*: import shocks are associated with more child labor whereas export shocks are associated with less child labor *Interpretation/Mechanisms*: In exporting regions, the *China trade shock* reduced poverty and in turn child labor, but in the importing regions the *China trade shock* increased poverty and in turn child labor. The findings support some assumptions of the luxury axiom, which suggests that trade-induced income shocks are expected to increase child labor if such shocks increase poverty.
Duryea and Morales (2011) El Salvador	Repeated cross-section, 2000–2008. 102,986 child level obs.	*Children aged 10–16. Binary indicators* for child employment. Just below 15% of children were employed pre-shock.	Test shock ⇒ increase multidimensional poverty ratio, 5 indicators of deprivation. Not	Financial shock: pre and post international financial crisis (*binary*)	Linear probability model with FE of age, gender, states with a time trend.	*Effects on child work*: The financial crisis increased child work by 2 pp. *By age/gender*: Results on child work significant for boys but not for girls.

TABLE 7 (Continued)

Study and country	Data	Child labor definition and prevalence within sample	Income definition and relation between shock and income	Shock definition	Methodology	Results and interpretation/ mechanisms
Urban and rural			controlled for in regression.			*Education*: The financial crisis decreased school attendance by 2.1 pp for children 10–16. *Interpretation/Mechanisms*: Following the adverse financial shocks, income effect dominates.
Theoharides (2020) Philippines Urban and rural	Panel, 2 waves, 1993 and 2009. 77 provinces, 529,217 individuals (adults)	*Children aged 5–12 and children aged 13–15*. Child labor rate is defined as children working for at least 1 h/week divided by the province population in age group. *Continuous*. Child Employment Rate: Ages 5–12: 3.3%, Ages 13–15: 16.4%.	Test that migration restriction to the Philippines ⇒ reduced remittances and in turn HH income and expenditure	Time dummy for post Japanese migration ban interacted with district level overseas migration rates (*continuous*)	DiD with a continuous treatment variable (the child labor rate), province and year FE	*Effects on child work*: In provinces most affected by the Japanese migration ban, lower remittances = 2.8% higher rates of child work (141 more children engaged in at least 1 h of work per week). *By age/gender*: Effects larger for older children (13–15) and for boys, but significant also for girls and 5–12 years old. *Interpretation/Mechanisms*: Households may force children to engage in employment to compensate for lost overseas wages (income effect dominates).
Yang (2008) Philippines Urban and Rural	Panel 1997–1998. 4 waves of quarterly data. 1646 HH	*Children aged 10–17*. Average hours worked in the past week (*continuous* variable). Mean hours: 1.1 in the initial period.	Test significant effect of positive exchange rate shock ⇒ increase in value of remittances	Positive income shock from foreign currency appreciation in recipient, following 1997 Asian financial crisis (*continuous*)	First-differenced regression, to include HH FE, and year FE.	*Effects on child work*: One *SD* increase in the exchange rate ⇒ decline in child work hours of 0.35 in the previous week *Education*: One *SD* increase in the exchange rate shock is associated with 1.6 pp increase in the likelihood of being a student *Interpretation/Mechanisms*: income effect dominates
Xu (2017) China Rural	Panel 1997–2011. 7226 child-year obs.	*Children aged 6–18*. Child work: participation (*binary*) and h/day (*continuous*) in wage labor, housework and agriculture. Children in agriculture (6%), in housework (22%), waged labor (2%) and spend 0.21 h/	Assume rural HH left behind always receive remittances, thus some "income effect" exists. But test labor effect on left-behind spouse, always increases.	Father emigration shock (*binary*)	Panel with individual and time FE, IV for migration with rural–urban (i.e., by education level) wage gap	*Effects on child work/by gender*: Father emigration = 43% increase in the participation of boys in wage work, about 3 more hours/day on wage labor compared to the children in non-migrant families. Less significant increase in agricultural work, both for boys and girls.

(Continues)

TABLE 7 (Continued)

Study and country	Data	Child labor definition and prevalence within sample	Income definition and relation between shock and income	Shock definition	Methodology	Results and interpretation/ mechanisms
		day in agriculture, 0.18 h/ day in housework, 0.14 h/ day in wage labor.				*Interpretation/Mechanisms*: substitution effect cancels out any income benefit from remittances, but in the case of boys, substitution dominates and they work more.
Nguyen and Nguyen (2015) Vietnam Urban and rural	Panel, 2 waves, 2006 and 2008. 21,232 children	*Children aged 6–18*. Child work: *binary* variable indicating whether children and adolescents had to work for economic activities during the past 12 month; number of annual working hours (*continuous*). Remittance recipients: average 140 h/year child work. Non-recipients: 222 h/ year.	Remittances account for accounting for around 30% of HH income. Richest income quintiles and urban HH receive higher income from remittances.	Receipt of international and national remittances (*binary*)	Panel with individual FE. Linear probability models for child work and education (outcome variables are binary); FE	*Effects on child work/by gender*: Remittance shocks ⇒ No aggregate effect on child work, but slight reduction in hours worked yearly for boys from *national* remittances. *Education*: International remittances: increase the number of completed grades by 0.11, around 2% of the average completed grade for children (not adolescents). *Interpretation/Mechanisms*: the distance of the emigrant family member matters for the overall effect. Income effect dominates for children with nationally emigrated relatives.
Binci and Giannelli (2018) Vietnam Urban and rural	Panel (two waves): 1992/93 and 1997/98. 2054 HH	*Children aged 6–15*. Child work: % of children in the HH who do some work (paid or unpaid), *continuous*. 6% of boys and 8% of girls "working only"; 16% of boys and 14% of girls "working and going to school."	Remittance value as direct measure of income for the HH.	Value of domestic and international remittances (*continuous*)	Binomial logit for the cross-section and two-sided censored regression panel analysis with HH FE	*Effects on child work*: 10% increase in domestic remittances ⇒ decreases likelihood of child work by 0.0016%. *Education*: Domestic remittances ⇒ slightly increase the probability of schooling *Interpretation/Mechanisms*: international migrants are likely to have less control on the use of remittances at home. Thus, international remittances are less effective than domestic remittances in reducing child work. For domestic remittances, income effect dominates.
Alcaraz et al. (2012) Mexico	Rotating panel, 2 waves, 2008–2009. 14,608 child-year obs.	*Children aged 12–16. Binary indicator*: participated in production of goods or services for at least 1 h in previous week, with or	Test US 2008–2009 recession impact on migration and remittances as direct	Pre and post US 2008–2009 recession (*binary*)	DiD with IV for migration and remittances (instrument: membership in the	*Effects on child work*: shock on remittance–recipient HH caused an increase in the probability that a child works of 9.8 pp, from a baseline level of 15.7%. Effects driven by rural HH.

TABLE 7 (Continued)

Study and country	Data	Child labor definition and prevalence within sample	Income definition and relation between shock and income	Shock definition	Methodology	Results and interpretation/ mechanisms
Urban and rural		without pay; 15.7% of children work in remittance-recipient HH. 14.6% of children work in non-recipients HH.	measure of income for the HH.		remittance recipient group)	*Education*: shock on remittance–recipient HH caused a decrease in school attendance of 15.6 pp, from a baseline of 82.2%. Effects driven by rural HH. *Interpretation/Mechanisms*: HH that experiment a disruption in remittance flows seem to be forced to take their children out of school to work to overcome liquidity constraints. Income effect dominates.
Cuadros-Menaca and Gaduh (2020) Colombia Urban	Repeated cross-section, 3 waves: 2008–2010. 143,655 child-obs	*Children aged 12–18*. Child work: *binary* variable for child in any economic activity (wage, family, domestic work, and unpaid work). *Continuous*: number of hours the child works. Labor market participation rate for family receiving remittances: 0.106, for families non-recipients: 0.118. Hours worked recipients: 30.23; non-recipients: 34.01.	Test unemployment shocks in a destination country ⇒ decrease total amount of remittances that HH received in past 12 months	Destination-country-specific shocks (monthly deviation of mean rate of unemployment in previous 12 months from precrisis rate). (*continuous*)	Tobit regression of work h on remittances. IV with unemployment in destination countries and historical migration rates. Metropolitan areas FE.	*Effects on child work*: US $1 increase in remittances ⇒ decreases the incidence of child work by 0.022 pp. From the average remittance value of US $3728, a 10% increase ⇒ 8.2 pp reduction in the probability of child work. *By age/gender*: The effect on child work is 2.5 times greater for older children (15–18) than that for the younger cohort (12–14) and almost double for girls than for boys. *Interpretation/Mechanisms*: income effect dominates.
Koska et al. (2013) Egypt Urban and rural	Panel, 2 waves 1998 and 2006. 446 child-obs. in 1686 migrant HH, 1252 of which are remittance-receiving HH	*Children aged 6–18*. *Binary* variable equal to 1 if child i has ever worked; and *continuous* variable for the age of children entering the labor force.	Receipt of remittance as direct measure of income for the HH.	Receipt of remittances by a HH member (*binary*)	Panel, either region and destination FE, or IV for remittances with oil supply in destination countries	*Effects on child work/by gender*: Child work falls, especially for girls (coefficient of −0.09), even if both parents are absent. Age of entry into labor increases; however, if both parents are absent it falls (especially for girls). *Effects on education*: No significant effect of remittances on schooling (if both parents are absent negative effect). *Interpretation/Mechanisms*: Positive income effect of remittances dominates the family disruption effect of migration.

TABLE 8 Summary of the effect of negative income shocks on child labor.

Adverse shock	Country	Study	Net effect on child work
Climate	Ethiopia	Colmer (2021)—rainfall variability	−
	Ethiopia	Gebregziabher et al. (2023)—rainfall	+
	Cambodia	Nguyen et al. (2020)—rainfall, drought	+
	Guatemala	Baez et al. (2017)—natural disaster	+
	Latin America	Caruso (2017)—natural disaster	+
Agriculture	Ethiopia	Miller et al. (2023)—agricultural shocks	+
	Ghana	Martey et al. (2023)—crop loss	+
	Tanzania	Beegle et al. (2006)—crop loss	+
	Tanzania	Bandara et al. (2015)—crop loss	+
	Cambodia	Nguyen et al. (2020)—livestock, crop loss	None
Family	Tanzania	Alam (2015)—illness	+
	Tanzania	Bandara et al. (2015)—death	+
	Ethiopia	Dinku et al. (2018)—illness	+
	Senegal	Vreyer and Nilsson (2019)—death	+
	Brazil	Duryea et al. (2007)—unemployment	+
	China	Liu (2016)—illness	+
	Vietnam	Mendolia et al. (2019)—illness	+
	Philippines	Pörtner (2016)—absence or death	+
	Cambodia	Takasaki (2020)—amputation	+
	Cambodia	Nguyen et al. (2020)—illness	None
Price	Côte d'Ivoire	Cogneau and Jedwab (2012)—cocoa	+
	Peru	Dammert (2008)—coca	+
	Vietnam	Beck et al. (2019)—coffee	+
	Uganda	Frempong and Stadelmann (2019)—aggregate	+
	Pakistan	Hou et al. (2016)—aggregate	+
Trans-national	India	Edmonds et al. (2010)—trade tariff	None
	India	Bai and Wang (2020)—trade tariff	−
	Brazil	Figueiredo and Lima (2022)—import shock	+
	El Salvador	Duryea and Morales (2011)—financial crisis	+
	Philippines	Theoharides (2020)—remittances	+
	Mexico	Alcaraz et al. (2012)—remittances	+

Note: A plus (+) indicates an increase in child labor, a minus (−) a decrease. A positive relationship indicates that the pure income effect dominates (greater poverty makes child labor necessary). A negative relationship means that the substitution effect dominates (lack of opportunities reduces child labor).

We hope that future research will consider this interesting asymmetry and unpack it further, both empirically and theoretically: for example, considerations about the rates of returns to educations relative to the (shadow) wage of child labor could better illuminate the trade-offs

TABLE 9 Summary of the effect of positive income shocks on child labor.

Favorable shock	Country	Study	Net effect on child work
Weather	Tanzania	Dumas (2020)—rainfall	+
	Brazil	Fitz and League (2021)—rainfall	+
	India	Shah and Steinberg (2017)—rainfall	+
	India	Ajefu and Abiona (2019)—rainfall	−
	India	Nordman et al. (2022)—rainfall	+
	Vietnam	Trinh et al. (2020)—rainfall	+
Agriculture	Burkina Faso	Kazianga and Makamu (2017)—cotton tech	−
	Ethiopia	Fontes (2020)—soil & water tech	+
	Sub-Saharan	Montt and Luu (2020)—soil & water tech	+
Price	Brazil	Kruger (2007)—coffee	+
	Brazil	Soares et al. (2012)—coffee	+
	Colombia	Bonilla Mejía (2020)—gold	None
	Colombia	Santos (2018)—gold	+
	Colombia	Angrist and Kugler (2008)—coca	+
	Vietnam	Edmonds and Pavcnik (2005)—rice	−
	Tajikistan	Danzer and Grundke (2020)—cotton	+
Trans-national	India	Ajefu (2018)—trade tariff	−
	Brazil	Figueiredo and Lima (2022)—export shock	−
	Philippines	Yang (2008)—exchange rate	−
	China	Xu (2017)—emigration	+
	Vietnam	Nguyen and Nguyen (2015)—remittances	−
	Vietnam	Binci and Giannelli (2018)—remittances	−
	Colombia	Cuadros-Menaca and Gaduh (2020)—remittances	−
	Egypt	Koska et al. (2013)—remittances	−

Note: A plus (+) indicates an increase in child labor, a minus (−) a decrease. A positive effect indicates that the substitution effect dominates (abundance of opportunities increase child labor). A negative effect means that the pure income effect dominates (economic abundance makes child labor less needed).

underlying the time allocation and substitution choices of families. Also, many of the mediating factors that could explain this asymmetry, such as imperfections in labor, land, and credit markets, have been studied only in a few contexts. Further research—including an exhaustive theoretical integration of these factors—could clarify the constraints faced by families resorting to child labor both after good and bad shocks, such as poverty traps, hysteresis in the choice of tasks or school participation, inability to smooth consumption over time, and so on.

From this review, we still see ample space for future research to examine with more detailed data some of the issues that for now are only examined in some studies, but not all, such as gender issues, different work tasks, extensive and intensive margins of child labor, the complementarity or substitutability of child work, schooling and leisure time, and the precise characteristics of shocks (for example the intensity and duration of these shocks is rarely

measured with some nuances). In general, we observe that studies that have more detailed data at the level of children and households, tend to have smaller samples and more approximative measures of shocks, while those with large spatial and temporary coverage have to rely on more stylized measures of child labor. There is therefore a need for future investigations that can provide evidence both with breadth and depth of information.

5 | IMPLICATIONS AND CONCLUSIONS

This study had the objective of offering a comprehensive analysis of the state of the art on the effect of income-related shocks on child labor. Through a systemic literature review, we compared the findings of 52 studies examining the causal link between different types of shocks and child work. We find substantial heterogeneity in the methodologies and measures applied to tackle this question. However, despite the differences, the overall trend emerging from the literature is that negative shocks that reduce income tend to increase child labor in most circumstances, but also positive shocks that increase income often have the same effect, since they increase the productivity and value of children's work.

An important caveat to interpret our results is that the literature analyzed is highly heterogeneous, and thus any direct comparison among the results for each type of shock should be done cautiously. Our strong restriction to only causal, quantitative studies still does not eliminate the large variation in definitions of child work, data samples and methodologies adopted; similarly, even if we focus mostly on income-related mechanisms, many different proxies for income are used, and their relationship to the original shock is tested with different and non-uniform approaches. The microeconomic focus of our review also entails another limitation: other types of studies can shed light on the link between shocks and child work from another point of view, for instance in-depth qualitative studies, mixed-method approaches, or analyses that do not take an economic perspective but more of a sociological or anthropological one, looking at other mechanisms beyond the income channel (e.g., psychological effects, cultural shifts, political or legal changes, and so on).

These findings have significant policy implications in the fight against child labor: while public interventions can provide buffers, for instance through credit instruments and insurance mechanisms to prevent the use of child labor during adverse events (droughts, illnesses, natural disasters, crop failures, illness, etc.), they should also carefully shape incentives to minimize the attractiveness of child labor when productivity shocks enhance the value of children's work. This kind of interventions are certainly more complex as they need a systemic approach, for instance enhancing the long-run returns to education, or increasing labor market liquidity in rural areas, so to facilitate the hiring of adult wage workers as an alternative to young family members. These policy interventions are relevant especially if dropping out of school and taking up work creates path dependency, such that children are less likely to return to school after starting child labor following a short-term shock.

In conclusion, child labor is a human resource used for production in many countries, despite strong international efforts to eradicate it. Understanding the relationship between income-related shocks and child labor is crucial in view of the numerous global threats posed by long-term current trends, first and foremost climate change. A similar issue is now painfully evident following the COVID-19 pandemic, whose severe impacts on the global economy, next to the human health cost, has thrown families without adequate financial buffers into poverty, and thus put more children at risk of child labor. Future research will need to carefully study

the long-term implications of these recent global shocks. Both economic well-being and children's freedom from labor are key development goals and fundamental human rights. The more research is produced to advance the understanding of their interaction, the more likely both goals will be attained in the face of an uncertain future.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

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ENDNOTES

[1] Child labor is more prevalent in the rural sectors compared to urban areas, with 112 million children working in agriculture (ILO and UNICEF, 2021); however, it is also an issue in urban contexts, especially in informal activities.

[2] In the work of the 18th International Conference of Labour Statistician, child labor refers to economically active children younger than 12, children 12–14 that are working outside of permissible light work, and children 17 and younger in hazardous or worst forms of child labor (ILO, 2007).

[3] In reality, children's time can also be allocated to leisure/idleness. Few studies consider the transition between these three states, rather than just between working and schooling.

[4] The search in the whole text leads to too many false positives in Scopus, similar to Google Scholar, because many articles mention "child labor" without data on it, and "income" is a common keyword in the economic development literature.

[5] See Scopus Search Guide: schema.elsevier.com/dtds/document/bkapi/search/SCOPUSSearchTips.htm.

[6] As an outcome of these consultations, a report was published by ICI in April 2020, titled "The effects of income changes on child labor—a review of evidence from smallholder agriculture," co-funded by the State Secretariat for Economic Affairs of the Swiss Federation (SECO).

[7] Note that two studies cover more than one country, namely Caruso (2017) for 15 Latin American countries and Montt and Luu (2020) for five Sub-Saharan African ones.

[8] https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups.

[9] In this literature, some articles identify a causal effect on child labor using geographic variation across countries as an instrument for trade, FDI or remittances flows (Davies & Voy, 2009). While this instrument is well-established in the literature, it does not examine any actual shock to income. that would make it relevant for our analysis, but rather a permanent source of variation across countries. Thus, we exclude this kind of studies.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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