

# Child labor and health: a systematic literature review of the impacts of child labor on child's health in low- and middle-income countries

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## ABSTRACT

**Objective** To summarize current evidence on the impacts of child labor on physical and mental health.

**Methods** We searched PubMed and ScienceDirect for studies that included participants aged 18 years or less, conducted in low- and middle-income countries (LMICs), and reported quantitative data. Two independent reviewers conducted data extraction and assessment of study quality.

**Results** A total of 25 studies were identified, the majority of which were cross-sectional. Child labor was found to be associated with a number of adverse health outcomes, including but not limited to poor growth, malnutrition, higher incidence of infectious and system-specific diseases, behavioral and emotional disorders, and decreased coping efficacy. Quality of included studies was rated as fair to good.

**Conclusion and recommendations** Child labor remains a major public health concern in LMICs, being associated with adverse physical and mental health outcomes. Current efforts against child labor need to be revisited, at least in LMICs. Further studies following a longitudinal design, and using common methods to assess the health impact of child labor in different country contexts would inform policy making.

**Keywords** children, health impact assessment, occupational diseases

## Introduction

For decades, child labor has been an important global issue associated with inadequate educational opportunities, poverty and gender inequality.<sup>1</sup> Not all types of work carried out by children are considered child labor. Engagement of children or adolescents in work with no influence on their health and schooling is usually regarded positive. The International Labor Organization (ILO) describes child labor as 'work that deprives children of their childhood, potential and dignity, and that is harmful to physical and mental development'.<sup>2</sup> This definition includes types of work that are mentally, physically, socially or morally harmful to children; or disrupts schooling.

The topic gained scientific attention with the industrial revolution. Research conducted in the UK, because of adverse outcomes in children, resulted in acts for child labor in 1802.<sup>3</sup> Many countries followed the UK, in recognition of the associated health risks. The ILO took its first stance in 1973 by setting the minimum age for work.<sup>4</sup> Nevertheless, the ILO and other international organizations that target the issue failed to achieve goals. Child labor was part of the Millennium Development Goals, adopted by 191

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nations in 2000<sup>5</sup> to be achieved by 2015. Subsequently, child labor was included in the Sustainable Development Goals,<sup>6</sup> which explicitly calls for eradication of child labor by 2030.

Despite the reported decline in child labor from 1995 to 2000, it remains a major concern. In 2016, it was estimated that ~150 million children under the age of 14 are engaged in labor worldwide, with most of them working under circumstances that denies them a playful childhood and jeopardize their health.<sup>7</sup> Most working children are 11–14 years, but around 60 million are 5–11 years old.<sup>7</sup> There are no exact numbers of the distribution of child labor globally; however, available statistics show that 96% of child workers are in Africa, Asia and Latin America.<sup>1</sup>

Research into the impacts of child labor suggests several associations between child labor and adverse health outcomes. Parker<sup>1</sup> reported that child labor is associated with certain exposures like silica in industries, and HIV infection in prostitution. Additionally, as child labor is associated with maternal illiteracy and poverty, children who work are more susceptible to malnutrition,<sup>1</sup> which predisposes them to various diseases.

A meta-analysis on the topic was published in 2007.<sup>8</sup> However, authors reported only an association of child labor with higher mortality and morbidity than in the general population, without reporting individual outcome specific effects.<sup>8</sup> Another meta-analysis investigated the effects of adverse childhood experiences (ACEs), including child labor, on health. They reported that ACEs are risk factors for many adverse health outcomes.<sup>9</sup>

To our knowledge, this is the first systematic review that attempts to summarize current evidence on the impacts of child labor on both physical and mental health, based on specific outcomes. We review the most recent evidence on the health impacts of child labor in low- and middle-income countries (LMICs) according to the World Bank classification. We provide an informative summary of current studies of the impacts of child labor, and reflect upon the progress of anti-child labor policies and laws.

## Methodology

### Search strategy

We searched PubMed and ScienceDirect databases. Search was restricted to publications from year 1997 onwards. Only studies written in English were considered. Our search algorithm was [(‘child labor’ OR ‘child labor’ OR ‘working children’ OR ‘occupational health’ OR ‘Adolescent work’ OR ‘working adolescents’) AND (Health OR medical)]. The first third of the algorithm was assigned to titles/abstracts to ensure relevance of the studies retrieved, while the rest of

the terms were not. On PubMed, we added [...AND (poverty OR ‘low income’ OR ‘developing countries’)] to increase the specificity of results; otherwise, the search results were ~60 times more, with the majority of studies being irrelevant.

### Study selection

Studies that met the following criteria were considered eligible: sample age 18 years or less; study was conducted in LMICs; and quantitative data was reported.

Two authors reviewed the titles obtained, a.o. to exclude studies related to ‘medical child labor’ as in childbirth. Abstracts of papers retained were reviewed, and subsequently full studies were assessed for inclusion criteria. Two authors assessed the quality of studies using Downs and Black tool for quality assessment.<sup>10</sup> The tool includes 27 items, yet not all items fit every study. In such cases, we used only relevant items. Total score was the number of items positively evaluated. Studies were ranked accordingly (poor, fair, good) (Table 1).

### Data extraction and management

Two authors extracted the data using a standardized data extraction form. It included focus of study (i.e. physical and/or mental health), exposure (type of child labor), country of study, age group, gender, study design, reported measures (independent variables) and outcome measures (Table 1). The extraction form was piloted to ensure standardization of data collection. A third author then reviewed extracted data. Disagreements were solved by discussion.

## Results

### Search results

A flow diagram (Fig. 1) shows the studies selection process. We retrieved 1050 studies on PubMed and 833 studies on Science Direct, with no duplicates in the search results. We also retrieved 23 studies through screening of the references, following the screening by title of retrieved studies. By reviewing title and abstract, 1879 studies were excluded. After full assessment of the remaining studies, 25 were included.

### Characteristics of included studies

Among the included studies ten documented only prevalence estimates of physical diseases, six documented mental and psychosocial health including abuse, and nine reported

**Table 1** Characteristics of studies included

Article	Country	Focus	Control group	reported measures	Outcome variables	Quality*
Ahmed and Ray <sup>13</sup>	Bangladesh	Physical health		Age, gender, school enrollment, working hours, child vaccination, protection at labor, type of job	Work-related injury or illness, symptoms of work-related injury or illness	Good
Al-Gamal et al. <sup>29</sup>	Jordan	Mental health	–	Age, sex, education, types of child labor, time spent at work, age they started working, the reasons for entering the labor force, parents age, marital status, level of education, employment status, religion, and type of family. SDQ and coping efficacy scale for children	Psychosocial health and coping efficacy	Good
Alem et al. <sup>28</sup>	Ethiopia	Mental health	Yes	Age, gender, ethnicity, religion, grade attained, self-reporting questionnaire for children, diagnostic interview for children and adolescents	Mental/behavioral disorders	Good
Ali et al. <sup>11</sup>	Pakistan	Physical and mental health	Yes	Age, gender, ethnicity, education, anthropometric measures, family background, work pattern and earnings	Abuse, stunting, wasting and malnutrition	Good
Ambadekar et al. <sup>12</sup>	India	Physical growth	–	Age, anthropometric measures	Weight, BMI**, genital development	Good
Audu et al. <sup>34</sup>	Nigeria	Sexual abuse	Yes	Age, type of work, place of work, educational status, maternal and paternal education, working hours, number of jobs, years of employment	Sexual assault	Good
Bandeali et al. <sup>30</sup>	Pakistan	Mental health		Demographics, SDQ scale, decision to start working, atmosphere at work place, total monthly salary, household income, number of earning members and family atmosphere	Peer problems, emotional problems, conduct problems, hyperactivity problems, pro-social behavior	Good
Banerjee et al. <sup>21</sup>	India	Physical and mental health	–	Age, sex, educational status, parental education, type of job, income, physical examination, blood tests including Hb, anthropometric measures	Presence of various diseases (anemia, vitamin deficiencies, infections, systematic diseases), abuse	Fair
Corriols and Aragon <sup>24</sup>	Nicaragua	Physical health	–		Acute pesticide poisoning	Fair
Daga and Working <sup>22</sup>	India	Physical health		Father's education, mother's education, family income, child's education, mother's occupation, father's occupation	Incidence of infectious diseases	Poor
Fassa et al. <sup>23</sup>	Brazil	Physical health (musculoskeletal disorders)	Yes	Age, gender, smoking, school attendance, sports activities, use of computer/video games/television, domestic activities, care of other children, and care of sick/elderly family members, work activities and workloads	Musculoskeletal pain/symptoms	Good
Fekadu et al. <sup>31</sup>	Ethiopia	Mental health	Yes	Sex, age, education, economic status, ethnicity, religion, place of birth, parents' marital status and occupation, family size and history of migration, types of child	Emotional and behavioral disturbances, mood and anxiety disorders	Good

Continued

Table 1 Continued

Article	Country	Focus	Control group	reported measures	Outcome variables	Quality*
				labor, time spent at work, age work started, any benefit obtained and how it was spent, rate of changing workplace and the underlying reasons for entering the labor force, and number of people the child supported from the generated income, physical, emotional, and sexual abuse and neglect		
Foroughi <i>et al.</i> <sup>27</sup>	Iran	Physical health (HIV, HBV, HCV)	Yes	Age, gender, ethnicity, alcohol consumption, smoking, parents' drug use, sexual abuse, sexual contact, sex trading	HIV, HBV, HCV infection***	Good
Hadi <sup>32</sup>	Bangladesh	Mental health (abuse)	–	Age, gender, educational status, education and occupation of the father, and the amount of land owned by the family	Physical abuse, sexual abuse, financial exploitation, over burden and forced work	Good
Hamdan-Mansour <i>et al.</i> <sup>18</sup>	Jordan	Physical and mental health	–	Age, gender, school grade, types of child labor if working, time spent at work, age work started, and the underlying reasons for entering the labor force, medical and surgical history; visits to health clinics, health providers, and hospital emergency, inpatient, and outpatient departments; and general health assessment, psychosocial, substance abuse, and sexual behaviors, anger expression/out, anger in/hostility, anger control/suppression	Physical health (represented in symptoms/illnesses)/psychological health (loneliness, depression, problems with family, law or employer) and risk behaviors (smoking, drugs use)	Good
Hosseinpour <i>et al.</i> <sup>14</sup>	Iran	Physical health (injuries)	Yes	Age, sex, worker status, anatomic site of injury, place of employment, mechanism of injury	Type of physical injury	Fair
Khan <i>et al.</i> <sup>20</sup>	Pakistan	Physical health	–	Age, nature of work, clinical examination, monthly wage, exposure to dangerous environment at work and chronic symptoms that children were suffering from, father's profession, family size and income	History and type of physical injuries, illnesses/symptoms based on the clinical examination and history	Good
Mohammed <i>et al.</i> <sup>15</sup>	Egypt	Physical and mental health	–	Age, gender, education, mother's education, father's education, family size, smoking, drug abuse, clinical examination, anthropometric measures	Health (vitamin deficiencies, anemia, chest symptoms), risk behaviors (smoking, drug abuse), physical injuries	Good
Nuwayhid <i>et al.</i> <sup>16</sup>	Lebanon	Physical and mental health	Yes	Age, education, father's occupation/education, mother's occupation/education, no. of siblings/working siblings, workplace, years of work, salary, work perception, employer relation, physical abuse, verbal abuse, schooling,	Social life and habits, nutritional habits, recent complaints (last 2 weeks), chronic illnesses, health during the last year, anxiety, hopelessness, self-esteem	Good

Continued

**Table 1** Continued

Article	Country	Focus	Control group	reported measures	Outcome variables	Quality*	
Oncu <i>et al.</i> <sup>33</sup>	Turkey	Abuse	Yes	nutrition (intake of fruit, vegetables, milk, caffeine), social habits (smoking, alcohol intake, dating), acute and chronic health problems, and use of health service, clinical examination, anthropometric measure, blood samples. Children's Manifest Anxiety Questionnaire, the Hopelessness Scale, and the Self-Esteem Inventory	Physical, emotional and sexual abuse, as well as physical neglect	Good	
Roggero <i>et al.</i> <sup>8</sup>	Developing countries according to the WB classification	Physical health	–	Age, gender, working lives, workplace characteristics, family income, family status including number of siblings and parents	Gender, adult mortality rate for men, adult mortality rate for women, percentage of the population below the poverty line, percentage of adults infected with HIV/AIDS, percentage of the population undernourished, percentage of children aged 10–14 years who were workers (child labor prevalence)	The mortality rate among boys aged 10–14 years, the mortality rate among girls aged 10–14 years, and the percentage of the population aged 10–14 years undernourished	Good
Tiwari <sup>25</sup>	India	Physical health	–	Age, gender, employment duration, working hours	Eye strain	Fair	
Tiwari and Saha <sup>19</sup>	India	Physical health	Yes	Age, duration of employment, working hours per day, reasons for working	Systematic symptoms including respiratory, GIT, Musculoskeletal, skin and CNS symptoms, Eye strain and repeated injury	Fair	
Tiwari <i>et al.</i> <sup>26</sup>	India	Physical health (respiratory morbidities)	–	Age, sex, daily working hours, and duration of exposure, X-ray	Respiratory morbidities (TB, Hilar gland enlargement/calcification)	Fair	
Wolff <sup>17</sup>	Indonesia	Physical health	–		Fever, cough and others	Fair	

\*The quality is based on the percentage of Downs and Black<sup>10</sup> tool, < 50% = poor, 50–75% = fair, > 75% = good.

\*\*BMI, body mass index.

\*\*\*HIV, human immunodeficiency virus; HBV, hepatitis B virus; HCV, hepatitis C virus.

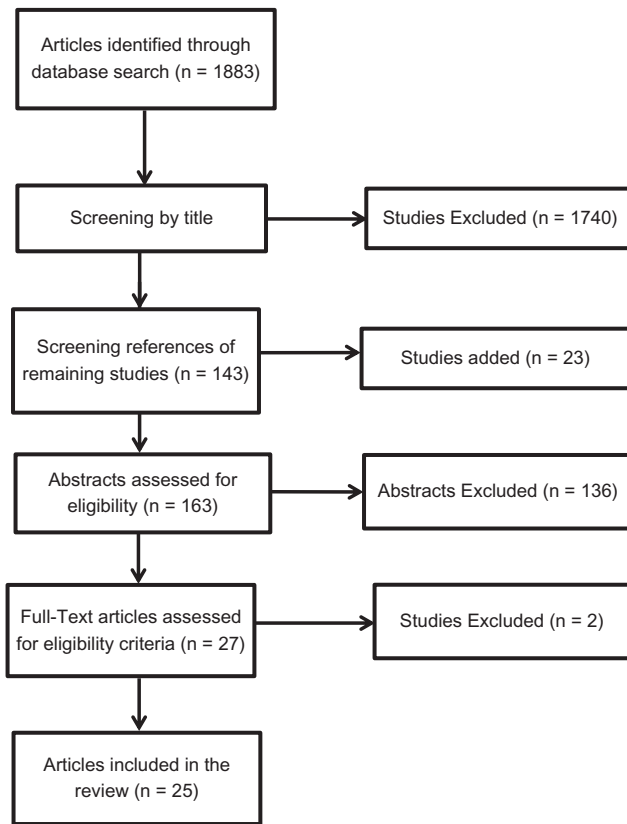
the prevalence of both mental and physical health impacts (Table 1). In total, 24 studies were conducted in one country; one study included data from the Living Standard Measurement Study of 83 LMIC.<sup>8</sup>

In total, 12 studies compared outcomes between working children and a control group (Table 1). Concerning physical health, many studies reported the prevalence of general symptoms (fever, cough and stunting) or diseases (malnutrition, anemia and infectious diseases). Alternatively, some studies documented prevalence of illnesses or symptoms hypothesized to be associated with child labor (Table 1). The

majority of studies focusing on physical health conducted clinical examination or collected blood samples.

Concerning mental and psychosocial health, the outcomes documented included abuse with its different forms, coping efficacy, emotional disturbances, mood and anxiety disorders. The outcomes were measured based on self-reporting and using validated measures, for example, the Strengths and Difficulties Questionnaire (SDQ), in local languages.

The majority of studies were ranked as of 'good quality', with seven ranked 'fair' and one ranked 'poor' (Table 1).



**Figure 1** Study selection process.

The majority of them also had mixed-gender samples, with only one study restricted to females.<sup>24</sup> In addition, valid measures were used in most studies (Table 1). Most studies did not examine the differences between genders.

### Child labor and physical health

Fifteen studies examined physical health effects of child labor, including nutritional status, physical growth, work-related illnesses/symptoms, musculoskeletal pain, HIV infection, systematic symptoms, infectious diseases, tuberculosis and eyestrain. Eight studies measured physical health effects through clinical examination or blood samples, in addition to self-reported questionnaires. All studies in which a comparison group was used reported higher prevalence of physical diseases in the working children group.

Two studies were concerned with physical growth and development. A study conducted in Pakistan,<sup>11</sup> reported that child labor is associated with wasting, stunting and chronic malnutrition. A similar study conducted in India compared physical growth and genital development between working and non-working children and reported that child labor is associated with lower BMI, shorter stature and

delayed genital development in working boys, while no significant differences were found among females.<sup>12</sup>

Concerning work-related illnesses and injuries, a study conducted in Bangladesh reported that there is a statistically significant positive association between child labor and the probability to report any injury or illness, tiredness/exhaustion, body injury and other health problems. Number of hours worked and the probability of reporting injury and illness were positively correlated. Younger children were more likely to suffer from backaches and other health problems (infection, burns and lung diseases), while probability of reporting tiredness/exhaustion was greater in the oldest age group. Furthermore, the frequency of reporting any injury or illness increases with the number of hours worked, with significant variation across employment sectors.<sup>13</sup> A study in Iran reported that industrial workrooms were the most common place for injury (58.2%). Falling from heights or in horizontal surface was the most common mechanism of injury (44%). None of the patients was using a preventive device at the time of injury. Cuts (49.6%) were the most commonly reported injuries.<sup>14</sup>

Other studies that investigated the prevalence of general symptoms in working children in Pakistan, Egypt, Lebanon, Jordan and Indonesia reported that child labor is negatively associated with health.<sup>15–19</sup> Watery eyes, chronic cough and diarrhea were common findings, in addition to history of a major injury (permanent loss of an organ, hearing loss, bone fractures, permanent disability).<sup>20</sup> One study, conducted in India reported that working children suffered from anemia, gastrointestinal tract infections, vitamin deficiencies, respiratory tract infections, skin diseases and high prevalence of malnutrition.<sup>21</sup> Another study—of poor quality—in India reported that child labor was associated with higher incidence of infectious diseases compared to non-working children.<sup>22</sup>

Only a few studies focused on specific diseases. A study in Brazil compared the prevalence of musculoskeletal pain between working and non-working children. Authors reported that the prevalence of pain in the neck, knee, wrist or hands, and upper back exceeded 15%. Workers in manufacturing had a significantly increased risk for musculoskeletal pain and back pain, while child workers in domestic services had 17% more musculoskeletal pain and 23% more back pain than non-workers. Awkward posture and heavy physical work were associated with musculoskeletal pain, while monotonous work, awkward posture and noise were associated with back pain.<sup>23</sup> A study in Nicaragua, which focused on children working in agriculture, reported that child labor in agriculture poses a serious threat to children's health; specifically, acute pesticides poisoning.<sup>24</sup>

A study conducted in India reported that the prevalence of eyestrain in child laborers was 25.9%, which was significantly more than the 12.4% prevalence in a comparison group. Prevalence was higher in boys and those who work more than 4 h daily.<sup>25</sup> Another study conducted in India documented that the difference between working and non-working children in the same area in respiratory morbidities (TB, hilar gland enlargement/calcification) was statistically significant.<sup>26</sup>

A study in Iran explored the prevalence of viral infections (HIV, HCV and HBV) in working children.<sup>27</sup> The study reported that the prevalence among working street children was much higher than in general population. The 4.5% of children were HIV positive, 1.7% were hepatitis B positive and 2.6% hepatitis C positive. The likelihood of being HIV positive among working children of Tehran was increased by factors like having experience in trading sex, having parents who used drugs or parents infected with HCV.

Lastly, one study was a meta-analysis conducted on data of working children in 83 LMIC documented that child labor is significantly and positively related to adolescent mortality, to a population's nutrition level, and to the presence of infectious diseases.<sup>8</sup>

### Child labor and mental health

Overall, all studies included, except one,<sup>28</sup> reported that child labor is associated with higher prevalence of mental and/or behavioral disorders. In addition, all studies concluded that child labor is associated with one or more forms of abuse.

A study conducted in Jordan reported a significant difference in the level of coping efficacy and psychosocial health between working non-schooled children, working school children and non-working school children. Non-working school children had a better performance on the SDQ scale. Coping efficacy of working non-schooled children was lower than that of the other groups.<sup>29</sup>

A study conducted in Pakistan reported that the prevalence of behavioral problems among working children was 9.8%. Peer problems were most prevalent, followed by problems of conduct.<sup>30</sup> A study from Ethiopia<sup>31</sup> reported that emotional and behavioral disorders are more common among working children. However, another study in Ethiopia<sup>28</sup> reported a lower prevalence of mental/behavioral disorders in child laborers compared to non-working children. The stark difference between these two studies could be due to the explanation provided by Alem *et al.*, i.e. that their findings could have been tampered by selection bias or healthy worker effect.

A study concerned with child abuse in Bangladesh reported that the prevalence of abuse and child exploitation was widespread. Boys were more exposed. Physical assault was higher towards younger children while other types were higher towards older ones.<sup>32</sup> A similar study conducted in Turkey documented that 62.5% of the child laborers were subjected to abuse at their workplaces; 21.8% physical, 53.6% emotional and 25.2% sexual, 100% were subjected to physical neglect and 28.7% were subjected to emotional neglect.<sup>33</sup>

One study focused on sexual assault among working females in Nigeria. They reported that the sexual assault rate was 77.7%. In 38.6% of assault cases, the assailant was a customer. Girls who were younger than 12 years, had no formal education, worked for more than 8 h/day, or had two or more jobs were more likely to experience sexual assault.<sup>34</sup>

## Discussion

### Main findings of this study

Through a comprehensive systematic review, we conclude that child labor continues to be a major public health challenge. Child labor continues to be negatively associated with the physical and psychological health of children involved. Although no cause–effect relation can be established, as all studies included are cross-sectional, studies documented higher prevalence of different health issues in working children compared to control groups or general population.

This reflects a failure of policies not only to eliminate child labor, but also to make it safer. Although there is a decline in the number of working children, the quality of life of those still engaged in child labor seems to remain low.

### Child labor and physical health

Children engaged in labor have poor health status, which could be precipitated or aggravated by labor. Malnutrition and poor growth were reported to be highly prevalent among working children. On top of malnutrition, the nature of labor has its effects on child's health. Most of the studies adjusted for the daily working hours. Long working hours have been associated with poorer physical outcomes.<sup>18, 19, 25, 26, 35</sup> It was also reported that the likelihood of being sexually abused increased with increasing working hours.<sup>34</sup> The different types and sectors of labor were found to be associated with different health outcomes as well.<sup>13, 18, 24</sup> However, comparing between the different types of labor was not possible due to lack of data.

### Child labor and mental health

The majority of studies concluded that child labor is associated with higher prevalence of mental and behavioral disorders, as shown in the results. School attendance, family income and status, daily working hours and likelihood of abuse, in its different forms, were found to be associated with the mental health outcomes in working children. These findings are consistent with previous studies and research frameworks.<sup>36</sup>

Child labor subjects children to abuse, whether verbally, physically or sexually which ultimately results in psychological disturbances and behavioral disorders. Moreover, peers and colleagues at work can affect the behavior of children, for example, smoking or drugs. The effects of child labor on psychological health can be long lasting and devastating to the future of children involved.

### What is already known on this topic

Previous reviews have described different adverse health impacts of child labor. However, there were no previous attempts to review the collective health impacts of child labor. Working children are subjected to different risk factors, and the impacts of child labor are usually not limited to one illness. Initial evidence of these impacts was published in the 1920s. Since then, an increasing number of studies have used similar methods to assess the health impacts of child labor. Additionally, most of the studies are confined to a single country.

### What this study adds

To our knowledge, this is the first review that provides a comprehensive summary of both the physical and mental health impacts of child labor. Working children are subjected to higher levels of physical and mental stress compared to non-working children and adults performing the same type of work. Unfortunately, the results show that these children are at risk of developing short and long-term health complications, physically or mentally.

Though previous systematic reviews conducted on the topic in 1997<sup>1</sup> and 2007<sup>8</sup> reported outcomes in different measures, our findings reflect similar severity of the health impacts of child labor. This should be alarming to organizations that set child labor as a target. We have not reviewed the policies targeting child labor here, yet our findings show that regardless of policies in place, further action is needed.

Most of the current literature about child labor follow a cross-sectional design, which although can reflect the health status of working children, it cannot establish cause-effect

associations. This in turn affects strategies and policies that target child labor.

In addition, comparing the impacts of different labor types in different countries will provide useful information on how to proceed. Further research following a common approach in assessing child labor impacts in different countries is needed.

Child labor remains a major public health concern in LMICs, being associated with adverse physical and mental health outcomes. Current efforts against child labor need to be revisited, at least in LMICs. Further studies following a longitudinal design, and using common methods to assess the health impact of child labor in different country contexts would inform policy making.

### Limitations of this study

First, we acknowledge that all systematic reviews are subject to publication bias. Moreover, the databases used might introduce bias as most of the studies indexed by them are from industrialized countries. However, these databases were used for their known quality and to allow reproduction of the data. Finally, despite our recognition of the added value of meta-analytic methods, it was not possible to conduct one due to lack of a common definition for child labor, differences in inclusion and exclusion criteria, different measurements and different outcome measures. Nevertheless, to minimize bias, we employed rigorous search methods including an extensive and comprehensive search, and data extraction by two independent reviewers.

### Compliance with ethical standards

The authors declare that they have no conflict of interest.

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