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CHILDREN'S WORK-RELATED ILLNESS AND INJURY:

EVIDENCE FROM ARMENIA

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Introduction

Child labour remains a key concern in Armenia. The Armenia National Child Labour Survey conducted in 2015 (NCLS 2015) indicated that about 9 percent of all children are engaged in child labour, about 40,000 children in absolute terms. The worst off are those whose work harms their health, safety and moral development, and effectively reaching this group therefore constitutes a particular priority within the wider effort to eliminate all forms of child labour. The current study reviews available data from NCLS 2015 on work-related injuries and illnesses as starting point for identifying the forms of children's work that are most hazardous to their health and that should be consequently prioritised in child labour elimination efforts.

The Labour Code of the Republic of Armenia prohibits the involvement of children in working activities that may be harmful to their health and morals. In particular, articles 257 and 258 of the Code state: "Engaging persons under the age of eighteen in heavy, hazardous, especially heavy, especially hazardous works established by the legislation of the Republic of Armenia, as well as in other cases prescribed by law, shall be prohibited".

The working conditions that are likely to be "heavy and hazardous" for children has been in turn established by the decision of the government as follows:

- Hazardous work due to chemical factors.
- Hazardous work due to physical factors.
- Hazardous work due to biological factors.
- Hazardous work due to industrial aerosols.
- Heavy work for persons below the age of 18 years: physical workload (heaviness, distance, required duration of standing).
- Work-related with sensitive, emotional, stress and risk factors.
- Work implemented with dangerous tools, devices and equipment.

However, a clear classification at national level of the specific industries and occupations that should be considered hazardous does not exist, hampering the formulation and targeting of interventions. The present study provides initial indications of the industries and occupations that pose the greatest threat to children's health and safety, and therefore provides a starting point for the development of a detailed national list of hazardous industries and occupations.

1. Literature review[1]

Concern about the health consequences of child labour derives primarily from the belief that work increases the child's exposure to health hazards that could in turn lead to illness or injury. The hazards may be obvious and threaten immediate damage to health, such as those risks arising from the use of dangerous tools and machinery, from exposure to high temperatures, or from work at high heights. Alternatively, the hazards may be less perceptible and less immediate in terms of their consequences for health, such as exposure to dust, toxins, chemicals and pesticides, the lifting of heavy loads or the forced adoption of poor posture. Hazards may also threaten psychological health, such as exposure to abusive relationships with employers, supervisors or clients (ILO, 1998).

The health consequences of child labour will vary with the type of hazards to which the child worker is exposed and with the average time spent on work. Variation in the nature and intensity of child work across industries and across countries means there is no one relationship between child work and health but a variety of such relationships.

One factor that increases the health risks faced by children in child labour relative to adult workers derives from the fact that children often work in informal, small scale and illegal settings which, by their very nature, are difficult to regulate (Fassa et al, 2000). Children working in small scale farming and manufacturing are often not given the protection promised by health and safety regulation. Even when this protection is available, it is likely to be much less effective for children since the measures are usually designed for adult, and not child, workers (ILO, 1998; Fassa et al, 2000). Hence, safety devices and clothing may not be usable by children and permissible exposure limits are usually established for adults and may not be appropriate for children.

Given their physiological and psychological immaturity and the biological process of growth, children may be more vulnerable than adults to abuse and to given health risks. Children are more prone to injury through accidents and have been found to be more sensitive to noise, heat, lead and silica toxicity, and ionising radiation (Bequele and Myers, 1995; Forastieri, 1997; ILO, 1998; Fassa et al, 2000; and Woodhead, 2004). Working long hours also takes a greater

1 This review builds on that undertaken in UCW Project, Child labour and health: evidence and research issues. Owen O'Donnell, F. C. Rosati and Eddy van Doorslaer, Working Paper, Rome, January 2002. It also draws on sources cited in Abdalla I., Salma M. A., Mohammed J., Jihad A.,Nanne de Vries. (2018). "Child labour and health: a systematic literature review of the impacts of child labour on child's health in low- and middle-income countries". Journal of Public Health, pp. 1–9. doi:10.1093/pubmed/fdy018.

physical toll on children. Tired children may be at greater risk of contracting disease and have less strength to combat them.

While many of the health risks children in child labour are exposed to threaten immediate damage to health, others are likely to develop over many years and might only become manifest in adulthood. Exposures to pesticides, chemicals, dusts and carcinogenic agents in agriculture, mining and quarrying and manufacturing increase the risks of developing bronchial complaints, cancers and a wide variety of diseases (Forastieri, 1997; ILO, 1998; Fassa et al, 2000). Ergonomic factors such as heavy lifting and poor posture raise the chances of musculoskeletal problems developing in later life (Forastieri, 1997; ILO, 1998; Fassa et al, 2000). Individuals who have worked as a child are at particular risk of developing chronic health problems not only because they are exposed to risk factors for longer periods but because the biological process of rapid cell growth reduces the latency period of some diseases (Fassa et al, 2000).

For the obvious reason of the strenuous data requirements, empirical examination of the long-term health consequences of child labour is limited. One small-scale study following children over a 17 year period in a rural region of India finds that children who work in agriculture, small-scale industry and services grow up shorter and lighter than those who attend school (Satyanararayanan et al, 1986). Two larger-scale studies based on different Brazilian data sets provide further support for a negative impact of child labour on health in adulthood (Kassouf et al, 2001; Guiffrida et al, 2001). Kassouf et al use a cross-section of adults living in both urban and rural settings in north-east and south-east Brazil to examine the correlation between participation in work as a child and self-reported health in adulthood. Simple bivariate analysis reveals that the probability of reporting less than good health in adulthood rises as the age of entry into the labour force falls, although the correlation attenuates with increasing current age.

Guiffrida et al employ a nationally representative cross-section survey of 18-60 year old Brazilian adults. After controlling for age, education, (latent) wealth, housing conditions, unemployment status and race, entry to the labour force at or below the age of 9 has a statistically significant and substantial negative effect on (latent) health in adulthood.[2] Given the inclusion of so many control variables, this result provides even stronger support for a direct effect of child labour on adult health.[3] The magnitude of the effect for women is roughly twice that for men. On average, a 40-year-old woman who started work at or below 9 years of age is estimated to have the health status of a 45-year-old woman who did not work before the age of nine.

Straub and Rosati (2004) offer more solid evidence on the long-term effects of child labour. By using retrospective information about the age of entry into the labour market, they analyse the effects of child labour on adult health. The estimates are based on a sample of siblings for Guatemala, helping to deal with the role of unobservables. They show that adult health is significantly and negatively affected by having worked as a child.

2 Guiffrida et al (2001) estimate a latent variable structural equations model (SEM). That is health status, wealth, health care access are all treated as latent (unobservable) variables, measured, with error, by observable proxy variables. Variations in all three latent variables, plus health care utilisation, are estimated simultaneously with health status specified as a function of (latent) wealth, plus exogenous variables, wealth a function of exogenous variables, health care access a function of health status and wealth and health care utilisation a function of health status, wealth and access. Identification is through exclusion restrictions, normalisations and restrictions on the variance-covariance matrix. Health status is proxied by self-assessed health, chronic conditions and limited activity.

3 Child labour is not a central focus of Guiffrida et al (2001) and no attempt is made to test for direct and indirect effects of child labour on health and to compare their magnitudes.

Numerous studies of adult workers point to a relationship between working hours and negative health outcomes. In 16 of 22 studies included in one recent review, overtime hours were associated with poorer perceived general health, increased injury rates, more illnesses or increased mortality. These patterns were more pronounced with very long work shifts or when 12-hour shifts were combined with work weeks greater than 40 hours (National Institute for Occupational Safety and Health, 2004). Other studies point to links between long working hours, negative psychological health outcomes, cardiovascular disease, diabetes and the likelihood of workplace accidents. There is also evidence of links between long hours and dangerous health behaviors such as smoking, and alcohol and drug abuse. Again, these effects were strongest when workweeks exceeded 48-50 hours (Beswick and White, 2003).

These studies of adult workers follow a variety of methodologies and rely on a number of different health indicators. Most, however, are based on relatively small sample sizes and target a very specific sector or segment of the adult working population. As such, they are ill-suited to drawing more general conclusions concerning links between working hours and health. At any rate, conclusions relating to adult workers are unlikely to be applicable to child workers, as children are not, of course, simply "little adults". The many differences between children and adults in terms of anatomy, physiology, and psychology may translate into children facing unique risk factors for occupational injuries and illnesses. The nature of child and adult work is also different, with children often concentrated in relatively more dangerous industries.[4]

Guarcello, Rosati and Lyon (2004) looked in detail at the relationship between children's weekly working hours and children's health outcomes, making use of household survey data from Bangladesh, Brazil, and Cambodia. The effect of work hours on health outcomes obviously depends on the nature of the work performed, and, for this reason, sector of work is also included in the analysis. The paper shows the important causal relationship between working hours, on one hand, and children's health and safety, on the other. The results indicated that each additional weekly hour of work adds about 0.3 percentage points to the probability of suffering work-related ill-health in Cambodia, and about 0.1 percentage points to the probability of sustaining a work-related injury in Brazil. In both countries, kernel regressions also illustrated how the probability of work-related ill health rises with the length of a child's workweek.

Another recent review on the impact of child labour on health provides a summary of current evidence on the impacts of child labour on physical and mental health (Abdalla Ibrahim et al., 2018). They searched for studies from 1997 onwards that included participants aged 18 years or less, conducted in low- and middle-income countries and carried out using quantitative data.[5] The authors identified a total of 25 studies, the majority of which were cross-sectional. The study concludes by highlighting that child labour continues to be a major health challenge. It was found to be associated with a number of adverse health outcomes, including but not limited to poor growth, malnutrition, higher prevalence of infectious and system-specific diseases, behavioral and emotional disorders, and decreased coping efficacy.

4 More than being in relatively more dangerous activities, children could have lower ability to recognize and assess potential risks and make decisions about them. Moreover, adolescents may undertake tasks on the job to demonstrate their responsibility and independence accepting risks to which they are not ready. We thank Anaclaudia Gastal Fassa for raising this issue.

5 The study details in a table the characteristics of the 25 studies considered for the analysis.

2. Data sources and variable definitions

Data sources

The main source of data for this study is the Armenia National Child Labour survey (NCLS) conducted in 2015 by the National Statistical Service of the Republic of Armenia (NSS) with the support of the International Labour organization (ILO). The survey, covering 6,520 households with children aged 5-17 years, was aimed at assessing the situation, scope, causes and consequences of child labour in Armenia. The survey collected information on children's economic activity, education, social status, living conditions, and, of most relevance for the present study, also included a module relating to health and safety issues for working children aged 5-17 years.

Indicators of children's work-related injury and illness

The paper makes use of two principal indicators of children's work-related injury and illness: **prevalence rate** and **incidence density.** Both are built on children's self-reported injuries and illnesses collected through the "Health and safety issues about working children" survey module. Specifically, the indicators are built using the following question: "Did you have any of the following in the past 12 months because of your work? 1. Superficial injuries or open wounds; 2. Fractures; 3. Dislocations, sprains or stains; 4. Burns, corrosions, scalds or frostbite; 5. Breathing problems; 6. Eye problems; 7. Skin problems; 8. Stomach problems / diarrhoea; 9. Fever; 10. Extreme fatigue; 11. Other (specify).

The prevalence rate is defined as the number of working children suffering from injury or illness divided by the number of working children. The calculation of this indicator is straightforward, but it should be noted that the reference periods for work and injury do not coincide. Information on injuries was collected using a recall period of 12 months, while the recall period for work used to build the employment indicator was the week preceding the survey, necessitating the assumption that a child had been working (and so exposed to risk of hazard) during the past 12 months. The prevalence rate does not take into consideration that differences in observed prevalence can be due to differences in the time of exposure.

To take exposure into consideration, a standard *incidence density* is computed as follows:

$$\textit{Incidence density rate} = \frac{\textit{no. of children injured during a specified period of time (T)}}{\textit{total person time}} \quad (1)$$

where "total person time" is the total hours worked during the specified period of time of one year (i.e., the cumulated exposure for all children considered). Using the information from the NCLS survey on weekly working hours and number of months worked per year, total person time is calculated by multiplying the weekly working hours by the number of weeks in a month (i.e., 4.3) to obtain monthly working hours, and then by multiplying monthly working hours by the number of months worked per year. We must assume, however, constant weekly hours of work, because information on working hours was only collected with reference to a one-week period.

Other indicators

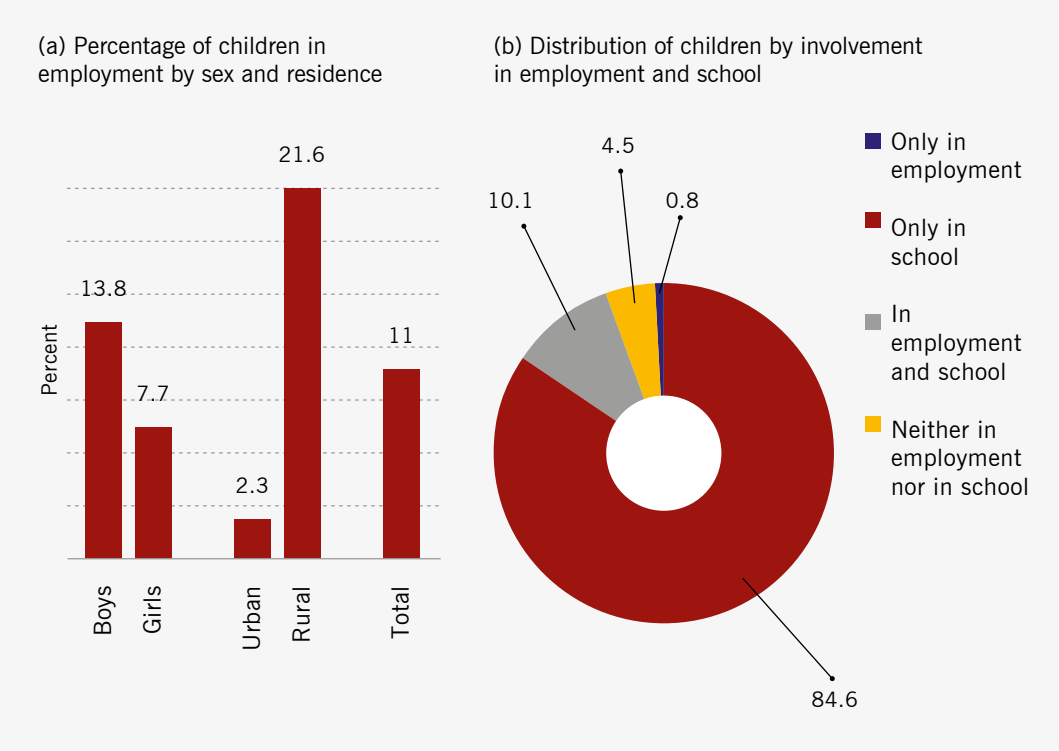
The other indicators used in the report are defined as follows. In keeping with international statistical standards, *children in employment* are defined as children involved in economic activity during the last seven days within or outside the family, paid or unpaid, for the market or not, including the production of goods for own use. Working hours are defined as the average number of hours worked during the last seven days. Sectors of employment are defined on the basis of the International Standard Industrial Classification of All Economic Activities (ISIC)(Rev. 4), i.e., agriculture, commerce, manufacturing, services, as well as a residual "other" category made up of remaining sectors.[6] The list of occupations follows the International Standard Classification of Occupations (ISCO), which categorises jobs into clearly defined groups according to the tasks and duties undertaken in the job. Finally, status in employment, distinguishes among wage and salaried workers (also known as employees), self-employed workers, and contributing family workers (also known as unpaid family workers).

6 The category "Other sector" includes water supply, transport, hotel and restaurant and other services non-elsewhere classified.

3. Children's involvement in employment

Eleven per cent of all children are in employment in Armenia. This overall estimate masks important differences in employment by sex and residence. In short, as reported in Figure 1a, children's employment is higher for boys (14 percent) than girls (8 percent) and much higher for children living in rural areas (22 percent) than for their peers living in cities and towns (2 percent). As expected, involvement in employment also rises sharply with age, from less than one percent at age 5 to 27 percent at age 17 (not shown). Most of those in employment are also continuing with their education. As reported in Figure 1b, 10 percent of all children combine school and employment while less than 1 percent work without also attending school. But by far the largest share of children aged 5-17 years – 85 percent – are full-time students. Remaining children, accounting for 5 percent of total children aged 5-17 years, are neither in employment nor in school.

Figure 1. More than one in 10 of all children are in employment, 5-17 years

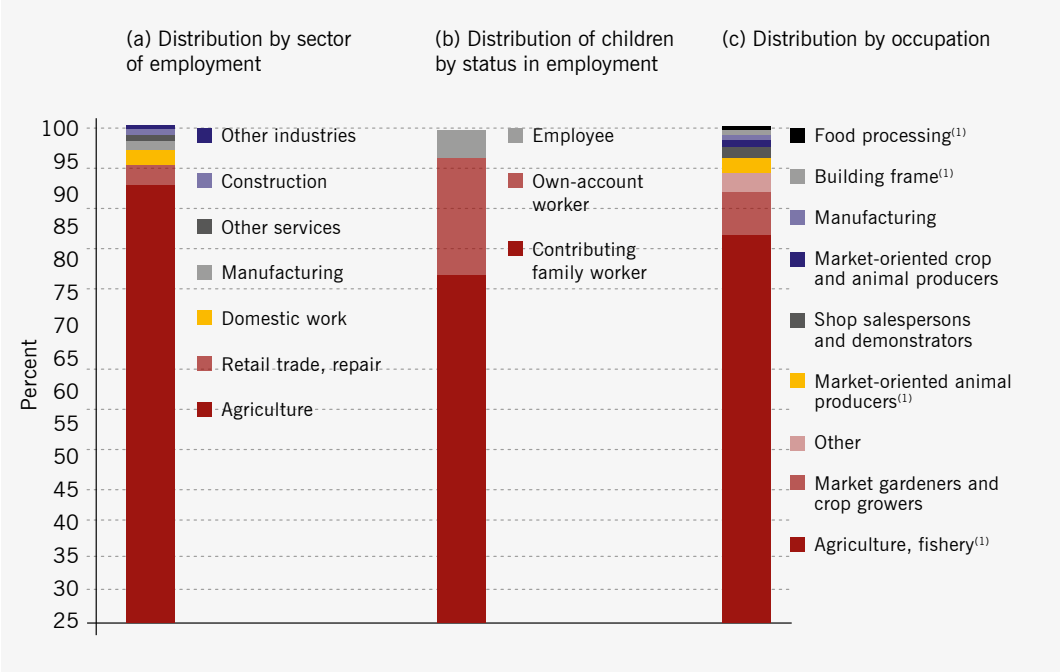


Source: Calculations based on Armenia National Child Labour Survey (NCLS) 2015.

The agricultural sector accounts for the bulk of children's employment in Armenia. As reported in Figure 2a, 91 percent of all children in employment are in the agriculture sector. The predominance of agriculture is a particular concern in light of the fact that this sector is one of the three most dangerous in which to work at any age, along with construction and mining, in terms of work-related fatalities, non-fatal accidents and occupational diseases.[7] Commerce is a distant second in importance (accounting for 3 percent of children in employment), followed by domestic work (2 percent) and manufacturing (less than 2 percent). Again, these overall estimates disguise variations by sex and residence, as reported in Table A2 in the Annex.

In terms of status in employment, the largest share of children are unpaid family workers (78 percent) followed by own account workers (18 percent). Only a small share of children – four percent – work as paid employees, suggesting in turn that very few children work in the formal economy, where paid employment arrangements are most common (Figure 2b). The breakdown of children in employment by occupation is reported in Figure 2c to provide additional insight into the workplace roles assigned to children. The majority of working children work in agriculture, fishery and related activities (83 percent), followed by children working as market gardeners and crop growers (7 percent) and market-oriented animal producers and related workers (2 percent) (Figure 2c).

Figure 2. Children in employment are concentrated in family-based agriculture



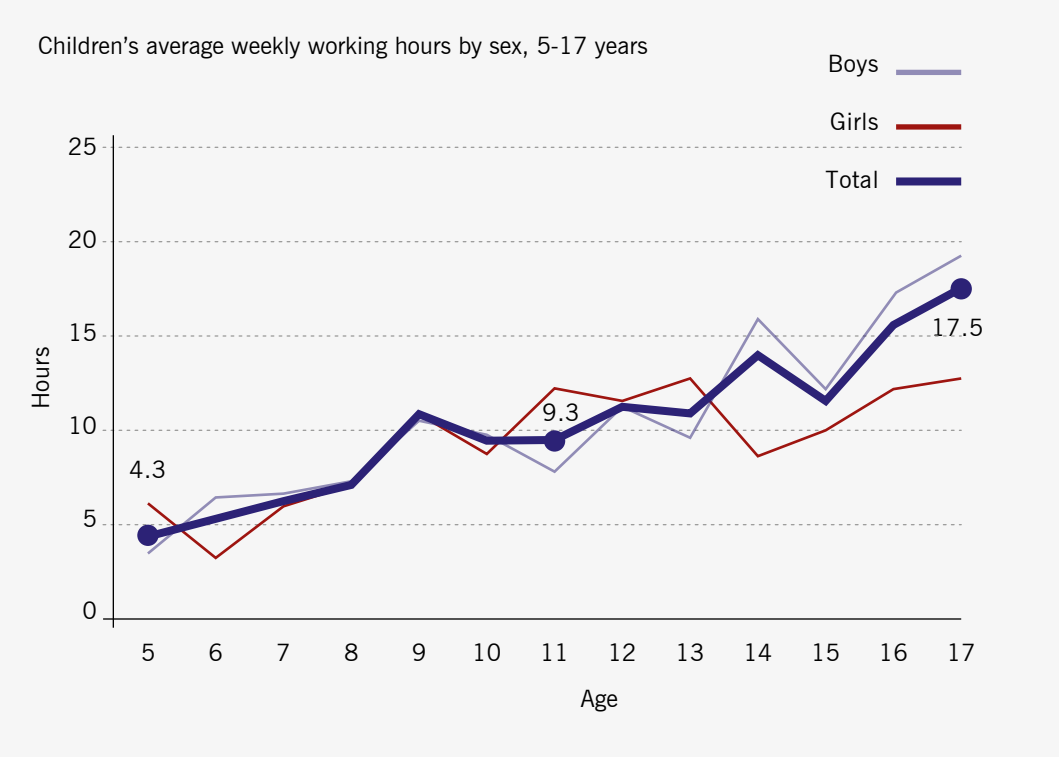
Notes: (1) Includes related activities.

Source: Calculations based on Armenia National Child Labour Survey (NCLS) 2015.

7 For further details, please visit the "Child labour in agriculture" section of the ILO-IPEC website: www.ilo.org/ipec/areas/Agriculture/lang--en/index.htm.

Working hours are important for the purposes of the present study because they provide insight into the length of children's exposure to any eventual health hazards in their workplaces. For children aged 5-17 years, the average weekly amount of time spent working is 13 hours. As reported in Table A3 in the Annex, boys log considerably more hours in employment than girls, and rural children spend slightly more time working than their counterparts living in cities in towns. Working hours for all groups of children rise significantly with age. As illustrated in with age; children aged 10 years work for 9 hours per week, and the average working hours increases to more than 17 for children aged 17 years.

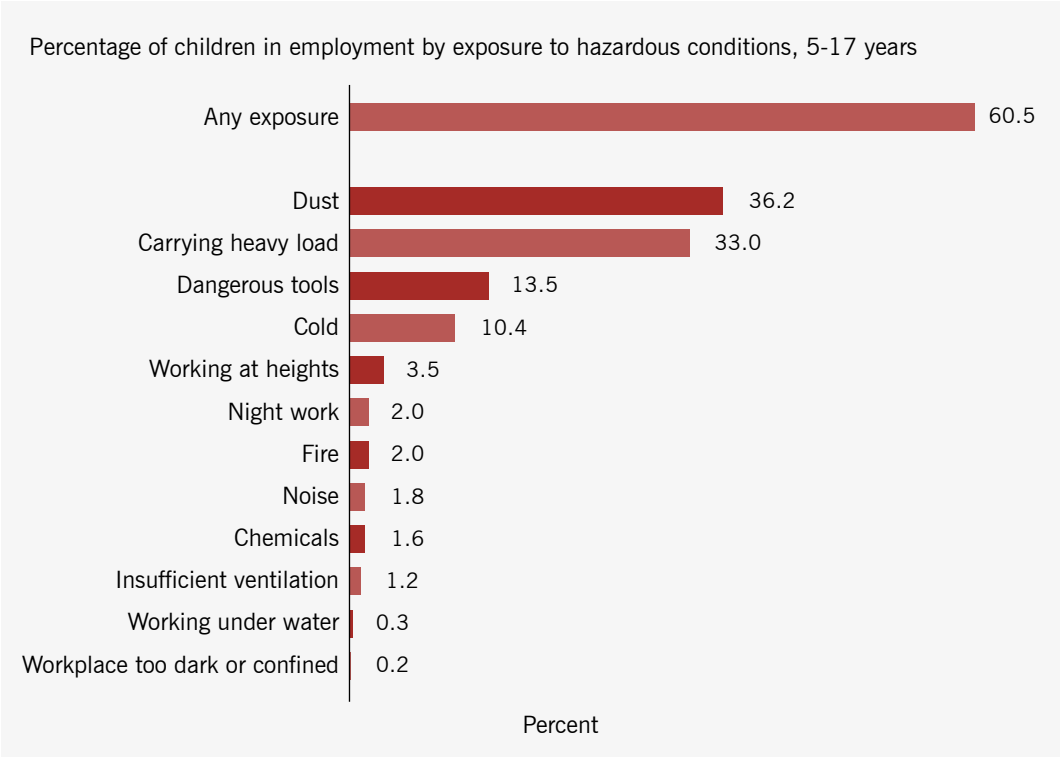
Figure 3. Children's average weekly working hours rises with age, reaching nearly 18 hours by the age of 17



Source: Calculations based on Armenia National Child Labour Survey (NCLS) 2015.

The National Child Labour Survey also collected information on the presence of hazardous conditions in children's workplaces, another indicator that is critical to understanding the health risk posed by children's employment. As reported in Figure 4, three out of every five children in employment are confronted with hazardous conditions in the workplace. Exposure to dust and carrying heavy loads are by far the most common hazards, experienced by 36 percent and 33 percent, respectively, of all those in employment. Other common hazards include the use of dangerous tools (13 percent), exposure to extreme cold (10 percent), working at high heights (4 percent) and night work (2 percent). These hazards are not of course necessarily mutually exclusive. Indeed, 53 percent of all working children experience at least two workplace hazards, and 12 percent experience three or more.

Figure 4. Sixty per cent of all children in employment experience some form of workplace hazard



Source: Calculations based on Armenia National Child Labour Survey (NCLS) 2015.

4. Children's work-related injury and illness

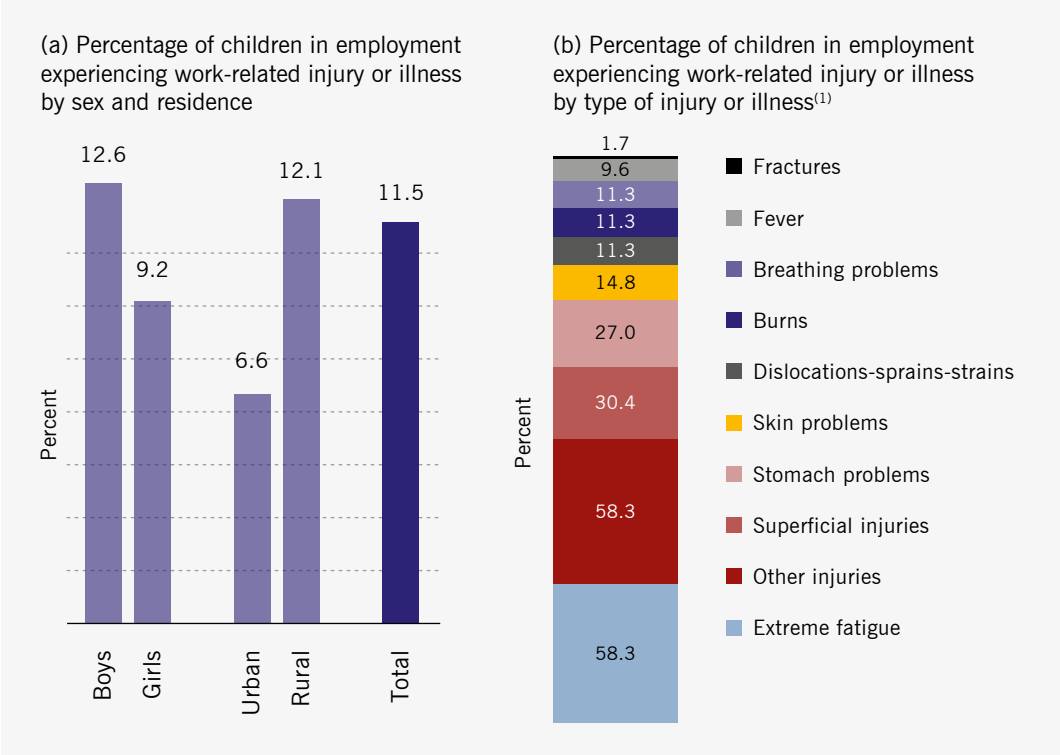
We now turn to evidence from the National Child Labour Survey on the impact of children's employment on their health, making use of the two broad indicators discussed earlier: the prevalence rate and the incidence density rate. The prevalence rate indicates how widespread the phenomenon is, while the incidence density conveys information about the risk of being injured or falling ill faced by working children. Taken together, the two indicators offer an as complete as possible picture within the limits of the NCLS 2015 dataset of work-related illness and injury experienced by children.

Prevalence of work-related injury and illness

The NCLS 2015 survey collected information on work-related health problems experienced by children aged 5-17 years through the Health and safety issues module. This survey module includes questions on injuries and ill-health due to work within a recall period of one year (*during the last 12 months*).

As reported in Figure 5a, nearly 12 percent of all children in employment in Armenia experienced some form of work-related illness or injury during the 12-month recall period. As also reported, there were large difference in the prevalence of health problems by both sex and residence. The share of girls experiencing work-related health problems (9.2 percent) was about one-third less than that for boys (12.6 percent), while the percentage of rural children experiencing work-related illness or injury (12.1 percent) was about twice that of children in cities and towns (6.6 percent). The results of a regression analysis controlling for possible confounding background factors support these patterns (Annex Table A7 and Table A8). The regression results underscore in particular the significance of rural residence as a risk factor.

Figure 5. About 12 percent of all children in employment experienced at least one episode of work-related injury or illness during the 12 months prior to the NCLS 2015 survey



Notes: (1) The sum is greater than 100 because individual children can experience multiple work-related injuries or illnesses.

Source: Calculations based on Armenia National Child Labour Survey (NCLS) 2015.

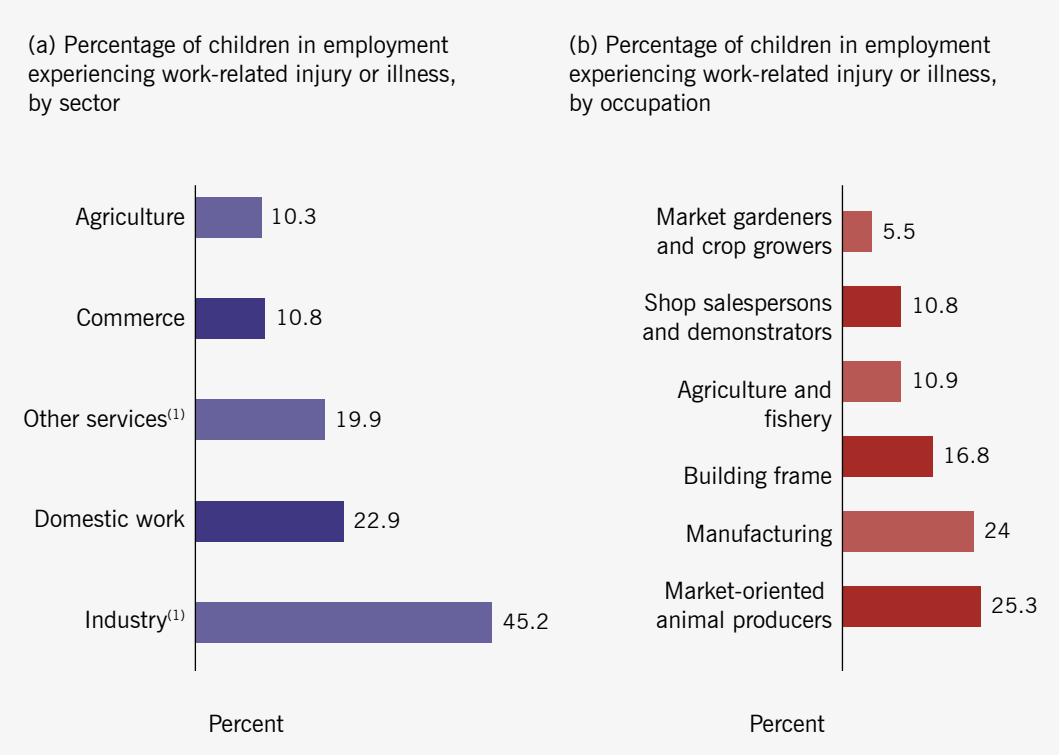
The specific type of injuries experienced by working children are reported in Figure 5b. Over 58 percent of all those reporting work-related injury or illness experienced extreme fatigue, 30 percent experienced superficial injuries and 27 percent had stomach problems. Skin problems affected 15 percent of working children, 11 percent suffered dislocations/sprains/strains, 11 percent experienced burns, 11 percent had breathing problems, 10 percent reported fever and 2 percent reported suffering bone fractures. Nearly 60 percent of all those reporting work-related health problems experienced various other forms of injuries or illnesses. As is obvious from this breakdown, most of those experiencing work-related health problems actually suffered from more than one, thus adding to the total adverse health impact of their work. Nearly four out of every five of all those experiencing work-related health problems suffered at least two episodes of ill-health, and more than two out of every five suffered three or more episodes of injury or illness.

Three important caveats should be kept in mind in interpreting these results. First, they may understate the total extent of health problems because of a simultaneity bias – they relate only to children who were working during the week prior to the survey, and *not* to possible additional working children who were not working during this precise one-week period because of work-related injuries or illnesses sustained prior to this period. Second, the results reflect only short-term health impacts, and not health problems arising from child labour that may arise later in the lifecycle. Third, the figures do not capture the *severity* of the illnesses or injuries caused by work, information that is also essential to understanding the degree to which work compromises children's health.

Work-related illness and injury by type of work

The health consequences of children's work appear to depend to an important extent on the sector in which the work takes place. As reported in Figure 6, health problems are by far most common in the industry sector, where 45 percent of children reported having experienced at least one work-related illness or injury during the 12 months recall period. Almost 23 percent of children working as domestic workers in third party households, 20 percent of those working in other service sector jobs and 11 percent working in commerce reported having suffering a work-related illness or injury during the recall period. Among children working in agriculture, who, it should be recalled, constitute most of the children in employment in Armenia, 10 percent reported experiencing illness or injury resulting from their work. Again, these figures are supported by the results of a regression analysis controlling for possible confounding background factors (Annex Table A7 and Table A8). The regression results show that working in both industry and domestic work significantly increases the risk of work-related health problems.

Figure 6. The share of working children experiencing injury or illness relating to their work varies considerably across sectors and occupations



Note: (1) Industry includes manufacturing, construction, mining, electricity, gas and water; other services includes transport, hotels and restaurants.

Source: Calculations based on Armenia National Child Labour Survey (NCLS) 2015.

These figures mask significant differences by sex, pointing in turn to gender-based specialization in children's work *within* economic sectors. Girls and boys, in other words, are often assigned different work responsibilities or roles that can have different consequences for their health. In both the industry and the domestic work sectors, the prevalence of work-related health problems is much higher for girls, while a larger share of boys suffer work-related health problems in the

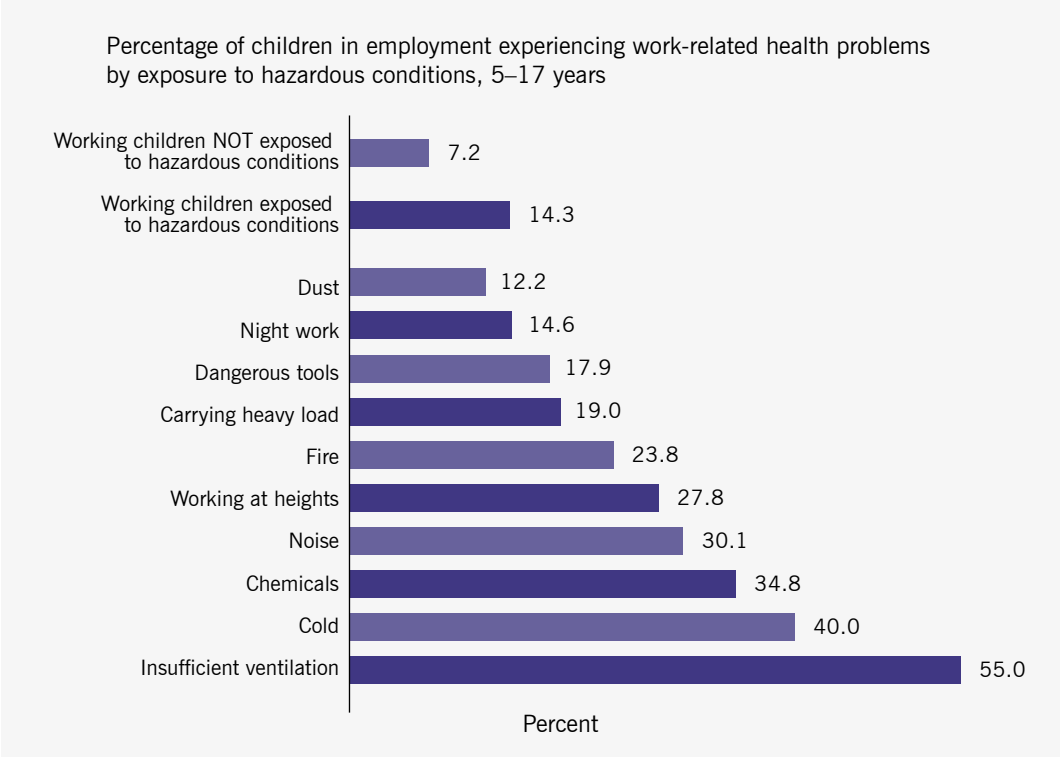
commerce sector. In the agriculture sector, by contrast, there is little difference between girls and boys in terms of the prevalence of work-related health problems (Table A4 in the Annex).

The health consequences of children's work appear also to depend on the occupational categories in which they work. Within the agriculture sector, the prevalence of work-related health problems is highest among those working in commercial animal husbandry (25 percent), followed by agriculture, fishery and related activities (11 percent) and by commercial crop production and gardening (6 per cent). Outside the agricultural sphere, the prevalence of work-related health problems is 24 percent for children working in manufacturing and 11 percent for children working as shop salespersons and demonstrators.

Work-related illness and injury by exposure to hazardous conditions

The analysis of the health impact of exposure to hazardous *conditions* in the workplace offers another lens through which to view the health risks of children's work. As reported in Figure 7, children's exposure to hazardous conditions in the workplace correlates closely to work-related health problems. Fourteen per cent of all working children exposed to hazardous conditions experience illnesses or injuries associated with work, compared to 7 percent of other working children.

Figure 7. Children exposed to hazardous conditions in the workplace are twice as likely as other working children to experience work-related health problems



Source: Calculations based on Armenia National Child Labour Survey (NCLS) 2015.

Figure 7 also reports the prevalence of work-related health problems associated with exposure to specific workplace hazards. Workplaces where children are exposed to insufficient ventilation are associated with the highest prevalence of work-related health problems. Fifty-five per cent of

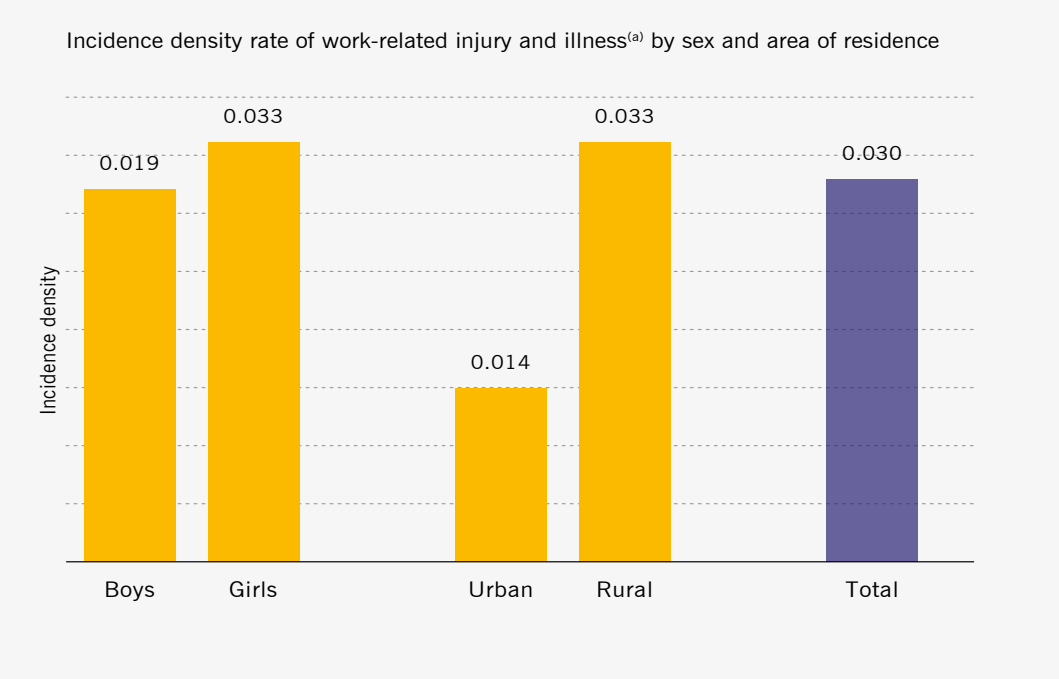
all those exposed to insufficient ventilation suffer from work-related illness or injury. Prevalence of work-related health problems are next highest children exposed to extreme cold (40 percent), chemicals (35 percent), noise (30 percent) and high heights (28 percent). Using a regression analysis to control for possible confounding background factors, heavy loads and exposure to cold emerge as particularly significant risks to children's health in the workplace (Table A7 and Table A8 in the Annex).

It should be stressed in interpreting these figures that a large share of total working children who are exposed to hazards – 60 percent – are actually exposed to more than one type of hazard, increasing the probability of suffering of illness or injury due to work. It should also be emphasized that these results do *not* necessarily mean that the children who remain healthy are immune to the effects of the hazardous conditions, as it is possible, indeed, even probable, that health problems will emerge in the future with further exposure to the hazardous conditions.

Incidence density rate and relative risk

The incidence density rate provides an indication of the relative risk of work-related illness or injury faced by working children. Unlike the simple estimates of prevalence rates presented above, the incidence density accounts for the possibility that observed differences in prevalence can be due to differences in the time of exposure.[8]

Figure 8. The risk of work-related injury or illness is highest for working children residing in rural areas



Notes: (a) We report the incidence density rate multiplied by 100.

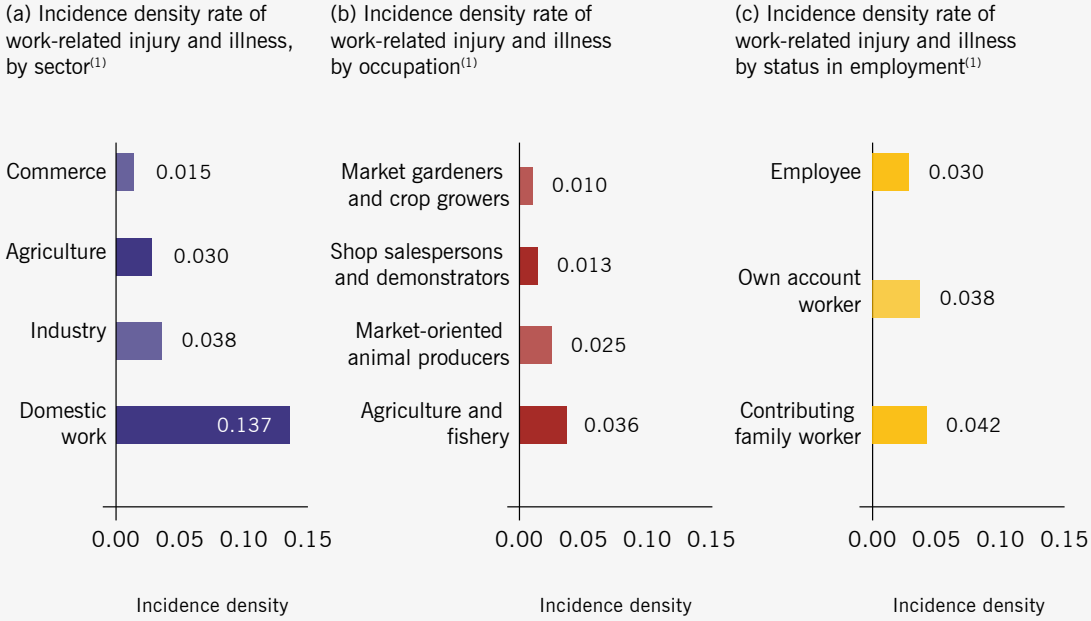
Source: Calculations based on Armenia National Child Labour Survey (NCLS) 2015.

8 In other words, the incidence density controls for the possibility that a larger share of children experience work-related health problems in a hypothetical sector A than from work in a hypothetical sector B not because sector A is inherently more dangerous or unhealthy, but rather because children in sector A work on average for longer hours.

Figure 8 reports the incidence density rates for work-related ill-health, by sex and area of residence. As shown, working children in rural areas face a much higher risk of work-related health problems than their peers living in cities and towns; girls face a slightly higher risk of injury or illness at work than boys.

The incidence density indicator allows us also to compare the health risks faced by children working in different sectors, occupations and status categories. As reported in Figure 9a, children in domestic work face a much higher risk than those working in other sectors. Variations in health risk faced by children in different occupational and status categories are smaller (Figure 9b and 9c); children working in agriculture and fishery face a higher risk than those in other occupations, and children who are contributing family workers face a higher risk than children who are own account workers or employees.

Figure 9. The risk of work-related injury or illness varies considerably across different work sectors, occupations and work arrangements



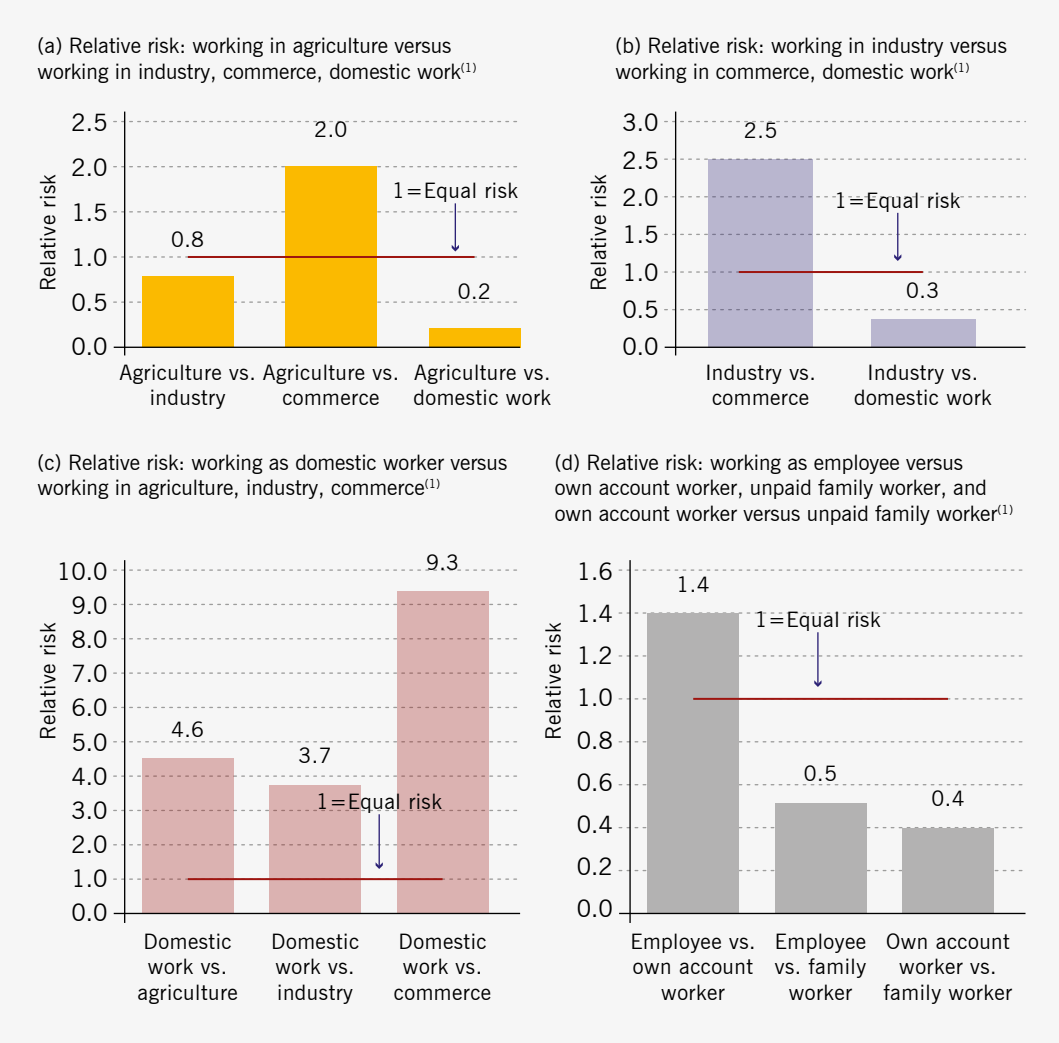
Notes: (1) We report the incidence density rate multiplied by 100.

Source: Calculations based on Armenia National Child Labour Survey (NCLS) 2015.

Simple values of relative risk, calculated by dividing the incidence density rate of injury or illness in one sector (or status category) with that of another sector (or status category), offer another means of illustrating these differences in health risks faced by children in different types of work.[9]

9 A value greater than one indicates that the health risk associated with work in the first sector (or status category) is greater than the risk associated with work in the second sector (or modality).

Figure 10. A value of relative risk underscores the large differences in risk associated with children's work in different sectors and work arrangements



Notes: (1) Relative risk is calculated as the incidence density of work-related ill-health of the first sector (or modality) divided by the incidence density of the second sector (or modality). A value of greater than one, therefore, indicates that the health risk associated with work in the first sector (or modality) is greater than the risk associated with work in the second sector (or modality).

Source: Calculations based on Armenia National Child Labour Survey (NCLS) 2015.

5. Discussion

The statistics from the National Child Labour Survey make clear that children's work in Armenia is often associated with adverse health consequences. Twelve per cent of all working children experienced some form of work-related ill-health during the 12-month period prior to the survey, of which nearly 80 percent experienced multiple episodes of injury or illness due to work. Moreover, these prevalence rates understate the total extent of work-related health problems, because they do not capture children whose work-related ill-health meant they were unable to work at the time of the survey and nor do they reflect possible long-term health consequences associated with work during childhood.

Incidence density values, which also take into account total time of exposure, underscore that the health risk posed by children's work is by no means homogeneous. Children in domestic work appear to face the highest risk of work-related health problems, followed by those in industry, agriculture and commerce. Children working within their own family units are more likely to experience health problems than their peers who are self-employed or who work as employees.

These results provide a valuable initial indication of where in the economy the health risk posed by children's work is greatest, and a useful starting point for country efforts towards a national list of hazardous work. But large knowledge gaps persist, underscoring the importance of further research in the area of children's work and health in the country to guide policy formulation.

Of particular importance, information from 2015 National Child Labour Survey only permitted an analysis of the health impact of children's work in different sectors and occupations at the most general, 1-digit, level of classification, which is by definition too broad to pinpoint the health risks associated with the specific work tasks and work arrangements of children. Specialised surveys are needed that allow meaningful conclusions to be drawn concerning the relative health risk of work decomposed at more detailed, 2-, 3- and 4-digit levels of detail. This is especially the case for the agriculture sector, where working children in Armenia are overwhelmingly concentrated. In addition, the NCLS 2015 did not permit insight into the severity of health problems due to work or into the impact of more prolonged exposure to work, information that is at least as important as prevalence, and that also needs to be addressed in a specialized survey.

Further research should fully exploit the extensive existing body of evidence on work-related health risks of different types of work contained in the ILO Encyclopaedia of Occupational Health and

Safety (OSH).[10] The Encyclopaedia does not specifically relate to children's work, but children are the group most susceptible to the occupational health and safety risks identified in it. Specialised surveys that generate more detailed information about the specific sectors where children are found working could be matched with the extant information in the Encyclopaedia on the health consequences of work in these sectors as an additional means of gaining understanding of the health risks of children's work.

10 See, ILO Encyclopaedia of Occupational Health and Safety (OSH) at www.iloencyclopaedia.org/.

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Annex: Additional statistics

Descriptive statistics

Table A1. Children's employment and schooling, 5-17 years

Sex and residence		(a) Only in employment	(b) Only in school	(c) In employment and school	(d) Neither in employment nor in school	(a)&(c) Total in employment	(b)&(c) Total in school	(a)&(d) Total out-of-school
Sex	Boys	1.4	82.1	12.5	4.2	13.8	94.5	5.5
	Girls	0.2	87.4	7.5	4.9	7.7	94.9	5.1
Residence	Urban	0.3	94.4	2.0	3.3	2.3	96.4	3.6
	Rural	1.5	72.5	20.1	6.0	21.6	92.6	7.4
Total		**0.8**	**84.6**	**10.1**	**4.5**	**11.0**	**94.7**	**5.3**

Source: Calculations based on Armenia National Child Labour Survey (NCLS) 2015.

Table A2. Children's employment by sector of employment and sex, 5-17 years

Sector of employment	Sex		Residence		Total
	Boys	Girls	Urban	Rural	
Agriculture	89.8	94.3	63.6	94.9	91.3
Manufacturing	1.8	0.6	3.4	1.1	1.4
Construction	1.3	0.0	3.6	0.5	0.9
Other industries	0.2	0.0	1.2	0.0	0.1
Retail trade, repair	4.0	1.7	17.9	1.4	3.3
Domestic workers	2.1	1.7	5.7	1.5	2.0
Other services	0.8	1.7	4.6	0.6	1.1
Total	**100**	**100**	**100**	**100**	**100**

Source: Calculations based on Armenia National Child Labour Survey (NCLS) 2015.

Table A3. Children's average weekly working hours by sex and area of residence, 5-17 years

Sex	Urban	Rural	Total
Boys	16.7	13.7	14.1
Girls	13.5	10.5	10.8
Total	**15.9**	**12.6**	**13.0**

Source: Calculations based on Armenia National Child Labour Survey (NCLS) 2015.

Table A4. Percentage of children in employment experiencing work-related health problems by sector and sex, 5-17 years

Sector of employment	Boys	Girls	Total
Agriculture	11.1	8.6	10.3
Industry	42.9	72.9	45.2
Commerce	11.7	6.1	10.8
Domestic work	18.2	34.5	22.9
Other services	41.7	0.0	19.9

Source: Calculations based on Armenia National Child Labour Survey (NCLS) 2015.

Table A5. Percentage of children in employment experiencing work-related health problems by sector of employment and area of residence, 5-17 years

Sector of employment	Urban	Rural	Total
Agriculture	4.8	10.7	10.3
Industry	16.8	63.6	45.2
Commerce	12.0	8.6	10.8
Domestic work	-	34.6	22.9
Other services	-	39.3	19.9

Source: Calculations based on Armenia National Child Labour Survey (NCLS) 2015.

Table A6. Percentage of children in employment experiencing work-related health problems by main occupations, 5-17 years

Main occupations	Percent
Agriculture, fishery and related activities	83.4
Market gardeners and crop growers	7.1
Market-oriented animal producers and related activities	2.3
Shop salespersons and demonstrators	1.6
Market-oriented crop and animal producers	1.2
Manufacturing	0.8
Building frame and related trades	0.6
Food processing and related trades	0.5
Other	2.6

Source: Calculations based on Armenia National Child Labour Survey (NCLS) 2015.

Regression analysis

Table A7. Regression analysis on experiencing any type of injuries - Marginal effects on children in employment, 5-17 years

	dy/dx	z
Age	0.0306	1.26
Age square	-0.0013	-1.37
Girls	-0.0019	-0.08
Household size	-0.0091	-0.99
Education of the household head[a]		
Secondary	0.006	0.11
Vocational/specialized secondary	-0.0009	-0.01
Higher education	-0.0237	-0.36
Log of household expenditure	0.0446	1.71
Area of residence: rural	0.0759***	3.71
Weekly working hours	-0.0002	-0.14
Sector of employment[b]		
Industry	0.3661**	2.71
Commerce	0.0295	0.46
Domestic work	0.2045	1.85
Other services	0.0361	0.48
Night work	-0.0004	-0.64
Heavy load	0.0006**	2.71
Dust	-0.0006*	-2.43
Fire	-0.0004	-0.49
Noise	0.0008	1.02
Cold	0.0018***	6.68
Dangerous tools	0.0002	0.82
Heights	-0.0004	-1.04
Water	-0.0002	-0.23
Dark or confined space	0.0005	0.28
No ventilation	0	0.07
Chemicals	0.0004	0.75
N	1064	

Notes: Reference categories (a) Education of the household head: primary or less; (b) Sector of employment: agriculture.
t statistics, in parentheses.
Significance level: * p<0.05; ** p<0.01; *** p<0.001.

Table A8. Logit estimation - Children in employment experiencing any type of injuries, 5-17 years

	Coef.	Z
Age	0.3563	(1.28)
Age square	-0.0157	(-1.39)
Girls	-0.0224	(-0.08)
Household size	-0.1063	(-1.00)
Education of the household head[(a)]		
Secondary	0.0698	(0.10)
Vocational/specialized secondary	-0.0111	(-0.01)
Higher education	-0.3085	(-0.37)
Ln household expenditure	0.5192	(1.73)
Area of residence: rural	1.1669**	(2.79)
Weekly working hours	-0.0024	(-0.14)
Sector of employment:		
Industry[(b)]	2.3894***	(3.64)
Commerce	0.3301	(0.50)
Domestic work	1.5827*	(2.54)
Other services	0.3955	(0.53)
Night work	-0.0049	(-0.64)
Heavy load	0.0069**	(2.79)
Dust	-0.0075*	(-2.39)
Fire	-0.0043	(-0.49)
Noise	0.0096	(1.02)
Cold	0.0215***	(6.35)
Dangerous Tools	0.0028	(0.82)
Heights	-0.0051	(-1.05)
Water	-0.0021	(-0.23)
Dark or confined space	0.0053	(0.28)
No ventilation	0.0005	(0.07)
Chemicals	0.0049	(0.75)
constant	-11.1598**	(-2.78)

Notes: Reference categories (a) Education of the household head: primary or less; (b) Sector of employment: agriculture.
t statistics, in parentheses.
Significance level: * p<0.05; ** p<0.01; *** p<0.001.

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