The SIMPOC Philippine Survey of Children 2001: A Data Source for Analyzing Occupational Injuries to Children

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SYNOPSIS

Child labor is a global issue that exists in both industrialized and developing countries. With the unanimous adoption of International Labour Organization (ILO) Convention No. 182 in 1999 calling for the immediate elimination of the worst forms of child labor, ratifying member countries have committed themselves to identifying hazardous work for children in the context of their respective legislative frameworks. Part of tackling the problem of child labor is knowing what types of occupational activities children are engaged in, what types of work environments they are under, and what risks of injuries and illnesses they are exposed to while working. Using the Philippines as a country example, this study introduces a promising data source on children's work and presents a methodology for examining hazardous work to children through the examination of injury rates. Data for this study rely primarily on a nationally representative dataset from the Survey of Children 2001 carried out by the Philippine National Statistics Office, covering the months of October 2001 to September 2002.

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Public health practitioners and policy makers have responded to the contribution of occupational injuries to morbidity and mortality rates by promoting injury prevention strategies to protect individuals in the workplace. While increased attention is being paid to the global situation of unintentional childhood injuries such as drownings, falls, fire-related injuries, poisonings, and traffic-related injuries,¹⁻³ occupational injuries and fatalities of children who work have not received the same attention.⁴ Working children and the effects of their work activity should not be considered marginal. In 2000, the International Labour Organization (ILO) estimated that approximately 211 million children aged 5 through 14 years are working around the world—mostly in developing countries.⁵ Of these children, 111 million or approximately 53% of all working children are in “hazardous forms” of child labor.⁵ Studying the epidemiology of work-related injuries to children can contribute to the identification of hazardous work for and prevention of injuries to children. Given the substantial numbers of working children globally, the relative importance of systematically investigating what constitutes hazardous work is necessary. In this article, we discuss one of the ILO’s Statistical Information and Monitoring Program on Child Labor (SIMPOC) data sets. SIMPOC is a relatively new and developing data source for studying children’s occupational injuries and illnesses.

Many children in developing countries are found working in environments that are considered hazardous (e.g., commercial and small-scale agriculture, construction, deep-sea fishing, domestic service, fireworks production, and mining and quarrying).⁶⁻⁸ Work that exposes children and youth to motor vehicles and mobile machinery, harmful substances (e.g., pesticides, fertilizers, cleaning solutions and disinfectants, asbestos, lead, benzene), and noise can cause acute and chronic health effects, and even death, among children.⁹ The identification of hazardous forms of work often comes from descriptive qualitative research or anecdotal evidence (Unpublished manuscripts. Mull LD, United States Agency for International Development, EGAT Division. Analysis of job tasks and activities performed by children in cocoa production; 2003; Kielland A, Tovo M. Child labor in Africa: the facts and the faces; 2005). To date, most of the empirical studies surrounding occupational injuries to children and youth are based on industrialized country examples such as the United States,¹⁰⁻¹² with a majority of these studies investigating agricultural-related injuries to children working on farms.¹³⁻¹⁵ Surprisingly, few studies focus on the incidence of working children’s injuries in developing countries, despite the high relative rate of child labor found there.^{10,16}

There are different approaches to assessing the risks that children face during work hours. One method for understanding and quantifying the dangers working children face is to look at absolute and relative risks of occupational injuries. Comparing risks of injuries and illnesses among children working in various industries and occupations and among children of different ages and gender contributes to our understanding of the severity of hazards imposed on children in different work environments. In the United States, for example, young people working in agriculture had a risk of fatality 4.4 times that of the average youth worker. Young people aged 15 through 17 years working in construction

had a risk of fatality two times that of construction workers aged 25 through 44. Young people who were self-employed or working in a family business, regardless of industry, had a risk of fatality four times that of other working youth.¹⁷ This type of information can lead to more appropriate and targeted safety and health regulations and injury prevention strategies for children and young people. Because the type and conditions of work that children are exposed to differ between developing and industrialized countries, and even within countries, individual country studies are needed to determine the risk factors for injuries specific to the cultural, developmental, geographic, occupational, and socioeconomic situation of the working child.^{13,18,19}

To date, data sources on occupational injuries and illnesses to children are not as comprehensive and have been conducted mostly in developed countries. In industrialized countries such as Australia, New Zealand, and the United States, injury surveillance studies on children’s fatal and non-fatal injuries have included mostly retrospective examinations of workers’ compensation data, hospital charts, and death certificates.²⁰⁻²⁶ Traditionally, these types of administrative data sources on adult occupational injuries have often suffered from issues of coverage and underreporting. Occupational injury surveys typically cover paid employees in formal sector establishments and do not include other types of workers like informal sector workers, the self-employed, workers in agriculture, and young workers.²⁷

To better understand the nature and extent of child labor, as well as inform policy and program design on a national level, governments, international agencies, research institutions, and nongovernmental organizations have undertaken considerable efforts to collect data on children and their work. The SIMPOC of the ILO has been leading the way by partnering with more than 40 countries to conduct surveys specifically designed to improve the understanding of children’s work and child labor in individual developing countries. Many SIMPOC surveys include questions that can be used to help identify hazardous forms of work. These questions contain information on occupation and industry, hours of work, time of day work is carried out, exposure to hazardous work environments, and whether children suffered work related injuries or illnesses.^{28,29}

As part of the ILO-International Program on the Elimination of Child Labor (IPEC) technical assistance projects, the Philippines have conducted two rounds of SIMPOC surveys. The child labor surveys conducted in the Philippines in 1995 and 2001 are unique because they were designed to provide data on the relationship between children’s work and health outcomes that can be statistically generalized to the population of working children. Compared with other SIMPOC national surveys, the Philippine Survey of Children (SOC) 1995 and 2001 consist of a series of occupational exposure-related questions that the other SIMPOC surveys in developing countries do not contain.

The child questionnaire of the SOC 2001 offers a unique opportunity to study the distributions of and risk factors associated with occupational injuries and illnesses. The survey includes basic work-related questions such as occupation and industry, status of employment, place of employment, and hours worked. Unlike most other surveys, the SOC 2001

collects detailed data on exposure to chemicals (e.g., gas, vapors, gasoline), hazardous physical environments (e.g., excessive temperatures, inadequate lighting), and biological hazards (e.g., bacteria, fungus, parasites). These types of exposure data are useful for determining what makes a particular occupation hazardous. The survey also includes questions as to whether the child experienced a work-related injury or illness, including detailed information on the type of injury or illness and the severity of injury.

The objective of this article is to use the Philippines SOC 2001 to illustrate the potential of the SIMPOC surveys for investigating occupational injuries and illnesses among working children. Specifically, we use the SOC 2001 data to demonstrate one approach to systematically calculating injury and illness rates to suggest hazardous areas of work. The first section introduces the SOC 2001, explains the data collection, and describes occupational safety and health items included in the survey. The second section outlines a method for calculating injury and illness incident rates and relative risks using the information from the SOC 2001. Finally, the third section discusses potential biases that researchers may encounter in using the SOC 2001 when researching occupational injuries and illnesses to children.

METHODS

The SIMPOC Philippine SOC 2001

The SIMPOC Philippine SOC 2001 is one of the few surveys on working children in a developing country that provides national estimates of occupational injuries and illnesses. The objectives of the SOC 2001 were to collect data on the demographic, health, and socioeconomic characteristics of working children aged 5 through 17 years and their households, and to provide information for national and regional policy and program development.³⁰

The SOC 2001, a module containing a questionnaire related to children's work, was attached to the quarterly Labor Force Survey (LFS) conducted in October 2001 by the Philippine National Statistical Office (NSO). It is a cross-sectional, nationally representative survey with a sample of 17,444 households and 6,351 working children aged 5 through 17 years.³¹ Data from the survey cover the months from October 2001 to September 2002, and the standard reference period regarding labor force participation was the 12 months preceding the date of interview.

The SOC 2001 collected data through personal interviews using two separate questionnaires. The first questionnaire, SOC Form 1, was directed to the head of the household or parent. This questionnaire collected data on the demographic and socioeconomic profile of households with children aged 5 through 17 years (e.g., household membership, household-operated activities, and information on working children). The second questionnaire, SOC Form 2, was directed to all children in the household who worked for at least one hour during the past 12 months, as identified by the household respondent. The purpose of this questionnaire was to collect detailed information directly from the children on their work and school activities, employment conditions (including occupational safety and health), attitudes toward work, and future aspirations.^{31,32} The SOC Form

1 had a response rate of 99.9%, and SOC Form 2, a response rate of 97.4%.³⁰

In addition to workplace exposures, occupational safety, and health items, the child questionnaire included questions regarding frequency of night work, adult supervision, performance of heavy physical work, experience of stress or boredom, types of tools handled, use of personal protective equipment, years of work experience, and perceptions of risk or danger at work. These elements have all been documented as risk factors for occupational injuries and can be tested as potential risk factors for work-related injuries to children using the SOC 2001.^{33–35}

Assessing the risk of injuries and illnesses to working children

There are two main approaches to assessing the risk of injuries and illnesses to working children. One approach compares the relative risk of injury and illness for working children to nonworking children. This approach allows one to consider whether working children are at greater risk of injury or illness than nonworking children. A second approach is to calculate total rates of injuries and illnesses for working children by occupation or industry. This approach can rank order relative risks of injury and illness by occupation or industry for working children based on a particular reference group, and it permits the evaluation of whether children working in certain occupations or industries are at a greater risk of injury or illness than children working in other sectors. These methods can provide a useful assessment for investigating the risk of injuries or illnesses to working children, and for identifying hazardous forms of child labor. Since the SOC 2001 lacks information on nonworking children and does not collect information on general injury and exposure status, our approach focuses on the latter.

Comparing rates of injuries and illnesses across industries and occupations in the population of working children can assist researchers in learning which sectors of work are the most hazardous for children. The set of risk factors that a child encounters at work is determined in part by job characteristics, including industry and occupation. As such, differences in injury and illness rates across these categories can account for inherent differences in hazards associated with particular forms of work. However, because hours worked by children vary by occupation and industry, the amount of time they spend exposed to injury or illness risk factors differs as well. Generally, children who work more days and longer hours are at greater risk of occupational injuries and illnesses. In other words, children who spend more time working have longer exposure durations. Therefore, hours of work—as a proxy for hours of exposure—also must be controlled for in the calculation of risk to more precisely identify hazardous jobs.

While this analysis is limited to one example of how the SOC 2001 can be used, it is important to extend the analysis described above by age and gender. Since work hours, as well as occupation and sector of employment, vary by the age and gender of the working child, we would expect to see systematic differences in exposure to risk for girls and boys in different age groups. Age and gender also are related to a

child's physiological maturity, and therefore his or her ability to endure a given exposure without suffering an injury.³⁶

Constructing an incidence rate for injuries and illnesses

In studying injury and illness causation or prevention, the outcome of interest is the occurrence of an injury or illness and its sequelae. The SOC 2001 allows for the calculation of two measures of risk using data on injuries and illnesses and hours worked. The first measure, the *incidence rate for injuries or illnesses*, is the number of injuries or illnesses per hours worked. The second measure of risk, the *relative risk*, compares the incidence rate for injury of a group of interest, such as agricultural workers, to a reference group—for example, children working in the non-agricultural sectors. This measure provides information on how much the risk of injuries or illnesses for the group of interest differs from the reference group.³⁷ In computing either measure, the figures needed for the calculations include the number of injuries, as well as the number of person-hours worked for the child and the total population.

In the example to follow, we investigate the incidence rates for only work-related injuries—not illnesses. This is due to the greater assurance of ascribing injuries to work-related events. That is, if a child falls at work, it is clearly a work-related injury. However, if a child feels nauseous at work, it could be because of heat exposure from prolonged time in the sun or because of something bad that was eaten. Therefore, in determining the number of injuries, the most generous definition of injury is used, and a child is considered to have a work-related injury if the child answered “yes” to having ever experienced an injury while working. The population of interest is further restricted to only those chil-

dren who experienced an injury based on a follow-up question regarding the type of injury the child experienced. More restrictive definitions of injury could be used such as considering only those injuries that required treatment and/or those that caused the child to stop working temporarily or permanently. It is important to note that the sample in the SOC 2001 is limited to children who were working during the 12-month reference period and did not suffer a fatal injury or illness. Therefore, only occurrences of non-fatal occupational injuries and illnesses are captured in the SOC 2001. Figure 1 shows the structure of illness- and injury-related questions asked in SOC 1, including the list of various injuries or illnesses that a child may have experienced while working.

The number of person-hours worked is also based on information from the survey. Time estimates of risk in the denominator for the specified population, such as children working in agriculture, can be derived from the estimated number of hours worked during the 12-month reference period. Compared to counting the number of injury or illness occurrences, determining the number of hours a child worked over the course of the reference period is a little more difficult because certain assumptions need to be made regarding specific time estimates. Figure 2 presents the time-related questions used to derive the number of person-hours worked for the population of working children. In addition to the usual number of days a child works per week, which requires no re-coding or manipulation, the normal hours of work and the number of work months per year associated with the nature of employment are used to calculate annual person-hours worked. The latter two work-time categories, hours worked per day and months worked per year, require that some assumptions be made.

Figure 1. Injury and illness-related questions in Philippine Survey of Children Form 2 children's questionnaire

Question number	Question and response options
B12	Have you ever experienced any injuries or illnesses while working? 1 Yes (GO TO B12a) 2 No (GO TO B13)
B12a	If Yes in B12, which of the following injuries/illnesses did you suffer from? (Multiple responses)
	<i>Injuries</i>
	Contusions, bruises, hematoma, abrasion ☐
	Cuts ☐
	Wounds/punctures ☐
	Amputation, loss of body parts ☐
	Crushing injuries ☐
	Dislocations, fractures, sprains ☐
	Burns ☐
	Other, specify _____ ☐
	<i>Illnesses</i> ☐
	Skin diseases (skin allergy, eczema, etc.) ☐
	Body aches/pains (head, neck, back, hand, wrist, joints) ☐
	Eye strain/eyesight impairment ☐
	Hearing impairment ☐
	Respiratory (e.g. asthma, TB, pneumonia, etc.) ☐
	Gastro intestinal (e.g. ulcer, hepatitis, etc.) ☐
	Other, specify _____ ☐

SOURCE: National Statistics Office. Survey of children 5–17 years old (SOC Form 2): child questionnaire. Manila: National Statistics Office; 2001.

Figure 2. Time-related questions in Philippine Survey of Children Form 2 children's questionnaire

Question number	Question and response options
B1c	What was the nature of your employment during the past twelve months? 1 Permanent 2 Short-term/casual 3 Seasonal/school vacation 4 Worked for different employers on a day to day/week to week basis 5 Other, specify_____
B1f	What were your normal working hours per day for the past twelve months? 1 1 to 4 hours 2 5 to 8 hours 3 9 to 10 hours 4 More than 10 hours
B1g ^a	How many days in a week did you actually work during the past twelve months? □

SOURCE: National Statistics Office. Survey of children 5–17 years old (SOC Form 2): child questionnaire. Manila: National Statistics Office; 2001.

^aThis was an open-ended question; the child provided the response.

The normal hours of work per day question has four pre-coded response categories: 1 to 4 hours, 5 to 8 hours, 9 to 10 hours, and more than 10 hours. For the last category, more than 10 hours, we set an upper bound of 16 hours, assuming that a child has at least 8 hours of non-work time each day. To estimate the usual hours worked per day, we take the midpoint of the child's response category to define normal work hours per day.

For the number of months a child worked over the reference period, specifications for the actual average number of months associated with each category for the nature of employment are assigned to each type of worker. The child is asked about the nature of his or her work in the last 12 months. There are five possible responses to this question: (1) permanent, (2) short term/casual, (3) seasonal/school vacation, (4) worked for different employers on a day-to-day/week-to-week basis, and (5) other. The technical notes from the enumerator's manual specify the duration for "permanent" employment to be at least a year.³³ However, the duration for the nature of employment categories of short-term/casual, seasonal/school vacation, work for other employers, and other is not specified by the Philippine NSO. Therefore, the number of months assigned to other categories of nature of employment is based on previous research conducted in the Philippines on child labor and children working in agriculture.³⁸

The "seasonal/school vacation" item can reasonably be translated into an average of four months to correspond with the length of school holidays in the Philippines. For children who work on a short-term/casual basis, a duration of six months is assigned to this category of work, keeping in mind that these estimates may vary by child.³⁸ For example, the seasonal nature of work for children who work in agriculture may actually exceed the number of months for school vacations. In cases where other SIMPOC surveys do not specify the number of months associated with the nature of employment, country-specific research should be reviewed to determine the approximate number of months to appropriately link with the nature of employment.

No information is collected on the usual number of weeks worked per month, so it is assumed that children work 4.33 weeks each month.

Although certain assumptions are made in the construction of the person-time component of the incidence rate for injury, the person-time component is still a more accurate measure of exposure time at-risk, compared with the assumption that each child works for equivalent amounts of time. Still, these assumptions about children's time at work may artificially inflate or deflate the denominator for person-time, leading to biased incidence rate estimates.³⁹

The following example illustrates how the time-related questions from the SOC 2001 are used to compute the number of person-hours a child worked during the reference period (12 months in this case). Consider a child identified as a "seasonal worker" (or, alternatively, one who indicates working during school vacations) who reported that he or she normally worked five to eight hours per day for an average of three days per week during the 12-month reference period. The person-hours worked for this particular child would be:

$$\left(\frac{6.5 \text{ hours}}{\text{day}} \times \frac{3 \text{ days}}{\text{week}} \right) \times \frac{4.33 \text{ weeks}}{\text{month}} \times \frac{4 \text{ months}}{\text{year}} = \frac{337.74}{\text{person-hours worked/year}}$$

The sum of the person-hours worked for each individual working child will then make up the denominator for the incidence rate for injury. Thus, the incidence rate for injury per 100 person-hours worked is:

$$\frac{\text{Numbers of working children who reported an injury in the 12-month reference period}}{\text{Sum of person-hours worked for the total population of working children in the 12-month reference period}} \times 100$$

or

$$\text{Incidence Rate} = \frac{\sum_i \text{injury}_i}{\sum_i \text{person-hours worked}} \times 100,$$

where i indexes working children. The variable *injury* is set equal to 1 if child i suffered an injury, and 0 otherwise.

Calculating relative risk

Once incidence rates for injuries are computed by industry or occupation, a relative risk can be calculated by taking the ratio of the injury incidence rate for children working in one sector to the injury incidence rate for children working in another sector. For example, an index of relative risk can be calculated by taking the ratio of the injury incidence rate of children working in agriculture (risk in exposed group) to the injury incidence rate for children working in non-agricultural activities (risk in unexposed group). This measure of relative risk demonstrates the injury risk for children working in agriculture relative to the injury risk faced by children working in non-agricultural activities, and reveals if and how they are different. If the relative risk is >1 , then the study group of interest has a greater risk of injury than the reference group. If the relative risk is <1 , then the study group of interest has a lower risk of injury than the reference group. Finally, if the relative risk is equal to one, then the risk of injury to the study group of interest is equivalent to the risk of injury to the reference group. In other words, there is no difference in the risk of injury for the study group of interest.

Statistical methods

Our goal in this article is to describe how the SOC 2001 can be used to study occupational hazards faced by child workers. As a demonstration of one of the dataset's many uses, we calculate injury incidence rates and an index of relative risk for child workers. We first calculated the cumulative injury incidence rates for the population of working children by nature of employment and sector of work (e.g., the agriculture and non-agriculture sectors). Second, we computed relative risk indices and the associated 95% confidence intervals (CIs) for these groups.

For the purpose of this example, we opted to restrict our sample to children who responded that they were permanent workers, short-term/casual workers, or seasonal/school vacation workers during the last 12 months. Children working for different employers or classified as "other" were excluded from the sample because of our inability to assign estimated months worked in the last year to these worker categories with some degree of confidence. Sample weights provided by the Philippine NSO are applied to the SOC 2001 sample to achieve population estimates of workers, occupational injuries, and person-hours worked for the reference year.

In this example, children are considered to have experienced an *occupational injury* if they answer affirmatively to the question, "Have you ever experienced any illness or injury while working?" and indicate the type of injury that occurred. This question for determining the occurrence of injury lacks a specific time horizon, which leaves the question open for interpretation (i.e., we do not know for certain if the injury took place in the last 12-months or earlier). A child may interpret this question in relation to the 12-month reference period or to the span of her entire work

experience, which may exceed the last 12-months. If the latter is the case, both prevalent and incident cases of injuries could be captured, leading to an overestimate in the risk of injuries that occurred in the reference period. Alternatively, a child may have experienced more than one injury during the reference period, but only a single occurrence of injury per child is counted in this example for the entire sample in the SOC 2001. In this case, the SOC 2001 underestimates the risks of injury to working children. As such, the injury incidence rates and relative risk index presented in the Table should be taken as lower-bound estimates.

Person-hours worked in the last 12 months are calculated as described in the previous section and use a child's usual hours worked per day, usual days worked per week, and the nature of their employment, to base the assumption of months worked per year upon. Information on weeks worked per month is not collected, and we assume the children in our sample work 4.33 weeks per month.

Industrial categories are classified according to the 1994 Philippines Standard Industrial Classification (PSIC).⁴⁰ The Philippines have 17 major industrial divisions with Major Division A comprising agriculture, hunting, and forestry. Jobs that fall under this division and their corresponding PSIC codes are growing of crops (PSIC 01); farming of animals (PSIC 02); agricultural and animal husbandry service activities, except veterinary activities (PSIC 03); hunting, trapping, and game propagation including related service activities (PSIC 04); and forestry, logging, and related service activities (PSIC 05). All jobs with two-digit PSIC codes greater than 05 are considered to be non-agricultural jobs.

RESULTS

The Table reports the annual injury incidence rate and index of relative risk for children aged 5 through 17 years working permanent, short-term, and seasonal jobs in the Philippines in 2001 by sector of work. Our results indicate that the risk of injury per hour worked for the children in our sample working agricultural jobs was approximately 4.7 times the risk of injury per hour worked by children in non-agricultural sectors. The apparent hazards of agricultural work are further demonstrated by the pattern of relative risk faced by children working in agriculture across nature of employment (i.e., permanent, short-term, and seasonal workers). Agricultural workers in all three categories face significantly higher relative risks of injury when compared with their respective reference groups.

Interesting differences in risk across nature of employment also reveal the higher overall injury incidence rate of seasonal workers (0.11) compared with permanent workers (0.02) and short-term workers (0.04). Seasonal workers also had higher injury incidence rates in both agricultural (0.17) and non-agricultural jobs (0.04) when compared with permanent and short-term workers. This is interesting because it suggests that the temporary nature of work, and not simply differences in industry, contributes to the risk faced by workers (i.e., the difference in risk cannot be explained entirely by a higher concentration of agricultural jobs among seasonal workers).

Table. Estimated occupational injuries, hours worked, injury incidence rate, and index of relative risk, by nature of employment and sector of work in children 5–17 years, 2001

Worker type	Population of workers (in thousands)	Occupational injuries in the last 12 months (in thousands)	Person-hours worked in last 12 months (in thousands)	Injury incidence rate (per 100 person-hours worked)	Relative risk	95% CI
Permanent, short-term, and seasonal workers						
Total	3,725.8	883.2	2,253,944.7	0.039	—	
Agriculture	2,012.6	637.3	796,614.4	0.080	4.74	(4.72, 4.76)
Non-agriculture	1,713.2	245.9	1,457,330.3	0.017	1.00	
Permanent workers						
Total	997.6	282.0	1,318,630.0	0.021	—	
Agriculture	461.7	177.5	438,146.4	0.041	3.41	(3.38, 3.44)
Non-agriculture	535.9	104.5	880,483.6	0.012	1.00	
Short-term workers						
Total	1,259.2	271.7	637,753.2	0.043	—	
Agriculture	589.6	177.0	188,583.1	0.094	4.45	(4.42, 4.49)
Non-agriculture	669.6	94.7	449,170.1	0.021	1.00	
Seasonal workers						
Total	1,469.0	329.5	297,561.5	0.111	—	
Agriculture	961.3	282.8	169,884.9	0.166	4.55	(4.51, 4.60)
Non-agriculture	507.7	46.7	127,676.6	0.037	1.00	

NOTE: Calculations made using Philippine Survey of Children 2001 data.

CI = confidence interval

DISCUSSION

The previous sections identified ways the SOC 2001 might be used to study the occupational risk faced by working Filipino children. As new instruments and methodologies for collecting occupational injury data are piloted in different countries, special consideration is needed when interviewing children.^{27,41,42} While most epidemiological research shares many of the challenges discussed in the following sections, we focus on certain limitations such as sample selection and survey and questionnaire design that should be considered when examining occupational injuries specific to working children.

Sampling and non-sampling errors

All large-scale surveys suffer from sampling and non-sampling errors. *Sampling error* refers to errors in measurement resulting from sample frame selection, sample size, and the stratification of samples. The SOC 2001 derives its sample from the enumeration areas of labor force surveys, which typically are designed to capture a nationally representative sample of adult workers. These sampling areas may not exactly represent the localities where working children may be found, especially if a large number of working children reside in non-household establishments such as squatter settlements that are not typically included in labor force survey sampling frames. This may result in an underestimate of the number of working children and thereby affect estimates of injury and illness incidence rates for children, particularly for children working in hazardous work environments.

Non-sampling errors generally stem from survey design, non-response by survey respondents, the inability to contact sample cases, the interpretation of questions by respondents, the capacity and willingness of respondents to provide the correct information, and lack of information on key risk factors for the outcome under study. Some of the relevant sampling and non-sampling errors encountered in the SOC 2001 are associated with the types of biases described below.

Truncation bias

As mentioned earlier, a major concern related to sample selection in the SOC 2001 is that the survey includes only non-fatal injuries for working children; it does not capture fatal injuries. A resulting obstacle to estimating the relationship between occupational injuries and hazardous child labor using the SOC 2001 is the presence of selection bias from working with a truncated sample. A truncated sample is drawn from a distribution that is cut at a certain point, called the truncation point, and only observations below, or in some cases above, the truncation point are observed.

In the case of the SOC 2001, no information was collected on children who have died as a result of an occupational injury. Therefore, the distribution of injury observations is truncated at the level of injury severity that would result in a child's death. Excluding children who suffered fatal injuries as a result of working is likely to result in an underestimate of the injury risk, since children who suffer fatal injuries may be more likely to work in hazardous occupations and experience prolonged risks to occupational hazards. In essence, by not controlling for workplace fatalities, children involved in

some of the most hazardous forms of work may be excluded from analysis. The existence of a truncated sample can be problematic in research but is less of an impediment if the number of omitted observations is small. In the case of injuries, the incidence of fatal injuries relative to non-fatal injuries is comparatively much lower, so the truncation bias is likely to be minimal.⁴³ The bias could be alleviated if proxy interviews were collected for children who had died as a result of work injuries during the specified reference period.

Information bias

While most surveys suffer from information bias, the challenge to gather accurate information can be even more pronounced when collecting data from children and on child labor.⁴¹ Reasons for this are due to children's awareness of the hazards associated with their work, their ability to recall details, and their capacity to articulate them to a surveyor. As Levison et al. point out, children may be unaware of the harmful effects of exposure to chemical agents such as pesticides and fertilizers or the hazards of working with particular machines or tools.⁴⁴ They also may not understand what a hematoma or contusion is or a viral or bacterial organism and, therefore, cannot report ever experiencing one with great accuracy. Younger children in particular have difficulty remembering events, retaining information, and placing events in time. They may only remember serious injuries or illnesses and inadvertently exclude less severe ones or report injuries that occurred years prior or that were unrelated to work.

In addition, collecting accurate information about children's work habits can be difficult because of the sensitive and often illegal nature of child labor. That is, even if children and parents can recall details perfectly, parents may be hesitant to answer questions candidly, and children may be afraid to provide honest answers. In the SOC 2001, parents who are unwilling to admit that their child is working prevent the child from being interviewed through the child questionnaire, which not only results in a reporting bias, but also underestimates the actual number of working children.

Incomplete and inaccurate information about children's work can produce biased estimates of the risk of injury faced by working children. Unfortunately, this bias cannot be corrected using SOC 2001 data. Instead, researchers should take care to discuss the potential magnitude and direction of the bias and how it may affect the interpretation of their results.

CONCLUSIONS

This article reviews a promising data source for identifying and comparing potential risk factors for non-fatal injuries and illnesses to working children. The information presented in the SOC 2001 can be further analyzed and used to develop policies and programs directed at preventing children from working in hazardous environments. For example, data from the Philippines SOC conducted in 1995 provided key input in designing significant legislation that establishes minimum age for employment and proscribes certain work

activities for children in the Philippines. The SOC 1995 was the primary dataset used in guiding the Philippine Department of Labor and Employment Order No. 04, Series of 1999, on Hazardous Work and Activities to Persons Below 18 Years of Age.

In accordance with Republic Act (R.A.) 7658 of 1993, Department Order No. 4 outlines four major areas of work regarded as hazardous for children. The categories of work are:

- work that exposes children to physical, psychological, or sexual abuse (e.g., lewd shows, cabarets, bars, dance halls, bath houses and massage clinics, and escort services);
- work underground, underwater, at dangerous heights, or at unguarded heights of two meters and above, or in confined spaces (e.g., mining, deep sea fishing, and window cleaning);
- work with dangerous machinery, equipment and tools, or that involves manual handling or transport of heavy loads (e.g., logging, construction, quarrying, and welding); and
- work in an unhealthy environment that may expose children to hazardous processes; to temperatures, noise levels, or vibrations damaging to their health; to toxic, corrosive, poisonous, noxious, explosive, flammable, and combustible substances or composites; to harmful biological agents; or to other dangerous chemicals including pharmaceuticals (e.g., manufacture or handling of pyrotechnics, pesticide spraying, and bleaching, dyeing, and finishing of textiles using chemicals).⁴⁵

In the same way SOC 1995 contributed to crafting legislation for work activities hazardous to children, the SOC 2001 is currently being used to develop policy recommendations on how to update the 1999 Philippine Department Order No. 4. Data from the SOC 2001 permit a reasonable assessment of injury risk across various job characteristics, including occupation, industry, and exposures, and child characteristics, including gender and age. An assessment that considers these aspects will do much to identify the forms of child work that should be targeted by policy for elimination or reform.³⁸

Despite the design limitations discussed in this article, the SOC 2001 provides rich information on the occupational health hazards of working children that is not generally collected on a national basis or directly from children. While more complete data and reporting systems are preferred, in their absence, it is more favorable to make inferences on risk factors in cases where children's health may be compromised than to make no effort at all.⁴⁶

While the ultimate goal should be to eliminate hazardous work for children, if a child's work is considered a temporary necessity due to a family's economic situation, research to prevent and control work-related injuries for children should concentrate on systems for improving the work environment of children. Improved data and more research on the short-term and long-term health effects of children's work can (1) assist in the classification of hazardous work activities for children, (2) help guide policy development in

the area of occupational safety and health for child labor practices, and (3) direct injury prevention and control strategies to protect children from hazardous work situations and activities.

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Laborer at a brick factory (Nepal)

Photo: David L. Parker