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# IDENTIFYING AT-RISK POPULATIONS FOR CHILD LABOR IN CAMBODIA

Application of a Risk Factors Model

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## Abstract

As attention to child labor increases, it becomes more critical to understand methods for identifying and describing at-risk populations. This can aid policy makers and program designers by focusing efforts on the most at-risk populations. Risk factors have been successfully used in public health programs to accomplish this type of goal. Using the 2001 Cambodia Child Labor Survey, this study tests a risk factors model using a broad set of variables, some commonly considered correlates of child labor and others not commonly associated with child labor. Results indicate the viability of a risk factors approach. Place was the key indicator for at-risk populations. Additionally, the study empirically validated differences in two categories of child labor defined by ILO conventions, specifically all types of child labor and hazardous child labor.

## Introduction

Child labor in developed countries has been a settled issue for nearly a century. In many developing countries, however it is still an integral part of economies. Children participate in acceptable forms of labor, for example, household activities both economic and casual, which do not present harm and allow children to participate in educational endeavors. But children also engage in paid labor outside their homes, which becomes a concern as labor activities can forestall educational opportunities and present potential harm to the child.

The International Labor Organization (ILO) has developed conventions for child labor, which have been adopted by a number of countries. The first is the Minimum Age Convention, No. 138 ratified in 1973. The first principle of Convention 138 is that the minimum age for working should not be less than the age for compulsory education and in no event less than 15. In countries lacking educational facilities, the age can be set at 14. The second principle is that a higher minimum age should be set for hazardous labor, which should be no less than 18<sup>1</sup>.

The second Convention is No. 182, established in 1999. It looks beyond hazardous labor, defining in detail worst forms of child labor. It defines worst forms of child labor as:

- all forms of slavery or practices similar to slavery, such as the sale and trafficking of children, debt bondage, serfdom and forced or compulsory labor;
- forced or compulsory recruitment of children for use in armed conflict;
- use of a child for prostitution, production of pornography or pornographic performances;
- use, procuring or offering of a child for illicit activities, in particular for the production and trafficking of drugs; and,
- work which is likely to harm the health, safety or morals of children.

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<sup>1</sup> The discussion on ILO Conventions No. 138 and 182 come from ILO's website, specifically <http://www.ilo.org/public/english/standards/norm/whatare/fundam/childpri.htm>.

Organizations such as UNICEF, ILO, IOM, USDOL, and US State Department have implemented programs to combat worst forms of child labor. While the most publicized worst forms of child labor is sexual exploitation, a number of other industries exploit children, for example, military (child soldiers), mining, organized street begging, and slaughterhouses. A substantial number of children around the world are engaged in various worst forms, from hazardous forms to the most abject forms of slavery and debt bondage.

The ILO has provided substantial literature on this issue<sup>2</sup>. Their estimates of labor activity in 2000 indicate that about 211 million children ages 5 – 14 were engaged in economic activity. ILO estimates that about half or 111 million of these children are engaged in hazardous forms of labor. Hazardous forms of labor involves everything from work around heavy machinery, which for adults is a legitimate labor activity but which presents potential for harm to children given their relatively limited physical strength, motor skills and work-place judgment, to extreme forms of physical exploitation that present continual physical, emotional or moral harm, such as work in mines. Beyond hazardous forms of labor, ILO estimates that about 8 million children ages 5 – 17 are engaged in worst forms of labor.

As awareness of this problem has grown, so has the parallel need for better data. International organizations have developed and funded measurement activities. This includes qualitative efforts. ILO provides clear examples with its rapid assessments. There are also systematic efforts to collect quantitative data on child labor. UNICEF's *Multiple Indicators Cluster Surveys* (MICS), The World Bank's *Living Standards Measurement Surveys* (LSMS) and ILO's *Statistical Information and Monitoring Program of Children* (SIMPOC) are examples of household surveys where child labor comprises either the focus or a significant module within the survey. All of these research efforts provide policy makers and program managers with guidance on the nature of problems and possible best practice solutions.

The more egregious forms of child labor, i.e., trafficking, can not be easily captured by standard measurement techniques, leaving a vital information gap. Still, the abundance of information on other forms of child labor provides an entry point for understanding the overall dynamics of child labor. As we construct a robust knowledge base, this allows us to conjecture about trafficking. As we develop more information on this form, we can use the broader context to supply meaning to all forms.

## Purpose

There is substantial literature on child labor. Quantitative studies, however, generally examine a single class of variables, e.g., poverty or parental education, and their role as determinants of child labor. Policy makers and program planners require a broader, integrated understanding of child labor indicators. This information helps guide the

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<sup>2</sup> The reference for this discussion is *Every Child Counts: New Global Estimates on Child Labor*, International Labour Office, Geneva, April 2002.

targeting of vulnerable populations, identifies particular geographies where problems are most acute, and prioritizes issues for remediation. Thus far this information comes from anecdotal data and qualitative studies. The goal of this study is to establish a set of quantitative indicators that provide a broad picture of child labor useful for policy makers and program planners.

We will employ a risk factors model to test a broad set of independent variables thought to be related to child labor. Risk factors originated in the health field where specific health conditions could be quantitatively measured and expressed as a ratio of the risk condition to the non-risk condition. A risk factor is a condition that can either be an inherent quality of an individual, a behavioral or socio-economic characteristic of them, or an environmental condition that increases the probability the individual will experience the risk-related outcome. One of the most common examples is that smoking increases risk for types of cancer.

In this study we will establish the following.

- A broad set of variables at the individual, household and community level that identify a set of significant risk factors useful for child labor policy making and program planning. We will operationally define “useful” as specific and descriptive enough to allow targeting of populations for interventions, focusing of resources or the basis for development of indicators.

We will also test two related hypotheses central to the discussion of child labor and its determinants. They are as follows.

- *We will test two discrete dependent variables relating to types of child labor – all types of labor and hazardous labor. We expect that there will be some differences in risk factors associated with each.* As discussed, ILO has defined different types of child labor. If the accepted categorization scheme has practical value, then we would expect this reflected in the risk factors associated with each type of child labor. Positive results will provide initial validation of the concepts.
- *We expect that place variables will be at least as important as individual or household level variables.* Previous studies typically look at individual or household characteristics. The qualitative literature and experience of those working in the field indicate that place is also an important factor. We have therefore included place related variables for a multi-dimensional view of child labor.

The study will use an example country – Cambodia – and its household level survey – the 2001 Cambodia Child Labor Survey (CCLS) as the primary database for analysis. We also plan to enhance the primary database with other census and intercensal sources. We have selected Cambodia for the following reasons:

- Cambodia has a high rate of child labor. Nationally, 19.6% of children 5-9 years of age work and 47.0% of children 10-14 work. While this is ameliorated somewhat by the practice of half-day classes, allowing many working children to also attend school, these rates are still very high<sup>3</sup>.
- In addition to the CCLS dataset, national statistics are generally very sound, allowing us to enhance the analysis with village and commune level statistics.
- It is an area where there are significant efforts to reduce child labor. Results can be used to support policy and program efforts.
- There is child trafficking. The database developed for this analysis can later be populated with geographic level data on trafficking (village, commune or district), thus allowing studies of trafficking and comparisons with other forms of child labor.

Also, Cambodia presents a unique mix of characteristics important for understanding results. Cambodia is a poor country with an estimated 35% of its population living below the poverty line<sup>4</sup>. Traveling through the countryside, one sees a traditional agrarian society primarily unchanged from past. This sector employs nearly 75% of Cambodians<sup>5</sup>. In contrast, its proximity to emerging economies of Southeast Asia, such as Thailand and Vietnam, Cambodia has seen foreign investment, primarily in manufacturing industries. Tourism also brings substantial foreign dollars into the country. Cambodia thus has a segment of the population who are members of a modern urban economy.

## Review of the Literature

There is substantial literature with respect to determinants of child labor. The greatest focus has been on income and poverty. This is the set of variables that first come to mind when most people think about the determinants of child labor. Investigators have considered a host of other variables, as well, with parental education and land ownership being examples of more frequently investigated variables. The following review first takes into account general considerations with the research and then examines findings for each class of variables.

### Background Considerations

There are three general sources of data on child labor<sup>6</sup>. The first is interviews or direct observation of children at work. This was the primary source of information until availability of the household survey datasets in the 1980s. It is still an important source, particularly for worst forms of child labor where access to children is limited, participation in formal interviews might present them with harm, or results may be suspect as topics are emotionally charged or of a nature that can not be easily captured

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<sup>3</sup> *Report on Cambodia Child Labor Survey, 2001*. National Institute of Statistics. September, 2002.

<sup>4</sup> Brahnhatt et al. *East Asia Update: Solid Growth, New Challenges*, World Bank, 2006.

<sup>5</sup> 1998 Cambodian Census with updates from 2004 intercensal survey.

<sup>6</sup> Sonia Bhalotra and Zafiris Tzannatos, *Child Labor: What have We Learnt?* The World Bank, September 2003

with quantitative means. Examples of current qualitative efforts are from ILO, who provides a number of rapid assessments that look at very sensitive child labor issues.

Large scale household surveys opened a new perspective on child labor as researchers could draw on a wide range of factors from scientifically sound samples of substantial size. There are three primary types – the SIMPOC, MICS, and LSMS, mentioned earlier. The SIMPOC surveys, developed by ILO, are dedicated to child labor and provide information from three modules: (1) a module describing each member of the household, (2) a head of household interview on each child in the house who works, and (3) an interview with each child who works. LSMS, developed by the World Bank, looks at the overall household economy with some questions devoted to child labor. The MICS, developed by UNICEF, looks at key childhood indicators. Most are health related indicators. Some of the questions in the household module also concern education, activities around the household, and child labor.

The third method for investigating child labor uses cross-country comparisons. Here the researcher gathers macro-level data for countries. In some instances it is a single year for each country and in other instances countries can have multiple years. Analysis considers child labor as a function of differences in key variables between countries and/or over time.

One challenge when comparing results across studies is that research methodologies sometimes consider different age groups. Some studies, for example, investigate children aged 10-14<sup>7</sup> while other studies investigate children aged 10-17<sup>8</sup>. These differences are important as a 10-14 year old age group represents children who by ILO conventions should not be engaged in paid labor whereas some in the 10-17 age group are legitimately engaged in labor activities. This presents two kinds of issues. The first is comparability between studies. The other is a potential mixing of legitimate and prohibited labor.

Prior quantitative studies generally do not distinguish between types of child labor, e.g., all types of labor and hazardous forms. They tend to focus on any child in the dataset within the specified age range who states they are working. While many of the worst forms are not asked in questionnaires, Some questionnaires include items about hazardous forms of labor<sup>9</sup>. But analyses make no distinction between hazardous and more egregious forms and other, non-harmful forms of child labor. The data, parsed appropriately, could help shed light on comparative dynamics for types of child labor.

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<sup>7</sup> See for example, Mahmood Hussain and Keith E. Maskus, *Child Labor Use and Economic Growth: An Econometric Analysis*, Blackwell Publishing Ltd., 2003.

<sup>8</sup> Ranjan Ray, *Analysis of Child Labour in Peru and Pakistan: A Comparative Study*, Journal of Population Economics, Spring 2000.

<sup>9</sup> SIMPOC does ask a question that relates to bonded labor but other forms of most egregious labor are not asked for good reason, e.g., difficulty framing questions and likelihood that responses would not be valid for a variety of reasons.

## Variables in Studies

The following discussion summarizes findings by key variables for several studies of child labor. It draws on a review of extant literature. It should be noted that this review was facilitated greatly by a 2003 article by Sonia Bhalotra and Zafiris Tzannatos that considered all relevant articles up to that point<sup>10</sup>. It is an excellent starting point for any investigation of factors relating to child labor. It points to both some clear trends but also ambiguities around key factors, highlighting the need for further study.

**Poverty.** Poverty and household income variables are the most researched cluster of variables relating to child labor. This probably derives from the intuitively appealing notion that a resource poor family will seek broad strategies for filling resource gaps, one being children working. The evidence for this conclusion is very mixed, however. Bhalotra and Tzannatos (2003) point out that mixed conclusions are partly related to a difference in the level of analysis among different studies, i.e. aggregate vs. micro-level data. Aggregate data, which compares across countries, co-mingle a number of group level variables with highly dynamic relationships. Poverty is one of the more salient variables and thus frequently tested. But other variables which may be primary causes of child labor reductions, such as free education and legal prohibitions against child labor, also occur as countries develop, and are not necessarily a direct outcome of poverty alleviation. Thus, aggregate level data can provide a broad picture of possible relationships between these variables, but these relationships cannot be directly tested.

Micro-data offers a different perspective, looking at individual level characteristics, behaviors and outcomes, and offer the ability to explore direct relationships between independent variables and outcomes. Here different conclusions arise as seen in Ray (2000)<sup>11</sup>, Esrado (2005)<sup>12</sup> and Admassie (2002)<sup>13</sup>. Using the 1994 Peru Living Standards Measurement Survey (PLSS) and the 1991 Pakistan Integrated Household Survey (PIHS), Ray examined two hypotheses: the *Luxury Hypothesis* and the *Substitution Hypothesis*. The first states that “a family will send children to the labor market only if the family’s income from non-child labor sources drops very low”. The second states that “child labor and adult labor are substitutes”. These two hypotheses derive from Basu and Van’s<sup>14</sup> analytic formulation regarding the interrelationships of child and adult labor. Ray set about to empirically test the formulations. Ray did not find substantiation for either hypothesis. The Pakistani data provided no evidence while the Peruvian data showed weak support.

Esrado also examined Basu and Van’s hypotheses using micro-data from Peru, Nepal, and Zimbabwe. Esrado used the same dataset for Peru as Admassie. For Zimbabwe,

<sup>10</sup> Sonia Bhalotra and Zafiris Tzannatos, *Ibid.*

<sup>11</sup> Ranjan Ray, *Analysis of Child Labour in Peru and Pakistan: A Comparative Study*. Journal of Population Economics, Spring 2000

<sup>12</sup> Lire Esrado, *Child Labor and Schooling Decisions in Urban and Rural Areas: Comparative Evidence from Nepal, Peru and Zimbabwe*. World Development. Vol. 33, No. 3, pp. 455-480, 2005.

<sup>13</sup> Assefa Admassie, *Explaining the High Incidence of Child Labor in Sub-Saharan Africa*. African Development Bank. 2002.

<sup>14</sup> Basu K., Van PH. The Economics of Child Labor. American Economic Review 88(3):412-427. 1998.

Esrado used the 1990-91 Zimbabwe Income Expenditure Consumption Survey (ZICES) and for Nepal the 1995 Nepal Living Standards Survey (NLSS). Esrado found mixed results, with the location as the key factor in understanding the role of poverty and child labor. In all three countries, poverty and child labor were positively related in rural areas but not in urban areas. Esrado saw this as confirmation of Basu and Van's Luxury Hypothesis, although limited to rural areas.

As an example of how aggregate level data can present a different picture of child labor than micro-level data, Admassie took a broad look at the link between incidence of child labor and macro variables, poverty being a primary one, in Sub-Saharan African countries. The study used macro-level data for sub-Saharan African countries for 1995 from different sources. Child labor statistics came from ILO. Admassie concluded that the impact although small was significant, more so than other variables. Admassie continued by noting that most child labor is found in poor countries, providing further support for the link between poverty and child labor.

**Parental Characteristics.** Researchers have examined a number of parental characteristics relating to child labor. These variables have proven more reliable predictors of child labor participation than poverty variables. Some of the most commonly investigated are parent's education and their employment or wage rate status. Researchers frequently look at mother's and father's characteristics separately, often proving a useful distinction in many cases.

Father's effect of working has shown some differences. For example, in Pakistan (Bhalotra and Heady, 2001)<sup>15</sup>, Bangladesh (Ravallion and Wodon, 2001)<sup>16</sup>, Peru (Sasaki and Temesgen, 1999)<sup>17</sup>, and a multi-country study of 64 countries (Hussain and Maskus, 2003)<sup>18</sup>, father's education resulted in less child labor participation. On the other hand, some studies find that a father's education has no effect (e.g., Liu, 1998)<sup>19</sup>. There is more consistent support that a mother's education results in less child labor participation. This is found in previously cited studies (e.g., Bhalotra and Heady, 2001)<sup>20</sup> as well as other studies (e.g., Ilahi, 1999)<sup>21</sup>. Admassie (2002)<sup>22</sup> found an inverse relationship between adult literacy and child labor participation.

<sup>15</sup> Bhalotra, S. and C. Heady (2001). *Child Farm Labor: Theory and Evidence, Development and Distribution Series Discussion Paper No. 24*, STICERD, London School of Economics, July 2000.

<sup>16</sup> Ravallion, M. and Q. Wodon (2001), *Does Child Labor Displace Schooling? Evidence on Behavioral Responses to an Enrollment Subsidy*. The Economic Journal, vol 110, pp. C258-C175.

<sup>17</sup> Sasaki, M. and T. Temesgen (1999). *Children in Different Activities: Child Labor and Schooling in Peru*. Washington, D.C.: World Bank: memo.

<sup>18</sup> Hussain, M. and K. Maskus (2003). *Child Labor Use and Economic Growth: An Econometric Analysis*. Blackwell Publishing Ltd. Oxford UK.

<sup>19</sup> Liu, A. Y. (1998). *School Children's Participation Behavior In Vietnam: An Empirical Analysis*, Paper Presented at the Twelfth Annual Conference Of The European Society For Population Economics, Amsterdam, Netherlands.

<sup>20</sup> Bhalotra and Heady, Ibid.

<sup>21</sup> Ilahi, N. (1999). "Children's Work And Schooling: Does Gender Matter? Evidence From The Peru LSMS Panel Data". Background Paper For The World Bank Research Report On Gender.

<sup>22</sup> Admassie, Ibid.

Ray (1999)<sup>23</sup> included parent's wage rates in an analysis of Peruvian and Pakistani data. Results showed that a rise in adult male wages resulted in less child labor participation, Peru and Pakistan, however, showed that increases in female wages related positively with child labor participation. Esrado (2005)<sup>24</sup> found similar results in Nepal, Peru and Zimbabwe. Referring back to the Substitution theory, results indicate that male wages are a substitute for child labor while female wages are a complement.

**Land Tenancy.** Researchers have observed that families engaged in agriculture who own larger than average parcels tend to engage their children in labor activities beyond the accepted practice of household chores and light and occasional participation in farming activities. Since one might expect that greater land ownership implies greater wealth and therefore less of a tendency towards child labor participation, this seeming paradox points to some interesting family and community dynamics.

Bhalotra and Heady (2003) in an article focusing solely on this issue, explored the underlying dynamics of land ownership. Evidence clearly indicates that ownership of larger than average parcels of land does lead to greater child labor participation. They cite a failure of markets for land and for labor. While land represents an asset, in a culture where credit is limited or non-existent, land assets are not easily leveraged into other assets. Also, where labor markets are not fully developed, owners of large parcels of land can not easily hire laborers to help with their farming operations. This leaves the option of family labor, children being one choice. Esrado (2005) came to a related conclusion, noting that improved access to credit related to a reduction in child labor participation. These studies suggest that transportability of household assets, or the lack of it, seems an important underlying factor.

**Household Composition and Characteristics.** A number of researchers have examined various aspects of household composition, typically focusing on issues such as family size, family structure, female headship, and relationship of child to head of household. Each of these variables shows some degree of relationship to child labor. Like other variables, the strength of the relationship is often conditional on characteristics such as country of study and urban-rural location.

To fully understand its role, researchers have found that household size requires consideration in light of other related factors. For example household size and composition are related, as are household size and farm size and other economic related variables. Controlling for related variables tends to indicate a positive relationship between household size and child labor participation (for example see Cochrane, Kozel, and Alderman, 1990)<sup>25</sup>.

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<sup>23</sup> Ray, Ibid.

<sup>24</sup> Esrado, Ibid.

<sup>25</sup> Cochrane, S., V. Kozel, and H. Alderman. 1990. "Household Consequences of High Fertility in Pakistan". Washington D.C.: *World Bank: Discussion Paper No.111*.

Family composition has also shown some promise as an explanatory variable. For example, Lloyd (1993)<sup>26</sup> and Jomo (1992)<sup>27</sup> found that children and especially female children are more likely to work as household size increases. This also is the case for higher birth order children. In a study that looked at trafficked girls – one of the most egregious forms of labor and one that is seldom studied quantitatively – similar results were found.

Female household headship has been considered in a number of studies. It has shown relates to modest increases in child labor, especially when household income is controlled (Bhalotra and Tzannatos, 2003)<sup>28</sup>. Examples are also seen in Patrinos and Psacharopoulos (1995)<sup>29</sup>, and Ilahi(1999)<sup>30</sup>.

## Methodology

Risk factor models typically use a form of logistic regression to derive odds ratios that describe the probability of occurrence of the dependent condition in light of the independent condition. This form of regression expresses dependent and independent variables in binary form, where a value of 1 typically equals presence of a condition and a value of 0 the absence of a condition. Thus a major focus of our methodology was identifying and classifying a range of relevant variables. While some variables, such as gender, naturally adapt into a binary format, many of variables of interest do not. This required us to spend much of our time in exploratory analysis, reviewing variables and how they behave in light of dependent variables, and then making decisions about recoding them into binary forms. It was important that we used logically derived and replicable methods for each type of variable. Once we completed this task, we conducted the analysis and then reviewed and assessed the results. The following describes our approach to these issues.

## Data

The dataset was drawn from two primary sources. The first source is the 2001 Cambodia Child Labor Survey (CCLS). The survey uses the ILO SIMPOC guidelines for questionnaire and methodology design. It includes three modules. The first is a general household questionnaire noting both the characteristics of the household and then an enumeration of each household member. Basic demographic and characteristics information is collected for each member. The second module is answered by the head of household about each child in the house and their education and labor participation.

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<sup>26</sup> Lloyd, C.B. (1993). “Fertility, Family Size And Structure- Consequences For Families And Children”. Proceedings of a Population Council Seminar, New York, 9-10 June, 1992, New York: The Population Council.

<sup>27</sup> Jomo, K.S. (ed.) (1992). Child Labor in Malaysia. Kuala Lumpur: Varlin Press.

<sup>28</sup> Bhalotra and Tzannatos, Ibid.

<sup>29</sup> Patrinos, H.A. and G. Psacharopoulos (1994). “Educational performance and child labor in Paraguay”, International Journal of Educational Development, 15, pp. 47-60.

<sup>30</sup> Ilahi, Ibid.

Questions are quite detailed. The third module is answered by the children, asking them nearly the same set of questions asked of the head of household. Data was collected from 10,000 households. Given that each member has his or her own record, this yields a dataset with approximately 70,000 individual records. The 2001 CCLS is the only source of household level information. The geographic level data comes from the 1998 Cambodia Census. It includes data at the village and the commune level. The two data sources were merged into one database.

### Variable Definitions

The following describes dependent and independent variables used in the analysis. Given the range of variables considered and in many cases the need to construct them into a form usable in the equation, a considerable amount of exploratory work was required to develop the final set of analysis variables. Since we used binary logistic regression, the final form of dependent and independent variables was binary. This allowed us to develop odds ratios for the independent variables, leading to identification of those that serve as risk factors in the analysis.

**Dependent Variables.** Since one of our goals is to see if a risk factors model can distinguish between types of labor, we constructed and then tested two dependent variables. One concerned hazardous forms of labor the other concerned all types of labor forms of labor whether hazardous or all types of labor.

The *all types of labor* dependent variable concerned children 5 through 14 years of age who report doing economic labor within the past 7 days. The variable is based on self-reported by the child—*During the past 7 days were you engaged in any economic or non-economic activity?* (“yes, in economic activity” or “yes, in both economic and non-economic activity”). Just over 2 in 5 (41.7%) of the children 5-14 years of age surveyed fit in this general child labor category.

We then constructed a *hazardous forms of labor* dependent variable—a subset of the general child labor variable. The CCLS asks several questions that help define this category. One set includes work around heavy machinery. Another set of questions concerns any illness or injury sustained on the job. Another concerns the behavior of a supervisor towards the child. The challenge here is that questions provide a range and gradation of situations for aspects of hazardous employment but the concept of hazardous forms of labor implies a strict binary condition, i.e. a work situation either does or does not present harm to a child worker. Furthermore this is a self-reported interview, and interviewees are likely to include ambiguous situations as well as clear cases of hazard.

To ensure that we included clear situations where harm had occurred or was likely to occur, we used a principle components analysis on all the hazard related items to create a category of harm where the probability of harm occurring or potentially occurring was greatest. While we probably excluded some cases of harmful forms of labor, we also minimized false positive cases, i.e. those where it did not occur. The first principle component scores were saved and those cases in the highest quintile of this “danger”

variable were determined to be in hazardous forms of labor. Because the principle component analysis was conducted for the broader under 18 category, less than 20% (12.6%) of the children 5-14 of age surveyed fit in this category

**Independent Variables.** Since analysis variables were in a binary format, considerable work was required to develop the final form of the independent variables. The following describes their development.

**Constructed Variables.** We developed the following variables from combinations of variables in the database.

- **Wealth Index.** Given the prominence of poverty in the child labor literature, we wanted a comparative variable describing household economy. Given that 75% of Cambodians farm and furthermore a significant amount of household income is from non-wage sources, we felt that that currency based measures for either household expenditures or income were problematic<sup>31</sup>. We consequently adopted a wealth index methodology, developed by Shea Rutstein and Kiersten Johnson for 44 countries under the sponsorship of the World Bank<sup>32</sup>. The wealth index has received good validation when compared to other measures of income or expenditure<sup>33</sup>. The World Bank Wealth Index performs principle components analysis on a standardized list of household assets used in surveys such as the LSMS, USAID's Demographic and Health Surveys, and the ILO-SIMPOC based surveys, including the one used for this study, the CCLS. The CCLS contains all standardized items except for flooring tiles. Due to this omission, we consulted with Shea Rutstein on the design of the analysis and re-ran the principle components analysis. This results in a ranking of each household in the survey based on its basket of assets. From this we developed quintiles, assigning each household to its appropriate quintile.
- **Proportion of Adults Not Working > 2 and Proportion of Children Under 14.** We developed these variables to test various aspects of family composition on child labor. For each we used the number of persons in the household in the denominator. For the proportion of adults' variable we used > 2 not working as the numerator. For the children's variable we used all children under the age of 14 in a household as the numerator.

**Recoding into Binary Forms:** The following describes recoding of all variables into binary forms.

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<sup>31</sup> For a more in-depth discussion please see the introduction of the following citation.

<sup>32</sup> Shea O. Rutstein and Kiersten Johnson. DHS Comparative Reports No. 6 – The Wealth Index. Measure DHS Reports USAID, ORC Macro, Calverton MD, August 2004.

<sup>33</sup> Filmer, D. and L. Pritchett. 2001. Estimating wealth effects without expenditure data—or tears: An application to educational enrollments in states of India. *Demography* 38(1):115-132.

- **Naturally Occurring Binary Variables.** These were the easiest to recode for obvious reasons. The general approach was to take a variable, e.g., gender, and assign the presence condition a 1 and the absence condition a 0. Typically, we defined the presence condition as the one which we expected to positively relate to the dependent variable.
  
- **Continuous Variables.** The continuous variables presented more of a challenge. Typically, an *a priori* assumption is made about the appropriate break point in a continuous variable. This point serves as the line of demarcation for cases in or out of the presence condition. This has been the case for poverty, with analysts using a poverty line as the distinction between determinant and non-determinant conditions. Given the possible weakness of using an *a priori* distinction, we took an empirical approach. We first performed exploratory analysis to understand where the proper break points occurred for the range of variables under consideration. To accomplish this we broke continuous variables into quintiles and then identified quintiles above a value of 1 and those below a value of 1. We then recoded the quintiles into a binary form with the quintiles above 1 as the presence condition and those at or below 1 as the absence condition. Quintiles for most variables exhibited a roughly linear pattern in a predictable progression. What is of most interest are the break points for some variables and the lack of significance as risk factors for others. We present results of the exploratory analysis in the results section along with the final variable forms.
  
- **Categorical Variables.** The only categorical variables were the provinces. Each province became a single variable with its respondents equaling one and all others equaling 0. We conducted a preliminary analysis to identify the province with the lowest risk factor. Typically observations receiving a “0” are absent the risk condition. No province is completely absent child labor, however. We chose Kaoh Kong as the absence condition as it had the lowest prevalence. The analysis then ran all the provinces together against each dependent with the exclusion of Kaoh Kong.

The following table describes the independent variables used in the analysis.

**Table 1  
Variables Used in Analysis**

Variable Name	Description and Comments	Source	
		CCLS	1998 Census
<b>Household Level Variables</b>			
Province of HH	24 dummy variables, each representing province of the household	X	
Khmer	Ethnic Khmer = 1, non ethnic Khmer = 0	X	
Urban	Living in urban = 1. rural area = 0		

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Wealth Index	For detail on wealth index, see previous discussion. Lowest three quintiles = 1; highest two = 0.	X	
Male	Male head of household = 1, female head of household = 0	X	
Female	Female head of household = 1, male head of household = 0	X	
Parent Head of Household	1 = parent head of household, 0 = parent not head of household	X	
Head of HH widowed, divorced or separated	1 = widowed, divorced or separated; 0 = not any of these conditions	X	
Head of HH Literate	1 = head of HH literate; 0 = illiterate	X	
Head of HH Educational Attainment	Highest level that the head of household has attained.	X	
Ratio of Adults in HH not Working to those working is > 2	Created ratio of adults in household where numerator is those not working and denominator is those working. Then used ratio of 2 as cutoff for the presence condition.	X	
Child in School	Child currently in school = 1, not in school = 0. Chose this among several possible education variables because it is simple and more likely to be accurate. Accuracy of complex education variables, e.g., current educational attainment, can sometimes be questionable, particularly in poor counties. Furthermore they can require calculations to determine if child is at, above or below expected levels, adding another possible source of error.	X	
Proportion of Children < 14 Years of Age	Created proportion with family size as denominator and number of children 14 and under the numerator. Then created binary based on quintiles where presence condition is 58% of family is children 14 and under.	X	
Child Moved in last 5 years	Child moved to village or town in last 5 years = 1, not moved = 0	X	
<b>Reasons for moving:</b>			
Insecurity	Moved because of armed conflict or threat of conflict	X	
Family Reunion	Members of family had been separated during Khmer period and have been reunited	X	
For Better Work Prospects	Moving because adult is looking for better work prospects	X	
For Better Education	Moving to find better educational opportunities for children	X	
For a Marriage	Moving because a parent is marrying or re-marrying	X	
Repatriation	Returning from dislocations during the Khmer Period	X	

Commune Level Variables			
Proportion of Poor	Presence condition is that 3% or greater in the commune are considered poor		X
Proportion of Migrants in Last Year	Presence conditions is 10% or less of the commune have migrated in the last 5 years		X
Village Level Variables			
Females Ages 6-9 in School	Presence conditions is where less than 37% of females 6 – 9 are in school		X
Males Ages 6-9 in School	Presence conditions is where less than 37% of males 6 – 9 are in school		X
Proportion of Literate Females	Quintiles 1 – 2 Presence conditions is where less than 50% of females are literate		X
Proportion of Literate Males	Quintiles 1 – 2 Presence conditions is where less than 78% of males are literate		X

## Analysis

For the analysis we used SPSS as the analysis software applying its binary logistic regression function. We ran each independent variable against each of the two dependent variables. This is typical in building a first stage risk factor model. The goal is to understand the affect each independent separately has on the dependent. Typically with regression analysis independents are run together to understand their cumulative affect and the relationships of independents to one another. Here we are looking for something different: given the presence of an independent condition what can we expect to then see with the dependent. We are looking for indicators of a dependent condition. Determining relationships of independents is a second stage activity beyond the scope of this study.

While statisticians understand the nature and interpretation of odds ratios, it is worth noting for non-specialists reading this article how to interpret them as it will aid in understanding the results. First, an odds ratio represents the odds of the dependent condition occurring when an individual exhibits the presence condition of the independent variable. Thus an odds ratio of 2.5 indicates that the dependent condition is 2.5 times more likely to occur when someone exhibits the presence condition of the independent variable. Second, odds ratios of less than 1 are not proportional to odds ratios greater than one. One method for interpreting them is as their mathematical inverse and as *less likely* rather than *more likely* to occur. For example, an odds ratio of .5 can be understood as two times *less likely* to occur and an odds ratio of .25 can be understood as 4 times *less likely*.

## Results

As the following narrative indicates, results describe a range of risk factors associated with child labor. Those concerning place were by far the strongest risk factors. We also found confirmation for the two hypotheses. The first hypothesis posited a difference between the two dependent conditions and the other concerned the significance of geographic level independent variables as determinants of child labor. Table 2 describes results in detail.

### Risk Factor Model

While the Discussion section will consider the value of this risk factor model to program planners and policy makers, the results indicate a breadth of variables that are significant and have elevated odds ratios. Rural location is one example, where odds ratios were elevated for both all types of labor and hazardous (1.592 and 1.745, respectively). Head of household's educational attainment showed a negative relationship with child labor, that is children coming from household's where the head's education was in the lowest quintile had slightly elevated odds ratios for hazardous labor (1.333). Similarly a child in school is slightly less likely to engage in all types of labor and hazardous forms of labor (.898 and .769, respectively).

The socioeconomic variable, the Wealth Index, performed in a manner not dissimilar to other household economic variables in other studies. While those in the lowest two quintiles, the quintiles associated with the poverty line, had elevated odds ratios for participation in child labor, results were similarly elevated for those in the third quintile. Taken together the lowest three quintiles yielded odds ratios for all types of labor and hazardous conditions of 1.693 and 2.122, respectively. Thus it is not poverty alone that relates to child labor but being in the first three quintiles, which includes some who are not poor.

### The Importance of Place

The strongest risk factors were variables relating to the provinces. Prey Veng had the two most elevated odds ratios for all types of labor and hazardous labor (19.349) and 49.358, respectively); Stueng Treng also had elevated odds ratio for the all types of labor (11.108); Preah Vihear had the second most elevated odds ratio for hazardous labor (16.857).. Other provinces with substantially elevated odds ratios for the all labor types were Svay Rieng (10.028), Krong Keb (4.856) and Kracheh (5.492). Other provinces with substantially elevated odds for hazardous labor were Kapong Chhnang (14.528), Kandal (13.795), Kong Palin (13.682) and Banteay Meanch (12.684).

The next set of variables with the most consistently high odds ratios were those at the village and commune level. The commune level variables included one for proportion of poor and the other for proportion of migrants in the last five years. Both variables had elevated odds ratios for all types of labor and hazardous labor (Proportion of Poor was 1.566 and 2.313; Proportion of Migrants was 1.684 and 1.520). The village level

variables considered two types of variables by gender: Children in School Ages 6-9 and Proportion of Literate Persons in the Village Ages 15 and older. The hazardous labor condition variables were more elevated than the all types of labor variables, with three having odds ratios at or near 2.

### **Difference in the Two Dependents**

While many independent variables behaved similarly under both dependent conditions, others behaved differently, lending initial validation to the idea that all types of labor and hazardous labor conditions are different not simply in definition but also in practice. This occurred mostly with the province level variables. For example, there were differences in all types of labor and hazardous labor for Banteay Meanch (2.708 and 12.684, respectively), Preah Vihear (2.738 and 16.857, respectively) and Stueng Treng (11.108 and 2.311 respectively). For individual and household level variables there were differences in all types of labor and hazardous labor for Ethnic Khmer (1.470 and .949, respectively) and Never Attended School (.743 and 1.174, respectively). Independent variables behaved similarly for the village and commune level variables.

**Table 2**  
**Description of Results**

Variables	Independent Variable Counts		Variable Definitions		All types of labor Age 14 and Under		Hazardous labor Age 14 and Under	
	Count	%	Definition of Presence	Range for Presence	Significant at the .05 Level	Odds Ratio (Coefficient)	Significant at the .05 Level	Odds Ratio (Coefficient)
<b>Household Level Variables</b>								
<b>Province of HH</b>								
P1 - Banteay Meanch	1224	5.8%	Lives in Province	N/A		2.708		12.684
P2 – Battambang	1815	8.6%	“	N/A		2.063		1.184
P3 - Kapong Cham	1552	7.3%	“	N/A		3.372		7.733
P4 - Kapong Chhnang	593	2.8%	“	N/A		7.280		14.528
P5 - Kapong Speu	812	3.8%	“	N/A		3.734		2.732
P6 - Kapong Thum	885	4.2%	“	N/A		4.169		4.565
P7 – Kampot	701	3.3%	“	N/A		2.191	No	2.228
P8 – Kandal	1059	5.0%	“	N/A		4.436		13.795
P9 - Kaoh Kong	333	1.6%	“	N/A		1.000*		1.000*
P10 – Kracheh	893	4.2%	“	N/A		5.492		4.583
P11 - Mondol Kiri	99	0.5%	“	N/A		2.764		8.978
P12 - Phnom Penh	3645	17.2%	“	N/A		2.230		3.577
P13 - Preah Vihear	222	1.0%	“	N/A		2.738		16.857
P14 - Prey Veng	1067	5.0%	“	N/A		19.349		49.358
P15 – Pursat	638	3.0%	“	N/A		2.112		3.960
P16 - Rattanak Kiri	155	0.7%	“	N/A		2.133		2.534
P17 - Siem Reab	1594	7.5%	“	N/A		5.659		10.010
P18 - Siahnok Vile	1478	7.0%	“	N/A		3.935		4.529
P19 - Stueng Treng	275	1.3%	“	N/A		11.108	No	2.311
P20 - Svay Rieng	555	2.6%	“	N/A		10.028		4.010
P21 – Takeo	880	4.2%	“	N/A		2.536	No	1.139
P22 – Oddar Meanchey	249	1.2%	“	N/A		3.686	No	1.746
P23 - Krong Keb	200	0.9%	“	N/A		4.856		4.050
P24 - Krong Pailin	229	1.1%	“	N/A		1.961		13.682
Ethnic Khmer	20096	95.0%		N/A		1.470	No	.949

Variables	Independent Variable Counts		Variable Definitions		All types of labor Age 14 and Under		Hazardous labor Age 14 and Under	
	Count	%	Definition of Presence	Range for Presence	Significant at the .05 Level	Odds Ratio (Coefficient)	Significant at the .05 Level	Odds Ratio (Coefficient)
Urban	14452	68.3%	Lives in Urban	N/A		.628		.573
Rural			Lives in Rural	N/A				
Wealth Index	13636	64.5%	Quintiles 1 – 3	N/A		1.577		2.301
Male	10824	51.2%	Male Respondent	N/A		.958	No	1.062
Female			Female Respondent	N/A				
Parent in Household	20679	97.8%	Estimated	N/A		.807	No	1.014
Parent Head of Household	19275	91.1%	As Described	N/A		1.424		1.741
Head of HH widowed, divorced or separated	2242	10.6%	As Described	N/A	No	1.089	No	.875
Female Head of Household	2959	14.0%	As Described	N/A	No	1.033		.807
Head of HH Literate	16759	79.2%	Has basic literacy	N/A		.847		.741
Head of HH Educational Attainment	4184	19.8%	As Described First Quintile	Less than one year of schooling		1.183		1.333
Ratio of Adults in HH Not Working to Working > 2	437	2.1%	As Described	N/A		.266		.192
Child in School*	15760	74.5%	Respondent Attending School to Some Extent	N/A		.898		.769
Never Attended School*	4840	22.9%	As Described	N/A		.743		1.174
Proportion of Children in HH < 14 Years of Age	6372	30.1%	As Described 5 <sup>th</sup> Quintile	Proportion of children in HH = 58% and up	No	1.007		1.247
<b>Child Moved in last 5 years</b>	1234	5.8%	Child Moved Residence But Not Necessarily Involved Parent(s)	N/A		.706		.808
<b>Reasons for moving:</b>								
Insecurity	85	0.4%	As Described	N/A	No	.687	No	1.490
Family Reunion	240	1.1%	As Described	N/A		.714	No	.698
For Better Work Prospects	271	1.3%	As Described	N/A		.724	No	.798
For Better Education	21	0.1%	As Described	N/A		.233	No	1.157
For a Marriage	24	0.1%	As Described	N/A	No	1.401	No	.000

Variables	Independent Variable Counts		Variable Definitions		All types of labor Age 14 and Under		Hazardous labor Age 14 and Under	
	Count	%	Definition of Presence	Range for Presence	Significant at the .05 Level	Odds Ratio (Coefficient)	Significant at the .05 Level	Odds Ratio (Coefficient)
Repatriation	23	0.1%	Returning from Dislocations During Khmer Period	N/A		5.049	No	2.453
<b>Commune Level Variables</b>								
Proportion of Poor	11470	54.2%	Poor as Defined by 1998 Census Quintiles 3 - 5	10% or greater in the commune are considered poor		1.566		2.313
Proportion of Migrants in Last Year	8854	41.9%	Migrants defined as Place of Birth Different from Current Residence and Moved in Last 5 years Quintiles 1 & 2	10% or less of the commune have migrated in the last 5 years		1.684		1.520
<b>Village Level Variables</b>								
Females Ages 6-9 in School	8927	42.2%	As Described Quintiles 1 - 3	Less than 37% of females 6 - 9 are in school		1.472		1.940
Males Ages 6-9 in School	8826	41.7%	As Described Quintiles 1 - 3	Less than 37% of males 6 - 9 are in school		1.398		1.705
Proportion of Literate Females	4987	23.6%	Females 15 and older who display basic literacy Quintiles 1 -2	Quintiles 1 - 2 Less than 50% of females are literate		1.368		2.155
Proportion of Literate Males	5712	27.0%	Males 15 and older who display basic literacy Quintiles 1 - 2	Quintiles 1 - 2 Less than 78% of males are literate		1.379		2.041

## Discussion

The most significant outcome of the study is this: *place is the chief indicator of child labor in Cambodia*. Those who work with programs aimed at eliminating child labor will not find this a particular surprise. Types of businesses tend to concentrate in specific locations, known in economics as agglomeration. Consider, for example industrialization in China. A hugely disproportionate amount of manufacturing centers in Guangzhou and Shanghai. Businesses that employ children in Cambodia are probably of specific types and therefore likely to agglomerate. It is not a surprise to find child labor concentrating geographically. Prey Veng is the prime example, where all types of labor and hazardous labor had their highest odds ratios (19.349 and 49.358, respectively).

While some may argue that provinces merely reflect the aggregate of individual and household characteristics, the data indicates otherwise. Further analysis indicated little overlap in the variance explained by individual and household level variables and that of the province level variables. Also, provinces explained more of the variance. There are many economic and related variables not in the dataset that probably are of equal or greater significance, e.g. geospatial variables such as proximity of households to paved roads. Results leave us with the unsettling possibility that involvement in child labor is as much a matter of being in the “wrong place at the wrong time” as it is of other factors.

That many individual and household level variables did not show predictive strength is also an important finding. In our search for significance and insights, we sometimes overlook what is meant by behavior or conditions that are neither significant nor insightful. That gender is not a differentiator, for example, says that boys and girls have equal probabilities of working. They may engage in different types of work, but both groups still work. That a child coming from a household headed by someone with low educational attainments has no greater chance of working in all types of labor than a child coming from a household headed by someone with average educational attainment, says that an adult’s education is not a prophylactic against children working. We should look as much at implicit findings as we do explicit findings.

One of the more interesting findings with the household level variables concerned the Wealth Index, where the presence condition involved the first three quintiles. This indicates child labor is not a phenomena limited to the poor. Those in the quintile above the poverty line allow their children to engage in labor activities to the same degree as families in the lowest two quintiles. When we consider other household level variables with reasonably strong odds ratios, such as the parent head of the household (1.424 for all types of labor and 1.741 for hazardous labor), this suggests a picture not of child labor as a method of last resort for economically desperate families but as a broadly accepted activity. Observations of daily life in Cambodia illustrate this. It is a common sight, for example, to see early adolescent and pre-pubescent children tending snack stands along roads in the countryside or performing informal labor activities in markets. The general openness and acceptability of these activities coupled with the quantitative findings suggests a picture of child labor somewhat different than what generally comes to mind for most Westerners.

Looking further into this line of reasoning one view holds that the more egregious the nature of child labor, the more a family feels impelled to place their child into less desirable labor situations. Our study does not support this notion for the two types of labor we investigated. Further analysis reveals, in fact, that hazardous labor may be more desirable labor from the standpoint of pay, skills and the children's perception. We found that children in hazardous occupations, as we defined it, tended to make higher wages and reported more satisfaction with their work. What we seem to be measuring here when we speak of hazardous labor, is not simply dangerous work but also more skilled work and higher paying work. Children are getting a pay premium either because of risk or their associated skills.

This brings to mind a personal experience I had with child labor in Cambodia. A few years back I escorted a local Cambodian research team for interviewing among the floating villages on the Tonle Sap. We chartered a boat for the day. Our pilot was a twelve year old boy. I was surprised at this. None of my Cambodian colleagues were, however. The boy was an able pilot, knowing navigation and handling of the boat along with basic engine repairs. On arrival at the village, or actually villages, we needed to check in with the commune chief. It turns out he was the boy's uncle. Given the status of the uncle as commune chief, it is unlikely the boy was in a low status occupation. At twelve he had completed the sixth grade, as far as he could go in that rural portion of Siem Reab province, and was starting on a career a bit less strenuous than his other option, fishing 12 hours a day, six days a week on the Tonle Sap. There were certainly dangers in his chosen occupation, particularly given the physical demands on a boy who had barely begun to embark on adolescence. What were his options, however?

Results point to a possible approach for identifying at risk populations. Rather than seek a single step method that uses a set of discrete variables, we should consider a multi-staged approach. If we accept the multi-dimensional nature of child labor there we may find a sound, multi-dimensional quantitative method for assisting policy makers and program designers. As the results indicate, place is important, i.e., province. The first step is to identify at-risk geographies as opposed to at-risk individuals or populations. Granted, child labor occurs in every province of Cambodia. But program funds are often incapable of stretching across all parts of a country. Having a method for narrowing the focus can help improve program impact.

With provinces identified, the next step is to identify communes and/or villages that are most at-risk. Our analysis shows that here is where education and poverty have the most salience. There are likely other commune and village level variables that can help pinpoint at risk locations. As previously mentioned, it is likely that geospatial variables are also important, e.g. proximity to paved roads and urban centers. While highly anecdotal, a perusal of a map of Cambodia suggests that the provinces with high rates of child labor are provinces that are poor *and* have a significant number of roads. There are a number of reasons why roads may be an affect. Further investigation would help illuminate other variables and their relationship with child labor. With villages identified,

we can then employ the individual and family level variables to finally identify the greatest proportion of at-risk persons.

A final topic area for this discussion concerns the two dependent variables and wider implications for all types of child labor. There seems an implicit assumption in this classification of child labor that there is a continuum of child labor that moves from the more benign to the most egregious. There is practical value to this linear conception when assessing the physical and psychological consequences of work on children. Selling snacks by the roadside is vastly less risky than working in a deep, narrow pit mine digging for gold or diamonds.

But the concomitant assumption is that families who place their children in increasingly risky occupations follow a parallel path of increasing desperation or even moral turpitude. Results of this analysis indicate that the strict linearity of this latter argument does not hold. Some types of hazardous labor are better paying and lead to greater satisfaction among the children who work these jobs. As we move further along the continuum into most egregious forms of child labor, including worst forms of trafficking, what is the case?

If we are to understand the motivations and drivers for children engaging in all types of work, it is important that we better understand the social meaning of work from the families' and children's perspective. Remediation does not work with an unwilling population, especially one that is receiving noticeably greater rewards for engaging in the target behaviors. One value of this study is a step towards a broader context for understanding all types of child labor. Specific forms of child labor, e.g., trafficking, do not exist in isolation, although we tend to view them in this manner. Their existence and continuance bears relationships with other forms of child labor. As we build a broader context for child labor we will better understand specific forms.

We should also recognize that as Cambodia and other countries develop, this can mean an increase in better paying but also more dangerous and egregious forms of labor for children and also adults. As we in developed countries fund economic development projects, especially infrastructure development that brings urban economic activities closer to rural communities, we should anticipate the almost certain consequence of increased opportunities for children to join in economic activity, both acceptable and otherwise. This speaks directly to the benefits and liabilities of globalization. The more we understand the determinants of child labor, the more we are in a position to forestall negative consequences.