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## Research Article

# Factors Associated with Child Labour in Ethiopia: A Multilevel Analysis

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## Abstract

**Background and Objective:** Child labour remains to be a serious problem in the world today. The problem is very severe in Sub-Saharan African countries. Among the Sub-Saharan African countries, Ethiopia is one of the countries with a high incidence of child labour. The major objective of this study was to identify and examine the key factors associated with child labour in Ethiopia. **Materials and Methods:** The study focused on children aged between 5 and 14 years by using the 2013 Ethiopia National Labour Force Survey cross-sectional dataset. Descriptive statistics, binary logistic regression and multilevel logistic regression analyses were used. **Results:** The two-level logistic regression analysis results revealed that region of residence, sex of the child, age of the child, place of residence, child's relationship with the household head, literacy status of the household head, employment status of the household head and the household size are significant factors associated with child labour in Ethiopia and also that the effect of place of residence varied across regions of Ethiopia. **Conclusion:** The current study has revealed key determinants of child labour in Ethiopia and should be of interest to both researchers and practitioners. There is a need to enforce the laws and put in place concrete interventions.

**Key words:** Child labour, heterogeneity, labour force survey, random coefficient model, two-level logistic regression models

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**Competing Interest:** The authors have declared that no competing interest exists.

**Data Availability:** All relevant data are within the paper and its supporting information files.

## INTRODUCTION

International Labour Organization (ILO) defines child labour as work that deprives children of their childhood, their potential and their dignity. The ILO convention 138 sets the general minimum age for admission to employment or work at 15 years and the minimum age for hazardous work at 18. Ethiopia has ratified the key international conventions concerning child labor. In addition, the Ethiopian Government has also established relevant laws and regulations related to child labor, including its worst forms. This study is based on information on children aged 5-14 years. Children under 5 years are assumed to be too young to work and consequently data for younger children are not available in the 2013 Ethiopia National Labour Force Survey<sup>1</sup>.

Child labor is a complex problem whose roots are deeply embodied in cultural, social, political and economic structures and traditions of societies<sup>2</sup>. Child labor remains to be a serious problem in the world today. According to the International Labor Organization<sup>3</sup>, out of 264 million working children worldwide that are between the ages of 5-17, 168 million children were engaged in child labor. Letting children work at an early age may have negative outcome on the personal development of the children and the economic and social development of their country.

Ethiopia as a developing country, might also suffer from this phenomenon given its current large proportion of young age population. The whole population of Ethiopia was 80.4 million in 2013, of which around 29.0% were between 5 and 14 years of age. Of this age group of children, 51.4% were boys. Further, only 18.3% of the child population lived in urban areas of the country<sup>1</sup>. According to the country regulations, those under 15 are banned to be employed in Ethiopia and the workers between 15-18 years old are entitled to special protection<sup>4</sup>. Child labour has also been one of the main reasons for low school enrolment in rural Ethiopia<sup>2</sup>.

Understanding child labour is important not only because young children are made to undertake work obligations that may be beyond their physical capability but also because of its long term effect on human capital formation and on the future welfare of the children<sup>5</sup>.

Similar to other African countries, child labour is a problem in Ethiopia. Different researchers have indicated that the situation is very severe in the rural parts of the country<sup>2</sup>. The 2013-ENLFS also confirmed that the situation of child labour is very high (49.2%) in rural parts of the country and relatively low (7.7%) in the urban parts of the country. Ethiopia had one of the highest rates of child labour in the world<sup>6</sup>.

In Ethiopia, it was reported that reported that about 27% of children under 15 (with 17% for children aged 5-11 and 55% for children aged 12-14) were engaged in child labor<sup>7</sup>. The 2013-ENLFS reported that 62.3% of the total children aged 10-14 years were involved in economic activities. In terms of sex differences, 66.3% of boys and 59.8% of girls were involved in economic activities. The proportion of urban children aged 10-14 years engaged in economic activities was higher for boys (20.4%) than for girls (18.0%)<sup>1</sup>.

Explanations of the high child labour rate in Ethiopia is not clear as very few studies have been conducted about the problem of child labour. In addition, regional variability wasn't accounted for in most studies of child labour in Ethiopia. Hence, this study has attempted to investigate and identify not only the factors associated with child labour in Ethiopia but also the factors that may explain the variation in child labour among regions of Ethiopia.

## MATERIALS AND METHODS

**Location and period of study:** The study was carried out at the Addis Ababa University, Ethiopia during December, 2016-June, 2017.

**Data source:** The dataset used in this study was obtained from the 2013 Ethiopia National Labour Force Survey (ENLFS) conducted by the Central Statistical Agency. The data were collected between May 24-June 12, 2013. The 2013-ENLFS is a nationally representative cross-sectional survey of individuals aged 5 or above. Data about work status were collected on children as low as 5 years old since children in rural and urban areas of Ethiopia engage in collection of fire wood, looking after cattle, shoe shining, street vendor, petty trading and the like at their early age<sup>1</sup>.

This multistage 2013-ENLFS dataset has hierarchical structure. The data have a two-level hierarchical structure with children at level 1, nested within 9 regions and 2 city administrations at level 2.

**Variables measurement:** Figure 1 shows that child labor could have a variety of factor levels.

**Response variables:** The response variable is a binary indicator of whether a child is engaged in any economic activities and considered as a child labourer or not. Therefore, the outcome for the  $i$ th child is represented by a random variable  $Y_i$  with two possible values coded as 1 and 0 as follows:

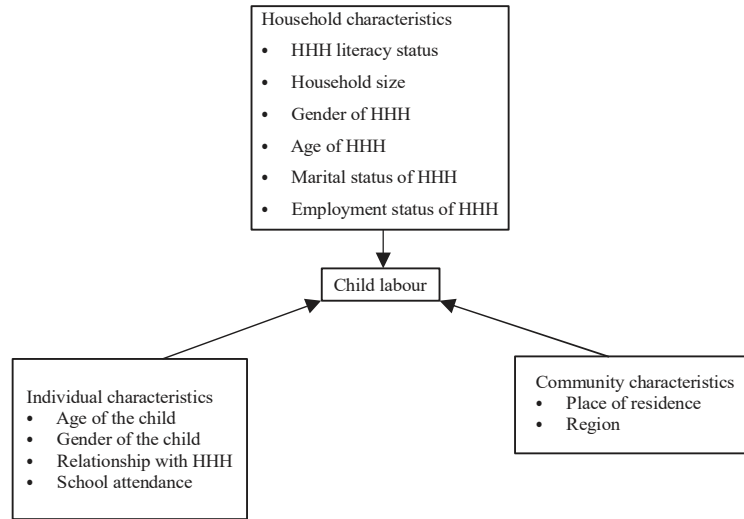


Fig. 1: Potential factors that may influence child labour in Ethiopia

Source: Adapted from a Webbink *et al.*<sup>17</sup>, HHH: Household head

$$Y_i = \begin{cases} 1, & \text{if the } i\text{th child is working and considered a child labourer,} \\ 0 & \text{otherwise} \end{cases}$$

To be considered as a child labourer, a child must be:

- (1) Between 5-11 years of age who is engaged in economic activity for at least an hour within the reference week or
- (2) Between 12-14 years of age involved in an economic activity for 14 or more hours in the reference week or
- (3) Between 5-14 years of age who is engaged in hazardous work for at least an hour during the reference week or
- (4) Between 5-14 years of age involved in any economic activity during night for at least one hour during the survey reference week.

**Predictor variables:** Independent variables/factors that are expected to influence child labour in Ethiopia are region, gender of child, age of child, residence, school attendance status, relationship with Household Head (HHH), gender of HHH, literacy status of HHH, occupation of HHH, marriage status of HHH and family size.

**Method of data analysis:** Descriptive statistics and multilevel logistic regression analyses were used to analyze factors associated with child labour.

**Multilevel analysis:** In this study, the clustering of the data points within geographical regions offered a natural 2-level hierarchical structure of the data. Let  $y_{ij}$  be the binary outcome variable for individual 'i' in region 'j', coded '0' or '1', associated with level-one unit i nested within level two unit 'j'. Also, let  $p_{ij}$  be the probability that the response

variable for individual i in region j equals 1,  $p_{ij} = \Pr(y_{ij} = 1)$ . The two-level logistic regression model can be written as:

$$\log \frac{p_{ij}}{1-p_{ij}} = \beta_0 + \beta_1 x_{ij} + u_{0j}$$

where,  $u_{0j}$  is the random effect at level 2.

Therefore, conditional on  $u_{0j}$ , the  $y_{ij}$ 's can be assumed to be independently distributed. Here,  $u_{0j}$  is a random quantity and follows  $N(0, \sigma^2_u)$ .

**Empty logistic regression model:** If the general link function  $f(p)$  is the logit function, then:

$$f(p_j) = \beta_0 + u_{0j}$$

where,  $\beta_0$  is the population average of the transformed probabilities and the  $u_{0j}$  random deviation from this average for group j, then  $f(p_j)$  is just the log-odds for group j.

**Random intercept logistic regression model:** The logistic random intercept model expresses the log-odds, i.e., the logit of  $p_{ij}$ , as a sum of a linear function of the explanatory variables and a random group-dependent deviation  $u_{0j}$ . That is:

$$\text{logit}(p_{ij}) = \log \frac{p_{ij}}{1-p_{ij}} = \beta_0 + \sum_{h=1}^k \beta_h x_{hij} = \beta_0 + \sum_{h=1}^k \beta_h x_{hij} + u_{0j}$$

where:

$$\beta_{0j} = \beta_0 + u_{0j}$$

$$\beta_{0j} + \sum_{h=1}^k \beta_h x_{hij}$$

is the fixed part of the model, because the coefficients are fixed. The remaining part  $u_{0j}$  is called the random part of the model. It is assumed that the residual,  $u_{0j}$  are mutually independent and normally distributed with variance  $\sigma^2_0$  and mean zero<sup>8</sup>.

**Random coefficient logistic regression model:** Suppose there are k level-one explanatory variables  $x_1, x_2, \dots, x_k$ . Considering the model where all x-variables have varying slopes and random intercept:

$$\text{logit}(p_{ij}) = \log \frac{p_{ij}}{1-p_{ij}} = \beta_{0j} + \beta_{1j}x_{1ij} + \beta_{2j}x_{2ij} + \dots + \beta_{kj}x_{kij}$$

Letting  $\beta_{0j} = \beta_0 + u_{0j}$  and  $\beta_{hj} = \beta_h + u_{hj}$ , for  $h = 1, 2, \dots, k$ :

$$\text{logit}(p_{ij}) = \log \frac{p_{ij}}{1-p_{ij}} = \beta_0 + \sum_{h=1}^k \beta_h x_{hij} + u_{0j} + \sum u_{hj} x_{hij}$$

The first part of this model:

$$\beta_0 + \sum_{h=1}^k \beta_h x_{hij}$$

is the fixed part and the second part:

$$u_{0j} + \sum_{h=1}^k u_{hj} x_{hij}$$

is the random part of the model<sup>8</sup>.

## RESULTS

**Descriptive analysis:** The total number of children aged 5-14 years covered in the present study was 12,238. Among these, 3,922 children (about 32%) were engaged in child labor during the last 7 days before the survey (Table 1). This is a sign of how severe the situation of child labor in Ethiopia is. The target group consists of boys and girls aged 5-14 years. Out of the total of 12,238 sampled children, 6,094 (49.8%) were girls.

The results in Table 1 shows that region of residence is significantly associated with incidence of child labour ( $p < 0.001$ ). The highest percentage (43.1%) of child labour was observed in Amhara region followed by Oromia region (38.9%). Conversely, Addis Ababa city administration and Gambela region had the lowest percentage (1.8 and 17.1%), respectively, for the occurrence of child labour among children in the age group of 5-14 years.

As shown in Table 1, higher proportion (34.4%) of boys and a relatively lower proportion (29.7%) of girls aged 5-14 were engaged in child labour. Similarly, 31.0% of the children in the age group of 5-11 and 34.5% of children in the age group of 12-14 years were child labourers.

Likewise, higher proportion (49.2%) of children residing in rural areas and a relatively small proportion (7.8%) of the children in urban areas were engaged in child labour.

**Bivariate statistical analysis:** The chi-square test results show that the incidence of child labour is associated with region, sex of the child, age categories of the child, place of residence of the child, school attendance of the child, relationship of children to the household head, sex of household head, literacy status of the household head, employment status of the household head and family size.

**Two-level logistic regression analyses:** A two-level structure (with children as first level unit and region as the second level unit) has been used. In this study, three two-level logistic regression models (empty model, random intercept with fixed effects model and random coefficient with random intercept model) have been fitted.

The chi-square test was applied to assess heterogeneity between regions means. The test results are  $\chi^2 = 658.428$  with  $df = 10$  ( $p = 0.001$ ) providing evidence of heterogeneity with respect to the incidence of child labour among the regions of Ethiopia.

**Model comparison:** The deviance, likelihood ratio test, AIC and BIC values were used for selecting the best fitting model among the three fitted two level logistic regression models considered. Table 2 shows that both deviance and the AIC values for the random coefficient model are less than that for the empty model with random intercept and the random intercept with fixed coefficient model.

This indicates that the random coefficient model provides a better fit as compared to both the empty model with random intercept and the random intercept with fixed effect model.

**Determinants of child labour: The random coefficient model:** The random coefficient model fit results are presented in Table 3. In Table 3, the values of  $\text{Var}(U_{0j})$  and  $\text{Var}(U_{4j})$  are the estimated variances of the intercept and slope of place of residence, respectively. These estimated variances are significant and suggest that the intercept and slope of place of residence vary significantly. So, there is a significant variation in the effect of place of residence across regions in Ethiopia.

Table 1: Distribution of child labor status by socio-demographic factors

Variables	Child labor status		Total	Child labor (%)	df	Chi-square	p-value
	Engaged in child labor	Not engaged in child labor					
<b>Region</b>							
Tigray (Ref)	323	612	935	34.5	10	658.428	<0.0001
Afar	144	313	457	31.5			
Amhara	912	1202	2114	43.1			
Oromia	1145	1798	2943	38.9			
Somali	146	597	743	19.7			
Ben-gumuz	139	379	518	26.8			
SNNPR	790	1622	2412	32.8			
Gambela	94	456	550	17.1			
Harari	83	267	350	23.7			
Addis Ababa	15	808	823	1.8			
Dire Dawa	131	262	393	33.3			
Total	3922	8316	12238	32.0			
<b>Sex of the child</b>							
Male	2114	4030	6144	34.4	1	31.552	<0.0001
Female (ref)	1808	4286	6094	29.7			
<b>Age categories of children</b>							
5-11 years (ref)	2663	5922	8585	31.0	1	13.97	<0.0001
12-14 years	1259	2394	3653	34.5			
<b>Place of residence of the child</b>							
Urban	391	4665	5080	7.7			
Rural (ref)	3531	3651	7182	49.2	1	2339.05	<0.0001
<b>School attendance of the child</b>							
Attending	2107	5649	7756	27.2			
Not attending (ref)	1815	2667	4482	40.5	1	237.7	<0.0001
<b>Child's relationship with the household head/spouse</b>							
Son/daughter	3422	7041	10463	32.7			
Not on/daughter (ref)	500	1275	1775	28.2	1	14.343	<0.0001
<b>Sex of the household head</b>							
Male	3231	6192	9423	34.3			
Female (ref)	691	2124	2820	24.5	1	94.449	<0.0001
<b>Literacy status of the household head</b>							
Literate	1521	4766	6287	24.2			
Illiterate (ref)	2401	3550	5951	40.3	1	366.3	<0.0001
<b>Employment status of the household head</b>							
Employed	3737	7200	10937	34.2			
Unemployed (ref)	185	1116	1301	14.2	1	212.5	<0.0001
<b>Current marital status of the household head</b>							
Married	3335	6682	10017	33.3			
Not married (ref)	587	1634	2221	26.4	1	39.329	<0.0001
<b>Family size</b>							
5 and below (ref)	1464	3721	5185	28.2			
10-Jun	2395	4350	6745	35.5	2	90.695	<0.0001
11 and above	63	245	308	20.5			

Source: Own calculation based on the 2013-ENLFS report

Table 2: Multilevel logistic regression model selection criteria

Model selection criteria	Log likelihood (LL)	Deviance-2LL	Deviance based		df	AIC	BIC
			chi-square	p-value			
Multilevel empty model	-7295.865	14591.73	10.56	0.0006	2	14595.73	14610.55
Multilevel random intercept model	-6151.97	12303.94	18.90	0.0001	13	12329.94	12426.3
Multilevel random coefficient model	-6131.61	12263.22	40.72	0.0001	26	12293.22	12404.4

AIC: Akaike information criterion, BIC: Bayesian information criterion

The effect of intercept on region  $j$  is estimated to be  $-0.5273 (0.1830)+U_{0j}$  and their variance 0.7359 (Standard error 0.4142). The intercept variance of 0.7359 (Standard error 0.4142) is interpreted as the between-region

variance when all other variables are held constant (i.e., equal to zero). The between-region variance of slope of place of residence is estimated to be 0.1924 (standard error 0.0925).

Table 3: Parameter estimates of the random intercept and random slope model

Variables	B	SE	Z-test	p> z	Exp. (B)	95.0% CI for exp (B)	
						Lower	Upper
Sex of the child (ref. female)	0.1988	0.0442	4.50	0.000*	1.220	1.1188	1.3303
Age of child (ref. 5-11)	0.3239	0.0497	6.51	0.000*	1.3824	1.2541	1.5239
Place of residence (ref. rural)	-2.5923	0.2838	-9.13	0.000*	0.0748	0.0429	0.1305
School attendance (ref. not attending)	0.0048	0.0471	0.10	0.920	1.0048	0.9162	1.1019
Relationship to HHH (ref. not son/daughter of HHH)	-0.4267	0.0732	-5.83	0.000*	0.6527	0.5654	0.7534
Sex of the household head (ref. female)	0.1131	0.0810	1.40	0.163	1.1198	0.9553	1.3125
Literacy status of HHH (ref. illiterate)	-0.1745	0.0488	-3.58	0.000*	0.8399	0.7633	0.9241
Employment status of HHH (ref. unemployed)	0.6071	0.0981	6.19	0.00*	1.8351	1.5142	2.2240
Marital status of HHH (ref. unmarried)	-0.1114	0.0876	-1.27	0.203	0.8946	0.7535	1.0621
<b>Household size (ref. 5 and under 5)</b>							
6-10 (age)	0.0472	0.0491	0.96	0.337	1.0483	0.9521	1.1543
11 and above (age)	-0.4153	0.1629	-2.55	0.011*	0.6601	0.4798	0.9083
Constant	-0.5273	0.1830	-2.88	0.004*	0.5902	0.4123	0.8448
<b>Random effect</b>							
	Estimate	SE	Z-value	p-value			
Var ( $U_{0j}$ ) = $\sigma^2_0$	0.7359	0.4142	1.78	0.0375			
Var ( $U_{1j}$ ) = $\sigma^2_{a1}$	0.1924	0.0925	2.08	0.0188			
Cov ( $U_{0j}, U_{1j}$ ) = $\sigma_{0a1}$	-0.1823	0.1521	-1.20	0.2301			

LR test vs. logistic regression: Chi-square (3) = 266.47, p-value = 0.000, \*Significant (p<0.05)

The random coefficient model fit results in Table 3 reveal that everything else being equal except slight difference on random effect in the model, boys were 22.0% more likely to be engaged in child labour (aOR = 1.22) compared to girls. Likewise, children in the age group 12-14 years were 38.2% (aOR = 1.382) more likely to be engaged in child labour compared to children in the age group 5-11 years controlling for other variables in the model and random effects at level two.

Similarly, children who lived in urban households were 92.5% less likely to be engaged in child labour (aOR = 0.0748) than children who resided in rural households.

Likewise, sons/daughters of the household heads were 34.7% less likely to be engaged in child labour than children who are not the sons/daughters of the household heads.

Also, children from households with literate household heads were 16.0% (OR = 0.840) less likely to be engaged in child labour than children from households with illiterate household heads controlling other variables in the model and random effects at level two.

Children who have employed household heads were 1.8351 (OR = 1.8351) times more likely to be engaged in child labour than children who have unemployed household heads controlling for other variables in the model and random effects at level two.

Finally, children from households of size 11 and above were 34.0% (aOR = 0.660) less likely to be engaged in child labour compared to children from households of size five or less controlling for other variables in the model and random effects at level two.

## DISCUSSION

This study was intended to identify the determinants of child labour (whether a child is engaged in child labour or not) among 5-14 years old children in Ethiopia based on evidence from the 2013 Ethiopian National Labour Force Survey data. Consequently, descriptive analysis and two-level logistic regression analyses were used.

Male children were more likely to be engaged in child labour compared to female children controlling for other variables in the model. The reason might be that girls are more engaged in household chores (domestic works) than boys. This finding is in agreement with the findings in other studies<sup>2,9-11</sup>. They concluded that girls are less likely to be engaged in child labour than boys because girls are more involved in housework. Conversely, older children were more likely to be engaged in child labour than younger children. This is also consistent with the findings in other studies<sup>11-13</sup>.

Likewise, children residing in rural areas were more likely to be engaged in child labour than children in urban areas. This finding is in line with the finding that child labour is, for obvious reasons, particularly widespread in developing countries and more so in rural than in urban areas<sup>14</sup>. The same result was also confirmed by others<sup>11,13</sup>. A study in Ethiopia also found out that the subsistence nature of economic life, tradition and cultural values force rural communities to involve their children in economic activities thereby perpetuating child labour<sup>2</sup>.

On the other hand, children of household heads were less likely to be engaged in child labour compared to those who are not. It is assumed that being a direct child of the household head is the basis for parental altruism and children who are not the son/daughter of the household heads may, therefore, be more involved in (housework economic activities) child labour<sup>9,15,11</sup>.

The current study revealed that children from households having literate household heads were less likely to be engaged in child labour than children from households having illiterate household heads. This finding is consistent with the finding of a study in Côte d'Ivoire<sup>16</sup>.

Consistent with the finding of a study in Côte d'Ivoire<sup>16</sup>, household heads employment status affect child labour positively. Children from employed household heads were more likely to be engaged in child labour than children from unemployed household heads. Household size was found to be negatively associated with the incidence of child labour. Children from households of size 11 or above were less likely to be engaged in child labour compared to children from households of size five or less.

In order to decrease the incidence of child labour in Ethiopia, it is crucial to raise adult literacy levels by strengthening existing programs and creating new ones throughout the country. Moreover, there is a need to address the severe situation of child labour in rural parts of Ethiopia by improving school infrastructures and creating awareness within the society.

## **CONCLUSION**

The descriptive results show that 32.0% of the sampled children in Ethiopia were engaged in child labour. The study identified region, sex of the child, age of the child, place of residence, child's relationship with the household head, literacy status of the household head, employment status of the household head and the household size as significant predictors of the incidence of child labour in Ethiopia. The results of the two-level logistic regression analyses indicated that older children were more likely to be engaged in child labour than younger children. Conversely, children were less likely to be engaged in child labour as the size of households increase. The two-level logistic regression results also revealed that only the effect of place of residence varied across regions whereas the effects of other covariates on the incidence of child labour remained fixed across regions.

## **SIGNIFICANCE STATEMENT**

This study has discovered the key determinants of child labour that can be beneficial for the formulation of policies and strategies that will facilitate the reduction of child labour in the country. The findings may also provide helpful information for those interested in conducting further studies on the issue. All studies conducted so far to investigate the determinants of child labour in Ethiopia did not capture the effects of relationship of a child with the head of the household, level of education of parents and gender of household head which may have important implications to child labour. In addition, regional variability wasn't accounted for in most studies of child labour in Ethiopia. Hence, this study helps in investigating and identifying the factors associated with child labour in Ethiopia by incorporating these variables. Thus, this study will help the researcher to uncover the critical areas of simultaneous variability in child labour within and between regions that many researchers were not able to explore.

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