International
COCOA
Initiative

Using community-level data to understand child labour risk in cocoa-growing areas of Côte d'Ivoire and Ghana

Executive Summary

October 2019

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KEY OUTCOMES

The research project is based on a novel data set which combines information on community characteristics with household survey data on child labour incidence from 258 cocoa-growing communities in Côte d'Ivoire and Ghana.

While recognising that a multitude of factors determine child labour risk, an analysis of data available from community assessments show that a relatively small set of indicators can be used to categorize communities according to their level of child labour risk, helping to identify those that may be most vulnerable.

These community indicators relate to:
- access to education
- transport and communication infrastructure in the community
- women's empowerment
- cocoa cultivation (importance for livelihoods and local production modalities)

Based on the selection of indicators from available community data, a model was developed which allows to classify communities into one of three child labour risk categories (higher, medium, and lower risk).

The study results provide a tool for targeting support for the most at-risk communities based on a set of community characteristics which can be collected easily and at a much lower cost than a household survey.

The results of the study highlight the important influence of education quality, household income and women's empowerment (among other factors) on child labour risk and suggest that interventions in these areas may be key elements of an effective strategy to address child labour in cocoa.

BACKGROUND

Child labour in cocoa-growing areas is caused by a complex interplay of social, economic and cultural factors which span across the individual, household, community, national and international levels. This research project sought to **identify which community factors indicate that a community is vulnerable to child labour** in the first place, and how these community factors can be used to **assess child labour risk in a cost-effective manner**. Child labour *incidence* surveys are often costly, complex to administer, and require a relatively large sample of individuals in each community. Information on potentially relevant community characteristics, on the other hand, is relatively straightforward and less costly to collect.

Data on community characteristics from 258 cocoa-growing communities in Côte d'Ivoire and Ghana were therefore combined with household survey data on child labour incidence to derive a "child labour risk indicator" based on an econometric

model. This model classifies each community into one of three child labour risk categories.

DATA AND METHODS IN BRIEF

The ICI Protective Cocoa Community Framework (PCCF) questionnaire, a community-level assessment tool which collects information related to community development, community empowerment, education, child protection, gender and livelihoods, was administered to 130 communities in Côte d'Ivoire and 128 communities in Ghana. In parallel, a child labour survey was administered to 5,200 households in Côte d'Ivoire, and 3,000 households in Ghana, which were randomly selected from all households in the same communities.[1] The child labour rates[2] derived from these surveys for each community were then matched to the community data to identify the community characteristics most strongly associated with child labour prevalence. In a next step, child labour risk classes were defined,[3] and the probability of falling into a specific risk class was estimated for each community. The model predicts for each community the probability of falling into one of three risk classes (higher, medium and lower-risk) based on the community characteristics that were identified in the first step.

KEY FINDINGS

First, we established lists of community characteristics to serve as predictors for child labour risk for each country. The lists comprised community indicators related to access to education; physical infrastructure; women's empowerment; and cocoa cultivation. Some indicators were included because step-wise regression analysis revealed a statistically significant correlation with child labour; and others were included because theory suggests that they may be important drivers of child labour risk.

Second, the sample communities were allocated to risk classes. For Côte d'Ivoire, three risk classes were identified based on an econometric model (a so-called finite mixture model), where the large share of communities (87%) fall into the *lower risk class*, with an average child labour rate of 17%; 5% of the communities fall into the *medium risk class*, with an average child labour rate of 30%; and 8% of communities fall into the *higher risk class*, with an average child labour rate of 54%. A more fine-grained classification of risk classes was not possible because a large proportion of

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[1] A smaller sample was needed for Ghana for the study to be representative of cocoa-growing areas as compared to Côte d'Ivoire, since there are fewer cocoa districts. This sample is larger than several other child labour prevalence surveys (for instance the Tulane 2013/14 survey completed 1,214 HH interviews in Cote d'Ivoire and 1,053 HH interviews in Ghana). Additional information on methodology is presented in Annex 1.

[2] Child labour rates were computed based on a binary indicator of whether or not a child is considered to be in child labour according to national legislation. Nuances in the gravity and frequency of child labour within this classification, while important, are therefore not taken into account for this research.

[3] For the definition of risk classes, a data-driven approach was used for Côte d'Ivoire (by estimating a finite mixture model). In Ghana, the data-driven approach failed due to lack of heterogeneity across communities; risk classes were set by sorting communities by child labour rates and dividing the sample into three equally sized groups. For a detailed description of the methodology, see the full research reports.

communities had very similar levels of child labour, and the overall variation was relatively low in both countries. In the Ghana sample, variation was too low to even apply the data-driven approach for establishing risk classes; risk classes were hence set by dividing the sample into three equally sized groups, where the child labour rate was 8% in the *lower risk class*, 18% in the *medium risk class*, and 32% in the *higher risk class.*

For both countries, the models were tested for their ability to correctly allocate communities to one of the child labour risk classes, based on the community characteristics listed above. The large majority of communities were correctly allocated by the model, using the true child labour prevalence for validation.

In conclusion, the study has shown that **a limited set of community characteristics, which can be collected easily and at low cost, are able to provide a powerful predictor of a community's approximate level of child labour risk**. The model could be applied as a **tool to target further assessment and support to the most at-risk communities.**

COUNTRY-SPECIFIC FINDINGS IN DETAIL

Côte d'Ivoire

Relevant community characteristics

Step-wise regression was used to filter out, from a long list of available community characteristics collected by the PCCF, those that have explanatory power for local child labour rates with statistical significance.[4] Decreases in child labour rates were found to be positively associated with:

- presence of a primary school
- absence of connection to the electricity grid
- mobile network coverage
- availability of casual adult labour
- some children receiving scholarships for secondary education
- increase in women's education level (main education level reached by women in the community)

The following community characteristics were added to those identified by regression since they are known to be potential drivers of child labour:

- presence of a kindergarten
- school attendance rate
- percentage of households cultivating cocoa
- annual cocoa production in the community

[4] Following the national legislation for Côte d'Ivoire, children are classified in child labour on the basis of the following criteria: children aged 5-13 years in employment and children aged 14-17 years working in hazardous occupations or working more than 40 hours per week or working at night.

- availability of agricultural inputs
- whether cocoa farmer organisations or cooperatives are active in the community

Risk classes

Based on these and the community-specific child labour rates, the finite mixture model generated three risk classes (categories) as indicated in the table below.

Figure 1: Risk classes for assessed communities in Côte d'Ivoire

Risk Class	No. Observations	Percentage	Average Child Labour Rate
1 (lower risk)	113	86.9%	17%
2 (medium risk)	6	4.6%	30%
3 (higher risk)	11	8.5%	54%
Total	130	100%	-

The findings reveal that the vast majority of communities - 87% - fall within the *lower risk class*[5] and have an average child labour rate of 17%. 5% of communities fall within the *medium risk class* and have an average child labour rate of 30%, while 9% of communities fall within the *higher risk class* and have an average child labour rate of 54%.

Specifically, the relevant community characteristics are indicative of the community's child labour risk as follows:

Individual and Household Risk Factors

The researchers also estimated a model which includes individual and household-level predictors, in addition to community-level predictors, for the child's participation in work and schooling, using four mutually exclusive categories: "study only", "work only", "work and study" and "do nothing/idle". The model used is a multinomial logit regression model which identifies how each of the various factors are associated with a child's participation in work and schooling, while holding all other factors equal.

The estimates show the following:

At the individual child level:
- **Gender and age** are important determinants of child employment and child labour. **Boys and older children** (notably boys aged 14-17 years) are more likely to be involved.
- If a child attends a school with **free school supplies,** he/she is less likely to also work.

At the household level:
- As the **education of the household head** increases, the probability of children being engaged in child employment or child labour decreases.

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[5] Although tested, it was not possible to break down this risk class further into sub-classes, as this would reduce the precision and most likely invalidate the model.

- As household monthly income increases, the probability of children being engaged in child employment and child labour decreases.
- As household cocoa production increases, the probability of children being engaged in child labour and child employment increases.

At the community level, factors that significantly reduce the probability of child labour (and consistent with the results obtained in the previous section) are:

- presence of a primary school
- primary school equipped with toilet facilities
- secondary school scholarships
- availability of casual adult labour

Ghana

Relevant community characteristics

As for Côte d'Ivoire, step-wise regression was used to filter out, from a long list of available community characteristics collected by the PCCF, those that have explanatory power for local child labour rates with statistical significance.[6]

Decreases in child labour rates were found to be positively associated with:
- increase in the number of primary schools within the community
- presence of a junior high school in the community
- lower distance to the nearest senior secondary school
- availability of a school feeding program
- mobile network coverage
- accessibility by road throughout the year
- increase in the percentage of women in leadership positions
- increase in the percentage of women engaged in livelihood activities
- presence of cocoa farmer organisations or cooperatives in the community
- percentage of households cultivating cocoa

The following community characteristics were added to those identified by regression since they are known to be potential drivers of child labour:
- availability of casual adult labour
- percentage of women who can read

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[6] Following the international standard definition, children are classified as in child labour on the basis of the following criteria: children aged 5-11 years in agriculture, children aged 12-14 years working in hazardous occupations or working from 14 to 42 hours per week and children aged 15-17 years working in hazardous occupations or working more than 42 hours per week.

Risk Classes

The sample of communities in Ghana was split into three child labour risk classes such that each class contained **one third of sample communities**.[7] The average child labour rates in each of the three classes were as follows:

Figure 2: Risk classes for assessed communities in Ghana

Risk Class	No. Observations	Average Child Labour Rate
1 (lower risk)	43	8%
2 (medium risk)	43	18%
3 (higher risk)	42	32%
Total	128	-

Individual and Household Factors

As for the Côte d'Ivoire study, the researchers also estimated a model which includes individual and household-level predictors, in addition to community-level predictors, for the child's participation in work and schooling, using the four mutually exclusive categories: "study only", "work only", "work and study" and "do nothing/idle". As explained above, the model used is a multinomial logit regression model which identifies how each of the various factors are associated with a child's participation in work and schooling, while holding all other factors equal.

The estimates show the following:

At the individual level:

- The age of the child is an important determinant of child employment and child labour. Older children have an increased risk of being engaged in child labour in Ghana.
- Children in rural areas are less likely to attend school without working and more likely to work (both with and without attending school) as compared to children in urban areas.

At the household level:

- As the education of the household head increases, the probability of children working only and of doing nothing significantly decreases.
- Children in households producing cocoa are more likely to work (both with and without attending school) and, in particular, less likely to attend school without working and more likely to do neither activity.
- Children living in households where women are literate are more likely to "study only" or to "work and study" (as compared to work only or be idle).

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[7] Several tests and attempts were made to adopt for the Ghana study a technique to determine from the data the number of risk classes (finite mixture model), as was done for the Côte d'Ivoire study. However, the communities in Ghana had very similar child labour rates which were statistically indistinguishable from one another, so that a finite mixture model resulted in one single risk class. Therefore, the sample was a priori divided into terciles on the basis of child labour rate, constituting a priori three risk classes.

At the community level:
- Children living in communities that are further away from the nearest senior school, have a higher child labour risk.
- Children living in communities with a higher share of households producing cocoa have a higher child labour risk.
- Having a primary school feeding programme reduces the probability of child labour.
- Children living in communities where a large share of leadership positions are occupied by women are more likely to "study only" or to "work and study".
- Presence of cocoa farmer organisations reduces the probability of child work (children are more likely to study only or work and study).

CONCLUSION

This study has demonstrated that a relatively small number of community-level indicators can be used to effectively estimate child labour risk in Côte d'Ivoire and Ghana.

It is important to note that the factors entering into the model **cannot be interpreted as causal drivers of child labour**. Rather, the model is designed as a risk assessment model and identifies community characteristics that are predictors for child labour incidence. Some of these factors may indeed be causal drivers of child labour (such as access to quality education), but others may simply be correlates of high child labour incidence, such as proxies for the community's level of isolation (access to electricity, mobile network and roads), where the linkage with child labour is complex and involves other intermediate factors.

In turn, in order to understand which interventions will be best suited to address child labour, different study designs are needed, such as experimental studies.

Application of the results

Identify and target high-risk communities
The study has demonstrated that PCCF data, which are collected at community level and therefore relatively low-cost, can be used by stakeholders to identify communities at higher risk of child labour (those that fall into the *medium risk* or *higher risk* classes), and thus target further assessment and intervention accordingly. For instance, communities with limited educational infrastructure and a high number of households producing cocoa may be prioritised for interventions aiming at child labour reduction.

Further invest in access to quality education
Results from both country studies underscore the importance for governments and key actors to invest in educational infrastructure with regards to reducing a community's risk to child labour. ICI has therefore used the same data sets to

investigate in more depth the link between *quality of education* and child labour.[8] This analysis has shown that **better educational quality is related to lower rates of child labour**, and that this link is independent of the community's overall level of economic and social development. Rates of child labour are lower when the number of pupils per classroom is smaller; when schools are equipped with toilet facilities (particularly relevant for adolescent girls' involvement in child labour); when schools operate canteens or school feeding programmes; when members of the school management committee (SMC) have received training for their role; when teacher attendance is monitored by the SMC; and when children at secondary school level receive scholarships.

Furthermore, this research has confirmed results from other literature which shows that older children (14-17 years) are most at risk of child labour. In the light of these findings, it should be a serious cause for concern that in Côte d'Ivoire, junior high schools were present in only seven out of the 130 communities (5.4%), and no senior high schools or vocational schools were present in any of the communities.

The data support the notion that improving access to education, and more specifically to quality education, is crucial when it comes to reducing child labour and the community's risk to child labour in both countries and especially Côte d'Ivoire for post-primary education. The study also confirms important linkages between the educational level of the head of household, women's educational level and child labour, indicating that investing in both boys' and girls' basic education and secondary school is crucial to preventing future generations from being engaged in child labour.

Target at-risk households with income support

At household level, children are less likely to work as the household's monthly income increases in both Ghana and Cote d'Ivoire. This could be an indication that targeted income support for vulnerable households might be effective in reducing child labour risk at the household level. Interventions such as social cash transfers, income-generating activity support, Village Savings and Loans Associations and support with school costs such as scholarships, school fees and uniforms, are all options that governments, companies and organisations working within cocoa-growing communities could test as elements of a strategy to address child labour risk.

Increase women's empowerment

Consistent with other studies and literature, women's education level specifically is strongly correlated with lower child labour risks. In Côte d'Ivoire, the higher the education level attained by the majority of women in the community, the higher the probability of a community belonging to the *lower risk* class. In addition, women's engagement in leadership positions and female literacy rates are strong predictors of children's working and schooling status in Ghana, with the probability that a child will study increasing as women are more engaged in leadership and literate.

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[8] Please see: International Cocoa Initiative (2019) *Education quality and child labour: A review of evidence from cocoa-growing communities in Côte d'Ivoire and Ghana*. Geneva: ICI.

Given the important correlation between women's empowerment and child labour on the one hand, and income and child labour on the other, targeting vulnerable women and female-headed households with income-support, capacity-building and educational support could further minimise the child labour risk at both household and community level.

ANNEX 1: METHODOLOGY

The sample for Côte d'Ivoire was drawn following a two-stage stratified sample design. At the first stage, localities in cocoa-growing areas were stratified by district and level of cocoa production (low level of production, mid-level of production and high-level of production), using information on cocoa production obtained from the Agence Nationale d'Appui au Développement Rural (ANADER). A total of 130 communities were selected, covering 9 cocoa-producing regions (Bas-Sassandra, Comoe, Gôh-Djiboua, Lacs, Lagunes, Montagnes, Sassandra-Marahoue, Yamoussoukro and Zanzan). At the second-stage, a fixed number of households were selected within each of the 130 localities, leading to the final sample of 5,200 households.

In Ghana, the sample was drawn also following a two-stage stratified sample design approach with cocoa-growing areas stratified by district and level of cocoa production using information on cocoa production obtained from Cocobod. The sampling frame covered the 6 regions where cocoa is cultivated: Ashanti, Western, Central, Volta, Eastern and Brong-Ahafo. In the first-stage, a sample of enumeration areas (EA) was extracted, leading to a selection of 128 cocoa-growing communities (EAs). In the second-stage, a fixed number of households were randomly selected within each sampled community, leading to a final sample of about 3,000 households.

Development of the Econometric Model (Risk Classes)

One principal finding from the child labour results from Côte d'Ivoire influenced the approach for the construction of the risk indicator. Notably, most of the communities have very similar child labour incidences which are statistically indistinguishable from each other.

Due to these findings and preliminary testing, it was decided to identify and categorise communities into child labour risk groups ("classes") using a data driven semi-parametric approach, based on the finite mixture model (McLachlan and Peel 2000) and Concomitant Variable Latent Class model (Dayton and MacReady 1988, Wedel 2002). With this model, the number and characteristics of the classes (groups) are not defined a priori in an arbitrary manner, and are instead determined by the data. Thus, on the basis of some goodness of fit criteria the estimation procedure identifies the number of classes and the probability of belonging to the different classes for each community and considers the probability of class membership as conditional on a set of community level covariates.

On the other hand, several tests and attempts were carried out for the Ghana tool development, to adopt techniques that do not establish a priori the number of classes, i.e. Latent Class or Finite Mixture models. However, the heterogeneity in terms of child labour risk across the communities in Ghana was not substantial enough to apply these methods: the communities had very similar child labour rates which were statistically indistinguishable from one another. In fact, using the finite mixture model approach yielded one single child labour risk class (whereas for Cote d'Ivoire there were three). Therefore,

the sample was divided into terciles on the basis of the community child labour rate, constituting a priori three child labour risk classes: risk level 1 (lower risk in relation to the other categories), risk level 2 (medium risk) and risk level 3 (higher risk). A multinomial logit model was then estimated, to predict the probability of belonging to any of the three risk classes.