

Verification of Certification Activities in West African Cocoa Sector

Review of Statistical Weighting Report: Côte d'Ivoire

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This report describes the findings of a review on statistical weighting report made on scaled-up certification study by the government of Côte d'Ivoire. The review from which the findings are derived was conducted by Fafo commissioned by the International Cocoa Verification Board (ICVB.) The findings of the study offer recommendations on technical aspects of statistical weighting that will refine the quality of the study made on child labor in cocoa production sector.

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Background

In 2007/8 the government of Côte d'Ivoire conducted a certification study with the objectives of estimating child labor and worst forms of child labor (WFCL) in cocoa production sector, as well as documenting the incidence of forced adult labor (PSSTE 2008). Commissioned by the International Cocoa Verification Board (ICVB), Fafao and Khulisa conducted verification activities on the results reported in the study to evaluate the credibility and the scientific basis of the study. Fafao and Khulisa recommended to the ICVB the conditional acceptance of the study. The condition put forward to make the findings of the study credible was that improvements need to be made regarding the estimation of the number and percentage of working children in cocoa sector reported in the scaled-up study. The improvements were needed on these estimates as the inherent design of the data collection did not allow for valid estimations of this key issue.

In addition to the condition that is needed for accepting the report, the verification report also noted that the results reported in the scaled-up study are valid to the selected sample and hence could not be generalized to all cocoa growing households in Côte d'Ivoire. To this end, the verifiers made a recommendation that these results can be made statistically representative and valid for all cocoa growing households in Côte d'Ivoire if the appropriate statistical weights are computed and employed to the results reported in the study. This aspect of the recommendation was implemented by the government of Côte d'Ivoire with a clear objective of enhancing the validity of the scaled-up study and presented a revised report in August 2009.

A verification of made on this report, however, identified errors in the formulas used for computing the weights. This was reported in Verification of Weighting Report in September 2009. The government of Côte d'Ivoire corrected these errors and a new weighting report was released in December 2009. This new report "CLMS/IDS (December 2009): Supplemental Study on the Initial Diagnostic Survey" is the subject of this verification in which the findings of the review are presented.

Review of weighting procedure: findings

The sample used in the scaled-up study was constructed as a four stage stratified sample, limited geographically to the cocoa producing regions in Côte d'Ivoire. The first stage of the sampling entailed constructing a frame of cocoa producing departments and stratifying them by cocoa production level in 1999/2001 into three categories (low, medium and high) and selecting *departments* based on their production level. The second stage entailed random selection of two *sub-departments* within the selected departments. The third stage entailed random selection of one *village* within each sub-department according to the production level of the category. The last stage involved

selection of a fixed number of households from each village. Development of sampling weights usually starts with the construction of the *base weight* for each sampled unit, to correct for their unequal probabilities of selection. The base weights must reflect the probabilities of selection at each stage. In reviewing the computations of weights outlined in the supplemental study (CLMS/IDS, December 2009), we followed the design stages and identified the right formulas that should be used for calculating the probability of selection of the unit in a given stage. The assessment of the four stages is presented as follows.

First Stage

The 51 cocoa producing *departments* in Côte d'Ivoire were categorized in accordance with the categorization of cocoa-producing regions, namely:

1. Low cocoa production (2% of national production – 20 departments),
2. Medium cocoa production (11% of national production – 14 departments), and
3. High cocoa production (87% of national production – 17 departments).

In the low-level category, two departments were randomly selected; in the medium-level category, two departments were randomly selected; in the high-level category, all the 14 departments were selected, except three departments that had been visited during pilot. Altogether 18 *departments* were sampled. The inclusion probability of *departments* is given by:

$$\rho_{c,d} = \frac{n_{c,d}}{N_{c,d}}$$

where $n_{c,d}$ is the number of departments sampled in each category of cocoa producing area (c is category and d is department) and $N_{c,d}$ is the total number of departments in each category of cocoa producing area. This formula was used correctly at this stage in the CLMS/IDS (December, 2009) and hence no error was found.

Second Stage

The second stage involves sampling of the *sub-departments* where from each selected departments, two *sub-departments* were randomly selected. The inclusion probability of sub-departments is given by:

$$p_{c,d,s} = \frac{n_{c,d,s}}{N_{c,d,s}} = \frac{2}{N_{c,d,s}}$$

where $N_{c,d,s}$ is the total number of *sub-departments* in each selected department and s is index of sub-department. This formula was used correctly at this stage in the CLMS/IDS (December, 2009) and hence no error was found.

Third Stage

The third stage entails sampling of the one *villages* in each selected sub-department. The inclusion probability of a *village* is given by:

$$p_{c,d,s,v} = \frac{n_{c,d,s,v}}{N_{c,d,s,v}} = \frac{1}{N_{c,d,s,v}}$$

where $N_{c,d,s,v}$ is the total number of villages in each selected sub-department and v is index of a village. This formula was used correctly at this stage in the CLMS/IDS (December, 2009) and hence no error was found.

Forth Stage

The final stage involves sampling of 20 households from each selected village. Hence the inclusion probability of a given household is given by:

$$p_{c,d,s,v,m} = \frac{n_{c,d,s,v,m}}{N_{c,d,s,v,q}}$$

where $n_{c,d,s,v,m}$ is the number of households interviewed in each selected village; $N_{c,d,s,v,q}$ is the total number of cocoa producing households in each selected village and m is an index for a household.

The error that was made reviously in (CLMS/IDS, August 2009) is corrected accordingly in the new supplemental report (CLMS/IDS, December 2009).

Table 0.1 Summary of appropriate formulas and errors found

Stage	Selected unit	Probability of Selection	Notation	Error found
I	Department	$p_{c,d} = \frac{n_{c,d}}{N_{c,d}}$	$n_{c,d}$: the number of departments sampled in each category of cocoa producing area $N_{c,d}$: total number of departments in each category of cocoa producing area.	No
II	Sub-department	$p_{c,d,s} = \frac{n_{c,d,s}}{N_{c,d,s}}$ $= \frac{2}{N_{c,d,s}}$	$N_{c,d,s}$: total number of sub-departments in each selected department	No
III	Village	$p_{c,d,s,v} = \frac{n_{c,d,s,v}}{N_{c,d,s,v}}$ $= \frac{1}{N_{c,d,s,v}}$	$N_{c,d,s,v}$: the total number of villages in each selected sub-department	No
IV	Household	$p_{c,d,s,v,m} = \frac{n_{c,d,s,v,m}}{N_{c,d,s,v,m}}$	$n_{c,d,s,v,m}$: the number of households interviewed in each selected village $N_{c,d,s,v,m}$: total number of cocoa producing households in each selected village	No
Overall probability of selection		$p_m = p_{r,d} \times p_{r,d,s} \times p_{r,d,s,v} \times p_{r,d,s,v,m}$		
Formula for sampling weight:		$W_m = \frac{1}{p_m}$		

Conclusions

The objective of this review has been to review a revised report released by the government of Côte d'Ivoire (CLMS/IDS, December 2009). The revisions were made to address the incorrect formula identified in the last stage of the sample selection procedure. After a comprehensive review of the revised report, we have found that the weights that are used are correct and follow the sampling procedure. It is now expected that these results will inform policy makers to design appropriate policies and program interventions to address child labor in the cocoa sector.