



International  
**COCOA**  
Initiative

# Risk models for predicting child labour

Findings and recommendations from six projects to predict  
the risk of child labour in cocoa-growing households

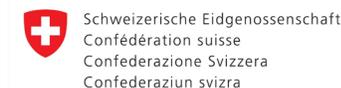
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# Aims of the study

This paper provides answers to the following questions:

- **What is a risk model** (and what is it not)?
- What are the **characteristics and performance** of the models developed to predict child labour among cocoa-growing households?
- What **learnings and recommendations** emerge from these projects?

It is based on a review of six case studies, developed by a range of stakeholders to predict child labour the cocoa sector.



Swiss Confederation

Federal Department of Economic Affairs,  
Education and Research EAER  
State Secretariat for Economic Affairs SECO

# What is a risk model ?

A risk model is a statistical approach aimed at **predicting an outcome for a given unit of observation from a set of predictors**

# What is a risk model not?

Risk models are not...

- Dependent on causal relationships
- An insight into the root causes of child labour
- Useful to decide on which specific intervention is better to tackle child labour

# A risk model: what for?

Risk models for predicting child labour can be used for different purposes:

- **To identify** households at higher risk of child labour more **quickly and cost-efficiently**
- **To prioritise** households or communities at higher risk of child labour **for support**
- **To broaden the targeting of households to receive preventative support**, in addition to those where child labour has already been identified

→ Risk models could facilitate the scale-up of effective interventions to cover all cocoa-growing households



# Building a risk model to predict child labour

## Model calibration

- **Data source:** first data set, including the outcome of interest and similar to target population
- The model learns about the outcome of interest using a set of predictors and a specific statistical method

## External validity assessment

- **Data source:** second data set, including the predictors and outcome of interest
- Predictions are compared to the observed outcome to assess the performance of the model

## Prediction

- **Data source:** data set related to the target population, and containing the predictors but not the outcome of interest
- The calibrated model is fed with the predictors present in the data and predicts the outcome of interest within the target population

At least **two different data sets** are needed for the model to learn about and predict child labour within the target population...

**Data management and statistical analysis capacity** is essential

# Performance of a risk model

Key concepts: sensitivity and specificity

		Predicted outcome	
		Positive (child <i>in</i> child labour)	Negative (Child <i>not</i> in child labour)
Observed outcome	Positive (child <i>in</i> child labour)	% True positives (Sensitivity)	% False negatives
	Negative (child <i>not</i> in child labour)	% False positives	% True negatives (Specificity)

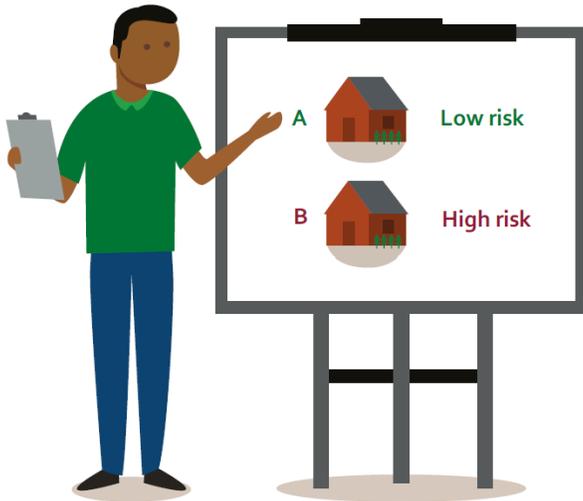


**Uncertainty** is inherent to risk models: there is a need to manage operational and **ethical considerations**

# Learnings and recommendations



# Key messages:



**It is possible to make highly effective risk models for predicting child labour:**

- Risk models can **reduce the time and cost** of identifying vulnerable children
- Risk model can **improve the targeting and prioritisation of support** to children and households who need it

**But careful planning, technical expertise and quality data are required!**

**There is no one-size-fits-all model** – each model should be tailored to the data at hand, the intended use of the predictions and the operational constraints of the context of use.

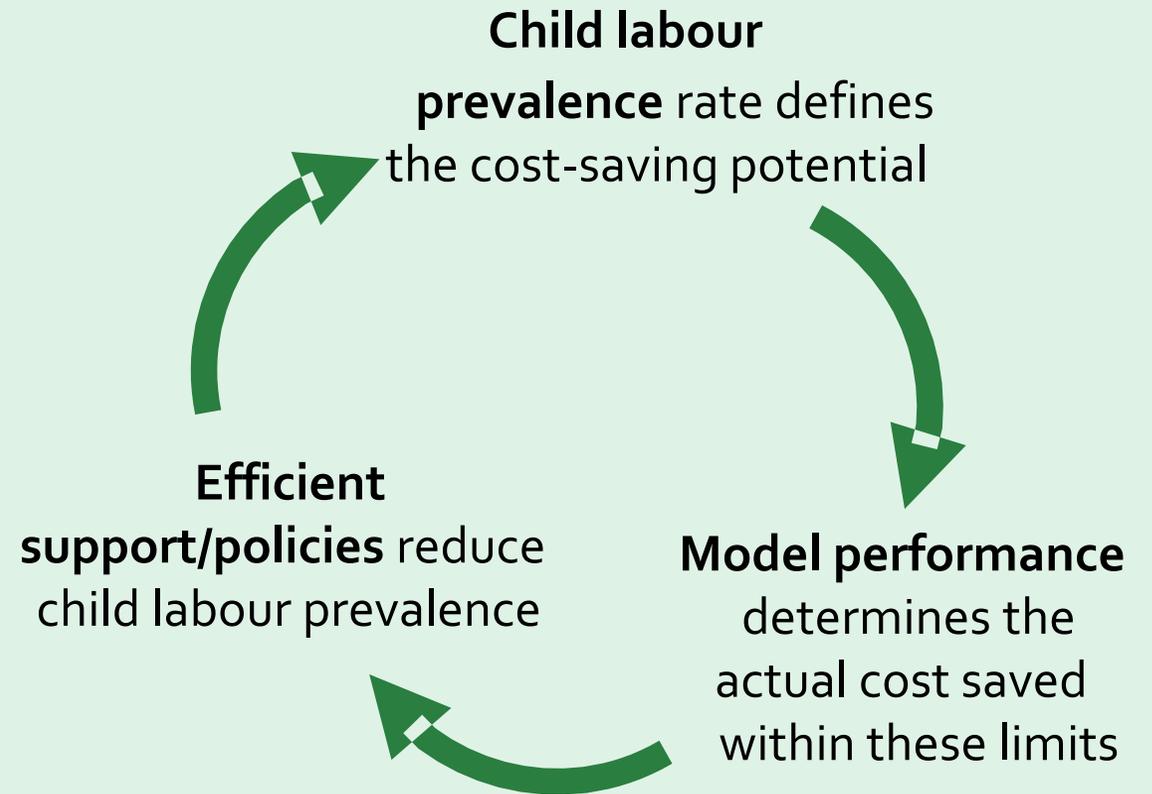
# Key learnings

- **Data quality matters:** accurate, complete and up-to-date data are key for a good model
- The best models could **reduce the number of households targeted by up to 50%**, while still reaching **95% of the children** in child labour
- **Information about individual children** (e.g. their age and sex) improves model performance
- It is more efficient and actionable to use the model to **predict the risk of child labour for households than for individual children**
- **An ongoing/repeated risk-assessment** is more likely to identify children at risk than a one-off activity

# What is the cost-saving potential?

Where child labour prevalence is higher, the potential cost savings from using risk models to predict child labour are lower.

But this could change over time: if targeted support is effective in reducing child labour, the potential for cost savings will increase.



# What to consider before starting?

- **Clearly define the aim** of using a risk model for predicting child labour (ie. is it to *narrow* or *broaden* the scope of activities?)
- **Assess the technical capacity and time available** for developing a model
- **Assess the availability of recent, complete and high-quality data**
- **Be aware of the operational constraints** so that a model can be tailored accordingly
- **Prepare to deal with uncertainty** around using predictive models, and the **operational and ethical consequences** of the choices made during development

# Does it make sense to develop a risk model?



# What to consider during risk model development?

- Focus on **easy-to-collect, easy-to-assess indicators**
- **Limit the number of predictors** used by the model: less may achieve more
- **Use reliable data on a large sample** to calibrate the model
- **Incorporate basic child-level predictors**, such as age and sex
- Use the model to **predict risk at household level**, rather than for individuals

# What to consider when using a risk model?

- **Run the risk model regularly** (annually), using up-to-date data
- **Constantly assess a risk model's performance** against known prevalence rates and the results of monitoring visits
- Use emerging data to **adjust and improve the model**

# Thank you!

Read the full report:  
[cocoainitiative.org/knowledge-hub/](https://cocoainitiative.org/knowledge-hub/)



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