Reducing Child Labor in Panama: An Impact Evaluation

Nasir Andisha
Oscar Chiquito-Saban
Eduardo Emmerich
Aurelia Figueroa
Yuewen Jiang
Jun Hui-Lee
Darren Manning
Alejandra Ortega-Sanchez
Kishore Gawande[1]

Bush School of Government and Public Service
Texas A&M University

Abstract:

This paper examines the impact of two specifically designed educational programs aimed at to reducing child labor among the indigenous population in Panama: a tutoring course (CEC) and an accelerated primary school/course (EPA). Based on a sample of 427 children belonging to 185 households, and using a post-intervention treatment and comparison group design, we find that the CEC program decreased the probability of working (child labor) by 10.7% and increased the probability of participating in an extracurricular activity by 23.5%. Thus, the program limited the possibility of CEC participants becoming involved in agricultural-related or other forms of child labor. Results from the EPA program is statistically insignificant, hence we are uncertain about EPA's direct impact on overall goal of child labor reduction.

Keywords: Impact evaluation, child labor, tutoring course, accelerated primary school

[1] Corresponding Author. Professor and Helen and Roy Ryu Chair in International Affairs. Bush School of Government, Texas A&M University, College Station, TX 77843-4220.
Email: kgawande@tamu.edu
Phone: (979) 458-8034

1. Introduction:

In poor countries, a large share of the population is excluded from the education system already at an early age and well before completion of the compulsory schooling cycle. Exclusion from the school system occurs for variety of reasons such as failure to enroll, irregular attendance and early drop outs (UNESCO, 2005). In some countries child labor is the main reason for exclusion of children from formal education system. We study the impact of a project designed to reduce child labor initiated by the U.S. Department of Labor and carried out in Panama over a four-year period. The project outlay was $ 3 million and spanned the period August 2004 to August 2008.[2]

In literature, a child of labor is generally defined as an economically active person under the age of 15 who works on a regular basis either paid directly or his/her work produces economic good and services destined for market.(Seiro Ito. 2005) However, the economist and other social scientists differ on the age cut-off and the type of work. While some definition like the one above focuses market goods and services, the United Nations System of National Accounts (SNA) argues that "the production of economic goods and services includes all production and processing of primary products whether for market, for barter, or for own consumption, the production of all other goods and services for the market and, in the case of households which produce such goods and services for the market, the corresponding production for own consumption." Likewise the age cut-off varies according to the nature of work performed, for example in the ILO convention No 138 the age cut-off for "light" works is under 13 and for "hazardous" works is less than 15 years. [3] Hence according to Eric Edmonds, so far there is no agreed upon description for child labor and efforts are underway to produce a censuses definition for child labor.

We have to introduce the child labor literature and write a para. on it Also, reference the literature in the references..

[2] Embassy of the United States in Panama. DOL's Child Labor Education Initiative (Project Destino) http://panama.usembassy.gov/sp101304.html

[3] A "light work" is defined in the Convention 138 as a work which is: 1- not likely to be harmful to their health or development; 2-not such as to prejudice their attendance at school, their participation in vocational orientation or training programs approved by the competent authority or their capacity to benefit from the instruction received. A "hazardous work" is a work which is likely to harm the health, safety or morals of children. Article 7 *ILO Convention No. 138 : Minimum Age Convention.*

In Panama, public education is freely available to all. However, miscellaneous school expenses are not provided, and the cost of transportation to school is borne by families. These serve as barriers to school attendance, particularly in rural areas and during the rainy season. During the harvest season, children migrate with their families to work as agricultural labor in sugar cane and coffee plantations, and banana, melon and tomato fields. Families migrate as far as Costa Rica to find work. As an example of the interference with school the harvest season provides, one-third of children in the north-western Ngobe-Bugle region, home to a large indigenous population, miss the first three months of the academic year to participate in the coffee harvest. The children participate in agricultural labor to help their family make ends meet, and in so doing, miss schooling, often dropping far behind in their education. In time, this leads some of them to drop out of school. CAII (20xx) reports that nearly 58,000 children between the ages of 5 and 17 worked in 2002. Furthermore, only 42% of them ever attended school. The proportion of primary school drop outs from rural and indigenous communities combined is higher than in urban settings. The engagement of children in agricultural activities is usually dismissed as part of culture in indigenous communities (United States Department of Labor 2009).

The U.S. Department of Labor's initiative to reduce child labor is thus relevant. The objective of this paper is to assess whether the means to do so, via a program known as DESTINO -- a four-year initiative to reduce the involvement of children in agricultural labor and prevent their participation in these activities -- was effective. We specifically evaluate the impact of a tutoring course (CEC) and an accelerated primary school/course (EPA) – two important components of the DESTINO program -- on reduction of child labor among participant-students, using primary survey data.

The DESTINO program aimed to withdraw 2,420 children from exploitative work in agriculture and prevent a further 675 children from involvement in such activities (United States Department of Labor n.d.). The program was funded by the US Department of Labor, administrated by Creative Associates International, Incorporated (CAII) and implemented by Casa Esperanza (CE), Fundación Tierra Nueva (FTN), and Centro de Capacitación Desarrollo Integral. This impact evaluation primarily considers the work done by CE to combat child labor through the tutoring course (CEC) and the accelerated primary school/course (EPA).

The overarching goal of CEC and EPA programs was to reduce the number of children working in agriculture by increasing elementary school completion rates. The program had a target population estimated at 6,695, with 3,095 being directly targeted by the implemented programs. The distinctive characteristic of the CEC and EPA programs were the targeted age ranges. The CEC program served children under 12, while the EPA program focused on bringing older dropouts back to school and engaging children who were in school but had fallen back in their appropriate grade level with the goal of bringing them to their appropriate level and graduating primary school more quickly. CEC focuses on improving basic math and language skills, while EPA works to increase self-confidence and educational levels. As of January 2007, 30 CEC and 7 EPA centers existed in Panama through DESTINO. CECs operate five days a week for almost 10 months each year during the school cycle. EPAs are an alternative to formal schooling that is operated five days a week, year round. An important distinction between the two programs is that while CEC programs have a retention strategy, EPA programs do not (Ordonez 2007, 11-12).

The selection process for establishing CECs consisted of interviews with teachers and school headmaster, whereas EPAs were selected based on potential target population size (Ordonez 2007, 12-13). An important value-added of CECs is their role as a withdrawal strategy from the worst forms of child labor (WFCL) because of the potential to limit the involvement of children in agriculture-related labor. The effects of CECs in this capacity vary, however, on the crop harvested. They can be particularly useful in the case of melons, but not as completely in the case of coffee. In the latter instance, they provide amelioration but not necessarily a solution given the typical reliance of coffee harvesting communities on this one crop (Ordonez 2007, 14).

The paper proceeds as follows. In Section 1 describes the survey design and methodology. Section 2 describes the data and offers a survey validation test. The econometric model and the empirical findings are analyzed in Section 3.The model uses a simple difference in means tests. Section 5 concludes.

1. Survey Design and Evaluation Methodology

A survey was conducted in Panama about EPA and CEC programs to determine if DESTINO had any impact on the prevalence of child labor.[4] The survey was asked to 185 heads of household (father, mother, grandparent, who responded for 427 children) in ten different communities in the Comarca Ngobe-Bugle (xx fn names of communities). The survey instrument appears in Appendix 1 (xx attach it in Spanish and footnote the fact that CE folks were with us to conduct the survey in Spanish). DESTINO, through Casa Esperanza, had a presence in all these communities with either or both the CEC and EPA programs. All communities, except Kwerima, have local access to a middle school (grades 7, 8 and 9) in addition to an elementary school. Children from Kwerima have the chance to attend middle school in other communities such as Oma. Access to a middle school was established as a prerequisite in choosing communities to survey because the goals of CEC and EPA were to help children complete elementary school and continue to attend middle school instead of dropping out. In communities where children do not have access to a local or closely located middle school, measuring the impact of these programs would have been biased by the inaccessibility of the schools.

[4] To prepare for and conduct the survey, team members traveled to Panama on two separate occasions. On the first visit, focused on studying the communities where the DESTINO programs were present. During these in-country visits, our team gained a better and more in-depth understanding of the cultural factors surrounding child labor in Panama. These include taking children to fields at an early age to prepare them to eventually make a living for their families and supporting their own families in the present day. Additionally, members of the target communities get married in their teenage years. Young women typically give birth at young ages, also contributing to school dropout rates. Based on findings related to the first in-country visit conducted in February 2009, our team designed a survey method that would allow for the greatest participation from potential respondents. This included choosing a specific site to be surveyed, with members visiting with the team to conduct the surveys, something set-up and approved by local community members.

While uncovering positive impacts of the DESTINO program, these visits also yielded indicators of the challenges facing the implementation for child-reduction programs. These included the lack of data available before the start of the program, including grades and performance records, and a lack of infrastructure. The lack of infrastructure mentioned above proved to be one of the most significant hurdles in program implementation, and includes limited access to or poor quality of school materials, roads and transportation. The last two are particularly pertinent during the rainy season, a time in which passing roads to get to school areas can be impossible.

We evaluated DESTINO after the project was completed in August of 2008, and there was no reliable pre- DESTINO (baseline) data. Therefore, we applied a post-intervention treatment and comparison group design. The treatment group in CEC program consisted of students who attended the CEC program since the program began in 2004. Likewise, the EPA program's treatment group consisted of students who participated in the EPA program. The comparison group for the CEC program was children of the same ages as CEC students, but did not participate in the program. The EPA program comparison group consisted of children above 12 years old who did not attend CEC and are not going to school. We used the comparison group as the counterfactual and conducted a mean differences analysis. Since the comparison groups were drawn from the same communities as the participants we controlled for parent education and household characteristics, assumed that any observable differences in time spent in doing homework, in other extra curriculum activities, and the difference in a student's economic activities, between project and comparison groups were due to the impact of DESTINO.

The simplest form of the post-intervention treatment and comparison group test uses the difference in means statistic

$$D= E [Y^T]-E [Y^C], \quad (1)$$

where Y^T is the expected impact of DESTINO on the treatment group in terms of reducing the amount of child labor. Y^C is the impact of child labor on the comparison group, and D is difference between amount of child labor in treatment and comparison groups. We also conditioned for a number of demographic and other control variables Z, as we describe in our econometric model specification in Section 3, so that our difference-in-means statistic is

$$D= E [Y^T|Z]-E [Y^C|Z]. \quad (2)$$

2. Descriptive Statistics and Validation Testing

Descriptive Statistics: CEC and EPA

The dataset for empirical testing on the impact of the CEC program is based on the survey of 10 communities in the Comarca region in Panama (Table 1)**.** The CEC program was implemented from 2004 to 2008. The average participation period of the treatment group in the CEC program is 2.41 years.[5] To analyze the impact of the CEC program, we used two samples. One is the full sample without restriction on age, while the second is a "7-17, School Sample" which only considers children in the 7 to 17 age group that are now enrolled in school. Since the age of children participating in the CEC program was set to be between 6-12 years and the program finished in summer 2008, this is the appropriate age group to cover the cohorts eligible for the program.

The full sample consists of survey responses on 398 observations . Of these, 158 observations are in the treatment group, while 240 are in the comparison group consisting of non-participants in CEC program. Table 1 shows the distribution of the sample across the ten regions. Cerro Iglesia and Hato Chami have the largest treatment groups with 22 CEC participants.

Given the difficulty in reaching all of the children that had participated in the EPA program, we focused our survey group on six communities in Comarca. We used a non-school sample consist of children over the age of 12 who are currently not attending school. Table 1 describes the distribution of the EPA sample across the ten regions. The full sample consists of 118 survey responses. The treatment group, or the actual participants in EPA program, consists of 24 observations, while the comparison group, non-participants in EPA program, has 94 observations

Validation tests: How truthful are survey respondents

As part of the survey design we included questions that were asked in the 2000 Panama National Census sample (Census) so we could compare our answers with the Census. This provides a simple but formal and reliable check on whether the respondents gave generally truthful answers to the survey questions. Specifically, we asked about the type of floor (e.g. cement, dirt, others), and the type of wall (e.g. block, wood, mud, metal, straw, others, no wall) in their homes. We

[5] The mean of the 158 treatment group response to the question "how many years child spent in CEC" is 2.36 years (standard deviation = 1.07).

then matched the distribution of these answers with that of the census in seven of the Comarca region communities that our survey has in common with the Census.[6]

For the floor question, the sample of households in our survey and the Census data are 130 and 2560, respectively. Figure 1. (attach xx) illustrates the distribution in the survey and Census samples of three types of floor: cement, dirt and others. 10.77% of the survey households had a cement floor, compared to 11.29% of Census households; 88.46% had a dirt floor compared to 88.52% in the Census; and 0.77% had flooring made of other materials compared to 0.20% in the Census. These numbers indicate that our sample's distribution is close to that of the Census data. Figure 4 shows the same distribution, by community. Four out of seven have distributions similar to the Census data: Cerro Puerco, Hato Chami, Hato Pilon, and Qda. De Loro.

Formal tests of data validity were performed using Pearson's chi-squared test and the likelihood-ratio test for each community. Table 2 reports the result of these tests, with *p*-values in parentheses. The last row of Table2 for the full sample indicates that both tests fail to reject the null hypothesis that our survey sample and Census sample have same distribution of floor materials. In four communities (Hato Chami, Hato Pilon,Qda. De Loro, and Cerro Puerco[7]), the survey sample distributions are statistically not different from the Census sample. That is, in these communities both distributions come from the same underlying population. In three communities (Boca del Monte, Cerro Iglesia, Chichica), the distributions are statistically significantly different.

For the wall question, the sample of households in our survey and the Census data are 128 and 2598 respectively. Seven wall-types could be matched up with the Census data: block, wood, mud, metal, straw, other, and no wall (i.e., just the shelter of a roof). Straw is the most popular material in both samples but there is disparity in the distribution of other materials between our survey data and Census data. 23.4% of our sample has wood walls, compared with 14.74% in the Census data. Formal tests, reported in Table 3 indicate that while the overall sample's distribution is statistically significantly different from the Census sample, for four of the seven

[6] These are Boca del Monte, Cerro Iglesia, Cerro Puerco, Chichica, Hato Chami, Hato Pilon, and Qda. De Loro.
[7] Cerro Puerco on the basis of the likelihood ratio test.

communities – Cerro Puerco, Chichica, Hato Pilon, and Qda. De Loro – we cannot reject the hypothesis at the 1% level of statistical significance that our sample and the Census sample come from the same underlying population distribution of wall materials.

These tests are not difficult to reject and therefore their statistical power (i.e. the likelihood of rejecting a false null hypothesis) is high. We take confidence in the survey responses from the fact that we cannot reject the hypothesis that the floor-material distributions in our sample and the 2000 Panama Census both come from the same underlying distribution. That is, the survey respondents answered this question truthfully. We also take confidence in the survey responses on the wall-material questions, and we cannot reject the hypothesis that the wall-material distributions for four communities in our sample come from the same underlying distributions as do the distributions for each of those communities in the 2000 Panama census. Since the wall distribution has many more options, it is easier to reject this hypothesis, and yet for the majority of communities we cannot. We take this evidence as indicating veracity from our respondents on average, and we will proceed on this assumption in interpreting our results. We now turn to the more formal econometric evidence about the impact of the DESTINO program.

3. Econometric Model and Results

Econometric Model

The impact of CEC/EPA program is assessed in three areas: economic activities, extracurricular activities, and schoolwork.[8] We therefore designed our instrument to produce five outcome indicators: whether children engage in any economic activities (*econacts*), time spent on economic activities (*hrseconact*), whether children engage in any extracurricular activities after school (*extracts*), time spent on extracurricular activities (*hrsextraact*), and time spent on homework (*hrshw*). Their descriptive statistics are reported in Table (4). We specify four econometric models to measure the difference of these five outcome variables between our treatment and comparison group in CEC/EPA program. The unconditional model is:

[8] An economic activity in our survey is defined as an activity aiming at improving family economic condition. Extracurricular activity refers to non-economic activity that takes place after school.

$$Y = \beta_T D_T + \beta_C D_C + e \qquad (3)$$

where D_T and D_C are dummy variables which denote treatment and comparison group respectively;[9] β_T and β_C are coefficients *of* D_T and D_C; e is an error term that is presumed to be identically, independently and normally distributed across observations. The other three are models include conditioning variables such as household and regional characteristics in order to control for observable and unobservable effects. The first conditional model includes only observable characteristics:

$$\begin{aligned} Y = {} & \beta_T D_T + \beta_C D_C + \alpha_1 GENDER + \alpha_2 AGE + \alpha_3 DIST + \alpha_4 PEDU + \alpha_5 AINC \\ & + \alpha_6 BINC + \alpha_7 TINC + \alpha_8 OINC + \alpha_9 LAND + \alpha_{10} FARM + \alpha_{11} AMAL + \alpha_{12} MIG + e \end{aligned} \qquad (4)$$

where GENDER denotes child's gender; AGE denotes child's age; DIST denotes distance from home to school; PEDU denotes parent's education; AINC denotes agricultural income; BINC denotes business income; TINC denotes social transfer income; OINC denotes other income; LAND denotes whether family owns land; FARM denotes whether the family farms crops; AMAL denotes whether family owns animal; and MIG denotes whether surveyed person migrates. The second conditional model controls only for unobservables via ten regional dummies:

$$Y = \beta_T D_T + \beta_C D_C + \gamma \boldsymbol{R} + e \quad , \qquad (5)$$

where $\boldsymbol{R}$ is a vector of community effects for the ten communities: Boca del Monte, Cerro Iglesia, Cerro Puerco, Chichica, Hato Chami, Hato Pilón, Kwerima, Oma, Qda. de Hacha and Qda. de Loro. The last conditional model combines observables and unobservables as:

[9] We realize that length of time in CEC may have an impact on our dependent variables. Therefore we first separated CEC treatment group into 4 subgroups in terms of years in CEC and created binary variables for each sub treatment group. However, according to the empirical results, no statistical evidence was found that length of time in CEC program affect the value of dependent variables. Therefore we dropped the result and proceeded to use one binary variable for the entire treatment group.

$$Y = \beta_T D_T + \beta_C D_C + \alpha_1 GENDER + \alpha_2 AGE + \alpha_3 DIST + \alpha_4 PEDU + \alpha_5 AINC + \alpha_6 BINC + \alpha_7 TINC + \alpha_8 OINC + \alpha_9 LAND + \alpha_{10} FARM + \alpha_{11} AMAL + \alpha_{12} MIG + \gamma \boldsymbol{R} + e \quad (6)$$

Tables 4 indicates that 57.1% of surveyed children perform economic activities, while only 26.4% of them participate in school-related extracurricular activities after school, averaging 1.53 and 2.03 hours of extracurriculars, respectively. Table 5 indicates that agriculture is the number one source of income (65.8%), followed by social transfers (62.1%), other sources[10] (15.9%) and business income (7.3%); the percentage of people who own land (76.7%) and farm crops (92.2%) imply the economic importance of agricultural work in these regions; finally, 19.4% of our sample migrates.

Analysis of Results: **CEC Sample**

We first estimated our regression model using a full sample, and then re-examined the model using a smaller sample restricted to children between ages 7 to 17 who study at school. For each regression model we tested the difference between the treatment and comparison groups using a *t*-test. The result for each dependent variable (outcome) is presented separately in Tables 6-10. Each cell contains the value estimated for ($D_T|Z$ - $D_C|Z$) with *t*-value in parentheses, followed by the adjusted *R*-squared value. The number of observations for treatment and comparison groups is reported in the last column.

Consider Table 6 with the binary dependent variable indicating whether the child spent any time on economic activity, that is, whether he or she worked. Using the full sample (top row), all four models yield a negative difference, implying that the DESTINO program was beneficial in reducing the amount of economic activity of children in the CEC program. However, the difference is statistically not significantly different from zero. Though negative, the difference is not precisely measured. It is likely that the imprecision in the estimates is a consequence of the small sample size. Our method should be applied to a sample that pools data across all

[10] Many survey respondents indicated that they receive income from other child labor reduction programs.

communities across Panam. We think the larger sample would likely produce a statistically and economically significant result. The smaller sample with the 7-17 school group yields one result of note. In Model (2) the difference is statistically significant, and rejects the hypothesis that the DESTINO program had no effect. The estimated difference of -0.107 indicates that being in the CEC program lowers the probability of working (child labor) by 10.7%.

Table 7 presents the result on the second outcome, hours spent per day on economic activities. Again, all differences are negative, indicating a robust finding for the CEC program across all our models. Although many differences are statistically insignificant, it is worth noting the size of the difference . In Model 2, for example, the statistically significant difference estimate of -0.478 indicates that being in the CEC program reduces the amount of time spent working by .478 hours per day (-0.553 in the smaller sample). While this does not mean that the CEC program has eliminated child labor, it does show that it reduced the amount of work considerably. Model 4 estimated with the small sample also shows a significant difference between treatment and comparison groups. Notably, the high *R*-squared values indicate that the models fit well. The increase in the explanatory power of the conditional models (2), (3), and (4) over the unconditional model indicates that the explanatory variables are statistically relevant.

On the question of whether the child participated in extracurricular activity, the results are statistically significant. Table 8 shows that all differences are positive and statistically significant at the 1% level, indicating that in this respect the CEC program succeeded. For example, Model (1) estimated using the full sample indicates that being in the CEC program increased the probability of participating in an extracurricular activity by 23.5%. If students spend more time on extracurricular activities after school, we presume they have less time for economic activities. The results support the effectiveness of the CEC program potentially reducing child labor.

The amount of hours per day spent on extracurricular activities shows a similar pattern. All estimates of $(D_T|Z - D_C|Z)$ are positive and statistically significant at the 1% level in Table 9. In Model (2) of the full sample, the estimate indicates that being in CEC program increases the amount of time spent on extracurricular activities by 0.902 hours per day. The results from the four model fall in the range of [0.668 ,0.902] hours per day using the full sample and [0.750 ,

0.949] hours per day from the small sample. The high adjusted *R*-squared values indicate that the models are capable of explaining much of the variation in time spent on extracurricular activities.

Table 9 presents results for the last outcome: time spent at home working on homework. All differences are negative and statistically different from zero, implying that CEC students spent fewer hours on homework than non-CEC students. In Model (1) of the full sample, the estimate indicates that being in CEC program actually reduces the amount of time spent on homework by 0.223 hours per day. There are two possible reasons for this result. First, since CEC took the form of tutoring after school, students got into the habit of using that time to do their homework, and therefore spent less time doing homework at home. Second, the CEC experience may have enhanced the students' understanding of class materials better than non-CEC students. As a result, they work faster and more efficiently on homework. For these reasons, the absolute amount of time spent on homework is not an unequivocal outcome indicator of CEC's impact on reducing child labor. We leave the resolution of whether these reasons or some other reasons lie behind the findings to future research that directly asks this question in the survey.

In summary, many of our results are consistent with our expectations. CEC students spent less time working and more time on extracurricular activities. While some of the results are not statistically significant, others are, and they strongly imply that the CEC program had a positive impact on reducing child labor, most notably by increasing extracurricular activity participation. The measures of fit indicate that the conditioning variables perform their function well. We reiterate our belief that if the sample were expanded across all communities, then we expect to find stronger results statistically and economically.

Analysis of Results: **EPA Sample**

This section is disjointed and not well written. Rewrite it with a clear message: use one sample for the results else it is confusing. We can footnote results from other samples.

The EPA program's sample is small, making it difficult to generate reliable and robust statistical results. However, we proceeded with our statistical tests on this limited data. We estimated the

regression model using a comparison group consists of non-school respondents and did a mean-difference test on their time spent on economic activity. For each regression, we tested the difference of means between treatment and comparison groups, using the Student's t-test in each model. The results are reported in Table 11.

In this model, we keep all treated students of EPA and take non-school respondents (21 out of 427 students) as our comparison group. Since non-school respondents are major targets of the EPA program, this is a more direct way for us to look for some impact of the EPA program (even though the sample size is quite small, 45 students). We tested one outcome variable: economic activity[11], and conducted the following t-tests (Table 11). Results are more significant than for the school sample in Table11. All differences are negative, indicating a robust finding that EPA students spent less time on economic activities. In this Model, the difference estimate indicates that being in the EPA program reduces the amount of time spent working by 3.34 hours. We think that since EPA students went to school, it reducing the time available to them for economic activity. Based on our tests, the three hour reduction showed that EPA students worked less, but it is hard to say that the EPA program achieved its purpose, which is to allow working children to finish primary school and progress to further education. In the conclusion we discuss how to better measure the EPA impact in the future.

Due to the small size of the EPA sample[12] and the unique nature of EPA students, we failed to find any clear impact of the EPA program on reducing child labor. Most importantly, since the objective of the EPA program is to allow working children stay at school and continue their education into middle and high school, there are other outcome indicators that might be more relevant. The graduation rate for EPA students (18.9% in Casa Esperanza's database), and the fraction of EPA students who progress to middle school (no data in the Casa Esperanza database) may be better measures of success for the EPA program.

[11] Parents of non-school students didn't answer the questions in the dependent variable section of our survey. They answered questions in a special non-school section. Therefore, the only outcome variable we can match up is the time spent on economic activity (that is, primary activity in non-school section).
[12] EPA was implemented in four communities of Comarca and three communities of central provinces, with the number of participants 143 and 122 respectively. As we mentioned before, the survey was conducted in Comarca region and due to the difficulty of transportation, we were only able to reach a few EPA students. Thus we have a small EPA treatment group (=24).

4. Conclusion

(Note to myself: Rewrite the conclusion)

Our impact evaluation concludes that, despite the challenges it faced, DESTINO's CEC program produced a significant positive impact on reduction of child labor in Comarca N-B area in Panama. The time spent during CEC, including extra-curricular activities plus the regular school hours, has limited the possibility of CEC participants becoming involved in agricultural-related or other forms of child labor.

Results from both EPA models are statistically insignificant, hence we could not conclude whether the EPA program was successful in achieving DESTINO's overall goal of child labor reduction. However, descriptive statistics from the EPA treatment group indicates that 73% of respondents completed their primary education. Thus, the EPA program's success rate in terms of completion was 73% in our model. This finding is reinforced by the CE dataset on EPA dropouts which shows an average of 16% for the duration of the project.[13] Since our treatment group sample size is small and we do not have a comparison group for the EPA program's completion treatment, this finding cannot be tested statistically.

A major challenge in evaluating the impact of DESTINO in the reduction of child labor in Panama is that the project design did not consider the impact evaluation as an integral part of the project cycle. When DESTINO was launched, the project did not create benchmarks against which the project could be compared after completion. As a result , the project did not identified a the control group at the beginning. Lack of a pre-project control group excluded the the possibility of using two most robust evaluation designs—the pre- and post intervention project, and control group designs—from our impact evaluation options.

[13] On September of 2006, Casa Esperanza created a database to follow the progress of CEC and EPA participants.

It is argued that in anti-poverty projects, intentionally depriving a group of equally eligible people from the benefits of a project for the purpose of impact evaluation, that is, selecting a control group, is unethical. In that case, it is reasonable to have a randomly selected treatment group. In DESTINO, both the CEC and EPA treatment groups were not selected randomly, which created the possibility of selection bias and heterogeneity problems, making an impact evaluation even more challenging. In some areas even random selection of the treatment group is not permissible due to government policies. In this case, conducting a baseline survey prior to projects commencement is a recommended approach. Such a survey provides a baseline data and enables the evaluators to assess the impact of the project against the baseline scenario.

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Table 1: Size of Comparison and Treatment groups for CEC& EPA programs by Community

Community	CEC Comparison	CEC Treatment	EPA Comparison	EPA Treatment
Boca del Monte	22	14	8	2
Cerro Iglesia	28	22	12	1
Cerro Puerco	27	17	12	0
Chichica	15	6	7	9
Hato Chami	37	22	14	0
Hato Pilon	33	19	14	4
Kwerima	13	11	4	7
Oma	26	15	8	1
Qda. De Loro	26	13	5	0
Qda. De Hacha	13	19	10	0
Total	240	158	94	24

Table 2: Validation test: Type of Flooring

Community	Chi-square test	Likelihood Test	N	Degree of Freedom
Boca del Monte	16.107 (0.000)***	22.969 (0.000)***	N_c=466 N_s=18	1
Cerro Iglesia	41.171 (0.000)***	21.317 (0.000)***	N_c=385 N_s=22	1
Cerro Puerco	12.520 (0.002)***	5.097 (0.078)	N_c=400 N_s=18	1
Chichica	26.173 (0.000)***	11.911 (0.003)***	N_c=610 N_s=8	1
Hato Chami	0.349 (0.555)	0.657 (0.418)	N_c=235 N_s=27	1
Hato Pilon	1.207 (0.272)	0.855 (0.355)	N_c=266 N_s=21	1
Qda. De Loro	0.329 (0.566)	0.628 (0.428)	N_c=466 N_s=24	1
All	1.857 (0.395)	1.178 (0.555)	N_c=2560 N_s=130	1

Notes:

1. In each cell, values of chi-square and likelihood test are reported. Below that are p-values in parentheses.
2. Nc is number of observations in census data. Ns is number of observations in our survey data.
3. *** indicates statistical significance at 1%.
4. Degree of freedom is 1 (There are 3 types of floor in the question therefore n-2=1).

Table 3: Validation test: Type of Wall

Community	Chi-square test	Likelihood Test	N	Degree of Freedom
Boca del Monte	36.215 (0.000)***	34.589 (0.000)***	N_c=474 N_s=18	6
Cerro Iglesia	28.363 (0.000)***	17.358 (0.004)***	N_c=398 N_s=22	6
Cerro Puerco	13.617 (0.034)	11.470 (0.075)	N_c=403 N_s=17	6
Chichica	15.028 (0.020)	9.234 (0.161)	N_c=612 N_s=8	6
Hato Chami	33.340 (0.000)***	28.920 (0.000)***	N_c=237 N_s=26	6
Hato Pilon	6.580 (0.254)	4.034 (0.545)	N_c=266 N_s=21	6
Qda. De Loro	7.585 (0.181)	5.538 (0.354)	N_c=208 N_s=16	6
All	25.960 (0.000)***	24.427 (0.000)***	N_c=2598 N_s=128	6

Note:

1. Degree of freedom is 6 (there are 8 types of wall in the question therefore n-2=6).

Table 4: Dependent and intervention variables

Variable Name	Definition	Mean	Std. Dev.
Dependent variable (Y)			
Econacts	Whether children engage in any economic activities (yes=1, no=0)	0.571	0.496
Hrseconact	Time spent on economic activities (hours per day)	1.533	1.522
Extracts	Whether children engage in any extracurricular activities after school (yes=1, no=0)	0.264	0.441
Hrsextraact	Time spent on extracurricular activities (hours per day)	2.030	1.243
Hrshw	Time spent on homework (hours per day)	1.177	0.805
Intervention (CEC)			
cectreat (D_T^c)	Dummy variable for CEC treatment group (CEC participant=1, CEC non-participant=0)	0.397	0.490
ceccompar(D_C^c)	Dummy variable for CEC comparison group (CEC non-participant=1, CEC participant=0)	0.603	0.490
Intervention (EPA)			
epatreat (D_T^e)	Dummy variable for EPA treatment group (EPA participant=1, EPA non-participant=0)	0.138	0.346
epacompar(D_C^e)	Dummy variable for EPA comparison group (EPA non-participant=1, EPA participant=0)	0.862	0.346

Table 5: Independent variables

Variable Name	Definition	Mean	Std. Dev.
gender	Child's gender	1.527	0.500
age (AGE)	Child's age	12.149	3.566
distance (DIST)	Distance from home to school (measured by time to school: 1=0-30 min, 2=30-60 min, 3= 60-120 min,	1.202	0.549
srydedu (PEDU)	Education level (grade) of surveyed person	3.554	2.936
agrinc (AINC)	Whether the household has income from agricultural	0.658	0.475
businc (BINC)	Whether the household has income from business activity	0.073	0.260
transfinc (TINC)	Whether the household has income from social transfers	0.621	0.486
othinc (OINC)	Whether the household has income from other activities	0.159	0.366
land (LAND)	Whether the household owns land (yes=1, no=0)	0.767	0.423
farm (FARM)	Whether the household farms crops (yes=1, no=0)	0.922	0.269
animal (AMAL)	Whether the household owns any type of animal (yes=1,	0.782	0.414
migrate (MIG)	Whether surveyed person migrates (yes=1, no=0)	0.194	0.396
Icommunity_1	Whether the community is Boca del Monte (yes=1, no=0)	0.091	0.288
Icommunity_2	Whether the community is Cerro Iglesia (yes=1, no=0)	0.122	0.327
Icommunity_3	Whether the community is Cerro Puerco (yes=1, no=0)	0.112	0.316
Icommunity_4	Whether the community is Chichica (yes=1, no=0)	0.068	0.252
Icommunity_5	Whether the community is Hato Chami (yes=1, no=0)	0.148	0.355
Icommunity_6	Whether the community is Hato Pilón (yes=1, no=0)	0.131	0.338
Icommunity_7	Whether the community is Kwerima (yes=1, no=0)	0.066	0.248
Icommunity_8	Whether the community is Oma (yes=1, no=0)	0.096	0.295
Icommunity_9	Whether the community is Qda. de Hacha (yes=1, no=0)	0.075	0.264
Icommunity_10 (R_{10})	Whether the community is Qda. de Loro (yes=1, no=0)	0.091	0.288

Table 6: Impact of CEC program: Difference between treatment and comparison groups
Dependent variable: Economic activity (1=engaged in economic activities, 0=not engaged in any economic activity)

	Model 1	Model 2	Model 3	Model 4	*N*
Full Sample	−.047 (−0.90) R^2= 0.565	−.089 (−1.71) R^2= 0.642	−.028 (−0.54) R^2= 0.584	−.062 (−1.20) R^2= 0.659	N_T=158 N_C=240
7-17, School Sample	−.069 (−1.25) R^2= 0.570	−.107 (−1.92)* R^2= 0.632	−.053 (−0.97) R^2= 0.586	−.085 (−1.54) R^2= 0.649	N_T=152 N_C=196

Notes:

1. *, ** and *** indicate statistical significance, respectively, at 10%, 5%, 1%
2. In each cell are reported (i) the difference between the program's impact on Treatment versus and Comparison groups measured as $[D^T|Z - D^C|Z]$ (see eq. (2)), (ii) *t*-value in parentheses, and (iii) the adjusted *R*-squared of the regression.
3. N_T and N_C, respectively, denote the number of observations in the treatment and comparison groups.
4. "7-17, School Sample" includes those 348 children who are at school and between age 7 to 17.
5. Model 1 is unconditional, simple difference-in-means; Model 2 includes child and family characteristics as controls (see eq. (4)); Model 3 has regional controls (see eq. (5)); Model 4 includes characteristics and regional controls (see eq. (6)).

Table 7: Impact of CEC program: Difference between treatment and comparison groups

Dependent variable: Time spent on economic activities (in hours)

	Model 1	Model 2	Model 3	Model 4	*N*
Full Sample	−.205 (−0.94) R^2= 0.507	−.478 (−2.14)** R^2= 0.623	−.248 (−1.21) R^2= 0.572	−.357 (−1.61) R^2= 0.654	N_T=158 N_C=240
7-17, School Sample	−.192 (−0.94) R^2= 0.512	−.553 (−2.59)** R^2= 0.625	−.216 (−1.09) R^2= 0.560	−.414 (−1.95)* R^2= 0.651	N_T=152 N_C=196

See Notes to Table 5

Table 8: Impact of CEC program: Difference between treatment and comparison groups
Dependent variable: extracurricular activity (1=engaged in extracurricular activity, 0=not engaged in any extracurricular activity)

	Model 1	Model 2	Model 3	Model 4	*N*
Full Sample	.235 (5.23)*** R^2 = 0.312	.227 (4.85)*** R^2 = 0.360	.237 (5.23)*** R^2 = 0.321	.235 (4.93)*** R^2 = 0.371	N_T=158 N_C=240
7-17, School Sample	.246 (5.18)*** R^2 = 0.328	.222 (4.43)*** R^2 = 0.379	.244 (5.08)*** R^2 = 0.337	.226 (4.43)*** R^2 = 0.384	N_T=152 N_C=196

See Notes to Table 5

Table 9: Impact of CEC program: Difference between treatment and comparison groups

Dependent variable: Time spent on extracurricular activities (in hours)

	Model 1	Model 2	Model 3	Model 4	*N*
Full Sample	.668 (2.70)*** R^2 = 0.746	.902 (3.09)*** R^2 = 0.751	.597 (2.74)*** R^2 = 0.817	.785 (3.06)*** R^2 = 0.823	N_T=158 N_C=240
7-17, School Sample	.839 (3.35)*** R^2 = 0.758	.949 (3.15)*** R^2 = 0.758	.750 (3.48)*** R^2 = 0.837	.754 (2.88)*** R^2 = 0.829	N_T=152 N_C=196

See Notes to Table 5

Table 10: Impact of CEC program: Difference between treatment and comparison groups
Dependent variable: Time spent on homework (in hours)

	Model 1	Model 2	Model 3	Model 4	*N*
Full Sample	-.223 (-2.48)** R^2= 0.689	-.278 (-2.96)*** R^2= 0.717	-.186 (-2.10)** R^2= 0.711	-.220 (-2.38)** R^2= 0.741	*N_T=158* *N_C=240*
7-17, School Sample	-.220 (-2.42)** R^2= 0.694	-.291 (-3.06)*** R^2= 0.721	-.176 (-1.96)* R^2= 0.711	-.238 (-2.53)** R^2= 0.741	*N_T=152* *N_C=196*

See Notes to Table 5

Table 11: Impact of EPA program: Difference between treatment and comparison groups

Dependent variable: Economic activity (1=engaged in economic activity, 0=not engaged in any economic activity)

	Model 1	Model 2	Model 3	Model 4	*N*
12+,School Sample, non-cec	.128 (1.18) R^2= 0.744	.091 (0.77) R^2= 0.782	.045 (0.36) R^2= 0.739	-.007 (−0.05) R^2= 0.792	N_T=24 N_C=94

Dependent variable: Time spent on economic activities (in hours)

	Model 1	Model 2	Model 3	Model 4	*N*
12+,School Sample, non-CEC	-.212 (-0.43) R^2= 0.520	-.200 (-0.37) R^2= 0.660	-.188 (−0.34) R^2= 0.553	.093 (0.13) R^2= 0.641	N_T=24 N_C=94

Dependent variable: Extracurricular activity (1=engaged in extracurricular activity, 0=not engaged in any extracurricular activity)

	Model 1	Model 2	Model 3	Model 4	*N*
12+,School Sample, non-CEC	1.11e-16 (0.00)*** R^2= 0.236	.085 (0.68) R^2= 0.249	-.086 (−0.68) R^2= 0.223	.040 (0.24) R^2= 0.187	N_T=24 N_C=94

Dependent variable: Time spent on extracurricular activities (in hours)

	Model 1	Model 2	Model 3	Model 4	*N*
12+,School Sample, non-CEC	.313 (0.54) R^2= 0.650	-.728 (−1.01) R^2= 0.765	.365 (0.57) R^2= 0.770	-1.874 (−2.23)** R^2= 0.877	N_T=24 N_C=94

Dependent variable: Time spent on homework (in hours)

	Model 1	Model 2	Model 3	Model 4	*N*
12+,School Sample, non-CEC	-.459 (-1.89)* R^2= 0.706	-.775 (−3.14)*** R^2= 0.796	-.585 (−2.13)** R^2= 0.735	-.718 (-2.15)** R^2= 0.796	N_T=24 N_C=94

Dependent variable: Time spent on economic activities (in hours)

	Model 1	Model 2	Model 3	Model 4	*N*
EPA and non-school comparison sample	-3.34 (-4.34)*** Adj R^2= 0.758	-1.77 (-0.87) Adj R^2= 0.954	-3.27 (−3.28)*** Adj R^2= 0.771	-1.33	N_t=*24* N_c=*21*

Notes: In Model (4), only difference is reported.