Does Domestic Work Affect the Academic Performance of Girls in Primary School in Côte d'Ivoire? Empirical Evidence from Probit Model

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Abstract

The objective of this paper is to highlight the effects of domestic work of girls on their school results in Côte d'Ivoire. From a probit model, the analysis indicates that domestic work favours, meaningfully, the fact about repeating a school year for the girl child. Besides, the availability of basic services in schools significantly reduces failure of girls in schools in rural areas. Thus, policy makers must equip schools with canteens, toilets for girls, and they should also provide the necessary facilities for drinking water points.

Keywords: Domestic work, quality of school, probit, school results, Côte d'Ivoire

Introduction

The process of ensuring quality education and learning opportunities throughout life for all is one of the objectives of sustainable development. Unfortunately, early employment of children in certain activities can be a barrier to achieving this goal. Since the publications of Basu and Van (1998) and their extensions in recent years (Luiz, et al., 2015), there has been a continued debate on child labour. One of those forms, domestic work, has become a concern for some scientists given its invisible nature and the difficulty of its measurement (Webbink, et al., 2012). However, this form of activity is part of a process of "learning by doing". Indeed, it is similar to the design on the endogenous growth theory in explaining the consequences of innovation and technical change (Kenneth, 1962). However, with the accentuation of crises in recent years, the socializing work has become an exploitation of children (Schlemmer, 1996). Therefore, domestic work, which is considered as an activity accomplished in the home, may interfere with children's schooling and have negative effects particularly on the

educational outcomes of girls (Punick & Bornstein, 2015; Zapata et al., 2011; Assaad, et al., 2010). In general, this type of activity is devoted to girls (Zapata et al, 2011; Diallo, 2001). It is done by women who were involved in domestic work inside or outside without any monetary consideration of the household. Since it can be accomplished for long hours, this form of activity could deprive girls of their education.

In developing countries, another factor that explains the failure of girls in school is poor quality (Abou, 2016a). The consequence is sometimes in maintaining them in domestic activities with long-term repercussions on the labour market (Aturupane et al., 2013; Spears, 2012; Gibbons, 2011). It is therefore important to highlight the relationship between domestic labour of girls and their academic performance. The general objective of this study is to show the effects of domestic work carried out by girls on their academic performance. To achieve this goal, this article is structured as follows: Section 1 presents a brief overview of studies on child domestic work; Section 2 will focus on the empirical specification and then the results will be discussed in Section 3.

Literature Review

Long ignored in the studies of child labour, domestic work is now increasingly highlighted (Punick & Bornstein, 2015; Webbink, et al., 2012; Zapata, et al., 2011; Assaad, et al., 2010). Indeed, this form of activity can interfere in the education of girls and promote their failure (Zapata, et al., 2011; Assaad, et al., 2010). This case arises when girls spend long hours on domestic activities, in fact, beyond 14 hours of domestic work per week. As a result, over 15% of girls aged 6-11 years get to repeat a class in Côte d'Ivoire (Abou, 2016b). Moreover, when the case goes beyond 21 hours of domestic work per week, it becomes impossible for these girls to attend school. There is then a possible negative relationship between the number of domestic working hours and the school results of the girls. However, in his analysis, Abou (2016b) has not demonstrated the robustness of this result. However, in Egypt, from a simulation and a sensitivity analysis, Assaad, et al. (2010) showed that the number of hours of domestic work negatively and significantly affects the educational outcomes of girls. Furthermore, in Ethiopia and in Guinea, the contribution of women to domestic work is the main cause of early school leaving and even their low academic performance (Colclough, et al., 2000). Thus, there is empirical evidence that domestic work can interrupt the schooling of girls.

In developing countries, in addition to domestic work, the school environment also plays an important role in the maintenance and acquisition of school children. Thus, the availability of basic services (toilets, drinking water, electricity, canteens, etc.) can reduce the school failure of girls (Abou,

2016a; Aturupane, et al., 2013; Spears, 2012; Bacolod & Ranjan, 2008; Spears & Lamba, 2006). Indeed, access to basic services poses the problem of the quality of schools in particular and that of the general education. Moreover, a major problem in developing countries is that the pressure for enrolment increases in the population, resulting to the large increase in enrolment. However, overcrowded classes can negatively influence the performance of students; particularly because of the inefficiency of teachers in these classes (Krueger, 2003).

In Côte d'Ivoire, there are already many studies on child labour (Abou, 2016a, 2014; Nkamleu, 2006; Diallo, 2001). However, there are only few studies that highlight the relationship between domestic work of girls and their school outcome. Nevertheless, maintaining those girls in the education system is needed to improve their productivity and empowerment in adulthood. Thus, the research question central to this analysis is an assessment of the impact of domestic activities on the academic performance of girls in primary school. Indeed, gender equality and women's empowerment are another component of sustainable development goals. In addition, the education of girls presents positive externalities in the sense that the health and education of children are closely linked to the education of their father than to their mother (Schultz, 2002). Such a study is necessary, because the results will help guide the educative policies to those that contribute to the academic performance of girls.

Methodology
Model

The research question in this study is how the domestic work of girls affects their school results in Côte d'Ivoire. Therefore, we appeal to the microeconomic theory of child labour (Basu & Van, 1998). However, to take into account the academic result, we are inspired by the model from Bacolod and Ranjan (2008). In their model, these authors maximize a utility function sub constraint to time and budget. They emphasize the importance of children's ability in the utility function. In other words, the human capital of children is based on their ability or aptitude. Here, given our objective, we consider the school results of children. Note that the head of household is the only one to make the decision to maximize the welfare of the household. His utility depends on the consumption and school results (R) of the child. Here, $R = 1$ if the child's school results are good and $R = 0$ if not. This school result is the number of hours of domestic work (td) and the quality of the school (φ):

$$R = r(td, \varphi) \qquad (1)$$

Empirically, it is possible to use several econometric models to highlight the equation 1 above. In fact, the head of household retires a great utility when the result of the child's school is good (admission to the next year). This is not the case when the result is bad (repetition, exclusion, school dropout).
Schematically:

Figure 1. School outcome of the child
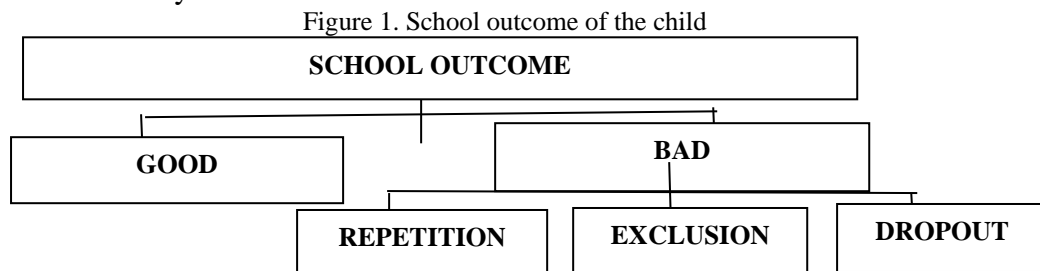
Source: The author

As presented, this figure shows a multinomial model. However, given the structure of the data, there are few children excluded due to poor academic results. It is also rare to see children leave school voluntarily. Therefore, there are only those who repeat and are admitted. Thus, academic performance in the framework species is captured by repetition.
Thus:

$$R_i^* = \beta_1 td_i + \beta_2 \varphi_j + \varepsilon_i \qquad (2)$$

With $R_i = 1$ if $R_i > 0$ and $R_i = 0$ if not; φ_i is the school quality, ε_i indicates the error term. $\beta_1 \, et \, \beta_2$ indicate the column vectors of parameters associated with the equation 2.

This model is similar to those used for studies on work and schooling for children. Thus, these focus on the dichotomous variable models (logit, probit). These models estimate the child labour (Bedi & Goulart, 2008). The use of these models is interesting for two main reasons: First, they are simple and estimator's properties are unbiased. Second, they are allowed to have results comparable to studies which take into account that of the education of children or their work.

$$\Pr\left(R_i = 1\right) = \Pr\left(R_i^* > 0\right) = \Pr\left(\beta_1 td_i + \beta_2 \varphi_i + \varepsilon_i \geq 0\right) \quad (3)$$

Equation 3 is the simple probit model with td_i the number of hours of domestic work, and φ_i, the environment of the school and household. In the following of this analysis, we present the variables of the model.
- ***The number of work per week***
The number of hours of domestic work is measured by the intensity of labour or the time needed to execute this activity per week. The expected

outcome is an inverse relationship between the repetition of the class and the number of hours worked per week.

-   *The school environment*

The school environment is characterized by the presence of certain basic services in a primary school. They are: public toilets (d_toil), electricity (d_elect), availability of a canteen (d_cant), the presence of a drinking water point (d_eaupo), and the class size (t_classe). These basic services can play an important role in children's learning. Furthermore, several studies have documented that fact (Abou, 2016a; Aturupane, et al., 2013; Spears, 2012; Bacolod & Ranjan, 2008; Spears & Lamba, 2006). It is therefore expected that the availability of these basic services in a school promotes high academic achievement of girls. In addition, the size of the class (the teacher/student ratio) is also important in explaining educational outcomes for girls (Valdenaire, 2011; Krueger, 2003).

-   *The household environment*

Household income (dep_m), level of education of household head can influence the performance of girls in primary schools. In this study, income is measured by the expenditure of more stable household assumed in time. When income is high, the probability of failure significantly lowers (Abou, 2014). This is the expected result in this analysis. It is also assumed that a high level of education of household head reduces the probability for a girl to repeat its class. This variable takes several ways: 0 if the household head is uneducated (none); 1 if he has the primary level (prim), 2 if he has the secondary (second), and 3 when the household head has the higher level (sup).

Data

Few surveys on child labour in Côte d'Ivoire address educational policies. With the financial support of the Strategic Support Programme for Scientific Research in Côte d'Ivoire (PASRES), data was collected from two locations (Bouaké & Soubré) with different socio-economic realities with 2010 local survey on child labour and education policy. This household survey with the methodology of the Program of Statistical Information and Monitoring of Child Labour of the International labour Office (ILO/SIMPOC) was designed to take into account child domestic labour and a set of variables relating to the school environment and the household. Therefore, it has to do with the availability of basic services in the local school or town (canteens, toilets, electricity, water, class size). Thus, 750 households and 1,338 children aged 6-14 years were interviewed. To obtain information on child domestic work, we referred to the number of hours devoted to household activities daily. This survey has also enabled us to have information on the level of household head in the areas of education and

income. This one is evaluated by the expenses of households. Regarding the education of children, it refers to those who attend the neighbouring school at the time of the survey. Information about the school is obtained from interviewers visits to the schools attended by the children. The verification of their report card made it possible for their results to be available during the school year.

Result
Descriptive Analysis

Table 1 presents descriptive statistics. Thus, the average repetition rate (42%) of girls aged 12-14 in rural areas is very high compared to that of others (39%), and then that of girls in urban areas (34%). In addition, girls aged 12-14 in urban areas spend more hours (15.83) on domestic work than those in rural areas. Certainly, this statistic may reflect employment opportunities in the urban areas (Fafchamps & Wahba, 2006). Moreover, regardless of the place of residence, the girls of ages 12-14 years spend more time than those aged 6-11 years. This could reinforce the assertion that as the age increases, children work more (Diallo, 2001). However, linking the number of hours worked and the repetition rate does not reflect a likely positive correlation. In fact, according to statistics, with an average number of hours of domestic work of 10 hours per week, the average repetition rate of girls aged 12-14 in rural areas is 42%. Yet, for an average of 15 hours of domestic work per week, the average repetition rate of girls of 12-14 years in urban areas is 34%. Econometric analysis will validate these results.

Compared to urban areas, as shown in Table 1, there is a lack of drinking water point in schools in rural areas. For example, only 5% of schools have a drinking water point. In addition, these schools usually do not have toilets. By cons, in the urban areas, the average coverage rate is over 60%. Nevertheless, a significant number of children (over 40%) in rural areas have access to canteens.

Since 2008, poverty affects a significant proportion of rural households especially (INS, 2008). Table 1 confirms this trend. Indeed, the average rural household income is below the poverty line defined by the INS in 2008 (INS, 2008). This threshold was $181.826 per year, while Table 1 indicates a threshold of $160.714 per year on average. In other words, rural households in areas of Bouaké and Soubré live in extreme poverty. In addition, the level of parental education is generally low regardless of the place of residence. All these factors may promote the use of girls in the household to do household chores at the expense of their education. Thus, all these results cannot be the subject of recommendations. As a result, we use econometric analysis to prove the robustness of the statistical results.

Table 1. **Descriptive statistics of variables**

Variables	Measure	Rural						Urban					
		Ensemble		6-11 years		12-14 years		Ensemble		6-11 years		12-14 years	
		Mean.	S.E	Mean.	S.E	Mean.	S.E	Mean.	S.E	Mean.	S.E	Mean.	S.E
						Outcome result							
red	1 = repeat	0.39	0.49	0.37	0.48	0.42	0.50	0.35	0.48	0.36	0.48	0.34	0.48
						domestic work							
intensity	Number of hours worked per week	8.07	9.59	7.53	8.12	10.13	12.99	9.40	11.86	6.84	9.07	15.83	15.19
						Household environment							
Income	Annual household expenditure per head	90,800	95,014	92,820	102,444	84,480	60,367	195,980	129,815	197,075	129,470	193,220	130,910
level of education	1= primary	0.35	0.47	0.33	0.47	0.41	0.49	0.32	0.47	0.30	0.46	0.35	0.48
	2 = secondary	0.18	0.38	0.18	0.38	0.18	0.39	0.17	0.37	0.16	0.37	0.19	0.39
	3 = higher level	0.03	0.19	0.03	0.18	0.04	0.22	0.08	0.27	0.07	0.26	0.09	0.29
						School environment							
School size	Number of students per class	40	12.86	39	11.97	41	15.31	50	14.80	40	13.74	53	16.97
canteen	1 = presence of canteen	0.46	0.50	0.45	0.49	0.49	0.50	0.30	0.46	0.37	0.44	0.21	0.41
toilets	1 = presence of toilets	0.14	0.35	0.14	0.35	0.14	0.35	0.67	0.47	0.66	0.47	0.72	0.45
electricity	1 = presence of electricity	0.29	0.45	0.28	0.45	0.33	0.47	0.97	0.16	0.97	0.16	0.97	0.18
Potable water	1= drinking water point	0.04	0.21	0.04	0.21	0.05	0.22	0.47	0.50	0.46	0.50	0.49	0.50

Source: The author

Econometric Analysis

Table 2 presents the econometric results of the effects of domestic work on educational outcomes for girls of ages 6-14 years according to place

of residence. Thus, the results of estimating the probit by the maximum likelihood method indicate acceptable quality adjustment. Indeed, Prob>chi2 = 0.0000 shows that the estimated coefficients of the equation are different from zero. Furthermore, a direct interpretation of the estimated parameters based on the calculation of the relative risk ratio exists. However this, having to systematically compare each variable with that of reference, can sometimes complicate the reading of the results.

Table 2. Results of probit effects of domestic work for girls aged 6-14 years on their school outcome

Variables	Rural			urban		
	Whole	6-11 years	12-14 years	Whole	6-11 years	12-14 years
Domestic work intensity						
	0.0951***	0.140***	0.0503***	0.0284***	0.0438***	00061
	(8.51)	(9.78)	(3.38)	(4.30)	(4.76)	(0.58)
Household environment						
Expenditure	-0.0967	-0.158**	-0.0563	-0.0277	-0.0066	-0.0419
	(-1.73)	(-2.65)	(-0.42)	(-0.53)	(-0.10)	(-0.45)
Level of education (none[1])						
Prim	-0.530**	-0.496*	-1.038**	-0.0628	-0.0814	-0.142
	(-2.85)	(-2.14)	(-2.65)	(-0.47)	(-0.52)	(-0.52)
Second	-0.520*	-0.462	-1.017*	-0.235	-0.182	-0.449
	(-2.43)	(-1.72)	(-2.18)	(-1.47)	(-0.97)	(-1.39)
Sup	-0.846*	-1.046*	-1.238*	-0.0314	-0.0383	-0.0010
	(-2.29)	(-2.10)	(-2.25)	(-0.15)	(-0.15)	(-0.00)
School environment						
t_classe	0.0334***	0.0438***	0.527	0.0253***	0.0328***	0.0166*
	(5.21)	(4.89)	(1.08)	(5.57)	(4.83)	(2.44)
d_cant (p_cant[2])	-0.0782	-0.141	-0.0763	-0.0035	-0.105	-0.473
	(-0.44)	(-0.64)	(-0.23)	(-0.03)	(-0.68)	(-1.73)
d_toil (p_toil[3])	-1.122***	-1.217**	-1.307*	-0.277	-0.348*	-0.107
	(-3.97)	(-3.26)	(-2.25)	(-1.95)	(-2.03)	(-0.39)
d_elect (p_elect[4])	-0.434*	-0.262	-0.672	0.0435	-0.0030	0.0621
	(-2.01)	(-0.88)	(-1.66)	(0.11)	(-0.01)	(0.09)
d_eaupo (p_eaup[5])	-0.040*	-0.804	-0.630*	0.0062	0.0245	0.0430
	(-2.27)	(-1.41)	(-2.32)	(0.05)	(0.16)	(0.18)
Cons	-0.526	0.0630	-0.423	-0.151	-0.044	-0.691
	(-0.44)	(0.05)	(-1.73)	(-0.88)	(-1.24)	(-0.30)
N	374	280	94	605	447	158
Wald chi2	100.3	122.2	30.96	85.12	6535	18.17
Prob>chi2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0776
Pseudo R^2	0.3400	0.4504	0,1527	0,1527	0,2182	0,0887
Likelihood	-163.763	-101.519	-48.7635	-333.544	-228.393	-92.4691

Source: Author

Notes

(1) indicates the reference modality; (2) no canteen in the school (p_cant) is the reference of the modality; (3) no toilets in the school of the children (p_toil) represents the modality of reference; (4) no electricity in the school of the children (p_elect) is the modality of the reference; (5) no drinking water point in the school of the children (p_eaup) indicates t statistic in bracket ; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

We interpret the marginal effects of the explanatory variables on the probability of school outcomes (Table 3). Also, we interpret only variables significant at 0.1% level, 1%, and 5%.

Table 3. Probit marginal effects of the incidence of domestic work by children of ages 6-14 years on their school outcome

Variables	Rural			urban		
	whole	6-11 years	12-14 years	Whole	6-11 years	12-14 years
Domestic work						
Intensity	0.0358	0.0520	0.0201	0.0103	0.0159	0.0022
Household environment						
Expenditure	-0.0364	-0.0586	-0.0111	-0.0101	-0.0024	-0.0151
Prim	-0.2009	-0.1872	-0.3879	-0.0227	-0.0294	-0.0512
Second	-0.2020	-0.1782	-0.3906	-0.0876	-0.0678	-0.1696
Sup	-0.3276	-0.3969	-0.4496	-0.0114	-0.0140	-0.0004
School environment						
t_classe	0.0126	0.0163	0.0073	0.0092	0.0119	0.0059
d_cant	-0.0295	-0.0528	-0.0015	-0.0013	-0.0381	-0.1611
d_toil	-0.4251	-0.4568	-0.4612	-0.1025	-0.1289	-0.0379
d_elect	-0.1570	-0.0951	-0.2567	0.0157	-0.0011	0.0221
d_eaupo	-0.2953	-0.2424	-0.3940	0.0022	0.0089	0.0154

Source: Author

Effect of the Number of Hours of Domestic Work

This variable gives the expected result. Other things being equal, regardless of the place of residence and age group except for children of 12-14 years in urban areas, the number of hours of domestic work of girls significantly and positively influences their repetition. Indeed, an increase in the number of hours of domestic work per week increases the probability of repetition of girls (Table 3). In rural areas, for example, 1 hour of extra domestic work per week certainly increases the likelihood of repetition but in small proportions. This probability is considerably greater than that of the urban environment. By age group, the repetition probability is higher in girls aged 6-11 years in rural areas compared to those of 12-14 years old. These results show that the more girls are compelled to do domestic work, the more the likelihood to repeat the class increases (Assaad, et al., 2010). In other words, long hours of domestic work are detrimental to girls' schooling (Webbink, et al., 2012).

Effect of Household Environment

Examination of Table 3 indicates the existence of a significant inverse relation between repetition and income. Indeed, when household income increases, the probability that girls of 6-11 years repeat the class decreases. In fact, when the head of household in rural areas has necessary income, it creates the conditions for success of girls. This result is certainly

due to the awareness raising on positive externalities of schooling for girls (Abou, 2014). In addition, this result falls within the dynamics of the luxury axiom model of Basu and Van (1998) in its extension with the model of Baland and Robinson (2000). Parents send their children to school as soon as the conditions allow the household. Moreover, as and when the level of education of the household head increases in rural areas, the probability of repeating the class decreases. The reduction of this probability becomes more important at the tertiary level. This result reflects the fact that the head of household, because of his level of education, in rural areas is involved in the framing of his daughters. In urban areas, by cons, households increasingly use repeaters. Thus, these results reflect the explanatory power of the level of education in the education of children. Based on a high level of education, the household head takes into account the future well-being of children (Baland & Robinson, 2000).

Effect of School Environment
The Effect of the Presence of Toilets in School
When schools have toilets, girls' performance would improve significantly. Indeed, girls' access to the toilet greatly reduces the probability of failure regardless of the place of residence. This decrease in the probability of repetition is higher in rural areas than in urban areas. Indeed, because of the virtual absence of toilets in rural schools, children generally defecate in the open. This defecation is a major threat to human capital in developing countries (Spears, 2012; Spears & Lamba, 2006). In other words, better access to hygiene can promote the acquisition of knowledge by children. Moreover, for Spears and Lamba (2006), children of 06 years, who were made aware of hygiene in India enhancement program during their first year of life, had less difficulty in recognizing letters and simple numbers than those who did not.

The Effect of the Presence of Electricity and Water Point in the School
In schools, the provision of electricity significantly reduces the probability for children to fail in the rural areas. Indeed, when children have access to electricity, their results improve (Bacolod & Ranjan, 2008; Aturupane, et al., 2013). In urban areas, the result is not significant and ambiguous. In addition to the presence of electricity, the availability of drinking water point in the school significantly reduces the probability of repetition of rural girls. Indeed, in the study areas (Bouaké and Soubré), the rural schools have wells either in the school yard or near to it. This avoids the girls to walk long distances in search of a drinking water point, or it improves the supply of teachers with drinking water. They can, thus, be assiduous in school. In fact, the lack of water and sanitation facilities adapted

is poorly maintained and causes diseases. Therefore, these cause absenteeism among girls, which can promote their repetition (Spears, 2012).

The Effect of School Size

As expected, the class size significantly and positively influences the probability of school failure of girls. The more the class is large, more girls repeat the classroom especially those from 6-11 years in rural areas. By cons, regardless of age, girls from urban areas repeat their class since the number of students per class is important. This result confirms other cases generally derived from estimates in developed countries (Bressoux, et al., 2009; Krueger, 2003).

Conclusion

The objective of this research was to highlight the effects of domestic work of girls in their school. Thus, the local survey data (Bouaké and Soubré) on child labour and education policies were the basis for the analysis. From a probit model, several results were obtained. Therefore, domestic work significantly increases the probability for a girl to intensify her current class of the school year, especially in rural areas. Furthermore, repetition is higher in girls aged 6-11 years. In addition, the head of household income negatively influences the girl's failure. In other words, when parental income increases, the probability for a girl to repeat the class decreases. Besides, the availability of basic social services (toilets, electricity, drinking water point, etc.) also plays an important role in explaining school failure of girls in primary school. In fact, analysis has shown that when schools have these services, the likelihood for girls to repeat their class decreases significantly. Thus, this result is consistent with other studies (Abou, 2016a); Aturupane, et al., 2013; Spears, 2012; Bacolod & Ranjan, 2008). The school environment is, therefore, essential in improving the performance of girls in primary school. The issue of poverty of rural households also remains a cause for failure in school girls.

To improve school performance of girls in primary school, several political synergies must be highlighted. This is to create a regulatory framework for domestic work of girls. For example, the law must determine the conditions of domestic work, such as that of child labour in general. In addition, the quality of the school environment must be at the centre of educational policies. These policies provide schools with toilets for girls and enable them to have drinking water point. Policy makers must also focus on the teacher/student ratio. This is to increase the number of class, and thereby reducing overstaffing. The objective of this policy is to improve the quality of education that will impact a better performance of girls in school. It is also important to improve the living conditions of rural households. Additionally,

this policy requires a better redistribution of the national wealth. In other words, the price of annuity products offered to farmers should reflect those of the international market. In addition, governments must facilitate access to credit for these households to develop and market the food products. This is to create more wealth opportunities to significantly reduce household poverty.

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