

## **Socio-Economic Impact of Government Spraying Programme on Cocoa Farmers in Ghana**

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### **ABSTRACT**

This paper assesses the impact of government cocoa spraying programme on the socio-economic live of cocoa farmers in Ghana. Due to high cost of pesticides, maintenance of cocoa farms was becoming a burden on farmers. As a remediation, Ghana government initiated a national spraying exercise in 2001 to control the spread of the black pod disease and cocoa pests, free of charge, with the aim of increasing yield. Nine years after implementing the project under CODAPEC, Ghana has seen an upsurge in cocoa production yet the economic fortunes of cocoa farmers appear not to have improved. It is hypothesized; therefore, that the mass spraying exercise being implemented by CODAPEC has not contributed to improving income from cocoa.

**Key Words:** Before and after, CODAPEC, counterfactual, golden pod, inflationary gap,

### **INTRODUCTION**

Ghana COCOBOD identified that due to the high cost of fungicides and insecticides, maintenance of cocoa farms was becoming a burden on farmers, so most of them felt reluctant to maintain their farms to the extent of abandoning them. This, according to Himme and Snoeck (2001), led to a sharp decline in cocoa production in Ghana from the 1980s to the beginning of the year 2000. As part of Ghana's determination to maintain high position in the cocoa production, COCOBOD, in 2001, was equipped to initiate a national programme which provides free spraying on cocoa farms to control the spread of black pod diseases and pests which has contributed to declining cocoa yield over the previous decades. The Cocoa Diseases and Pests Control Exercise Committee (CODAPEC) were formed to ensure the effective implementation of the project. The aim of the project was to facilitate increased production of cocoa that would also translate into increasing farm income to enhance the living standard of farmers. The objective of this research was to examine the socio-economic impact of the CODAPEC mass spraying exercise on cocoa farmers using Ahafo Ano South District as a study area.

### **Cocoa Diseases and Pests Control Committee (CODAPEC)**

Cocoa Diseases and Pests Control Committee (CODAPEC), was established by the government of Ghana in the year 2001. The committee was mandated to oversee the implementation of the mass cocoa spraying programme. The programme aimed at providing free assistance to farmers in controlling cocoa pests and diseases such as black pod that has reduced the yield of cocoa farms over the years. The organisational structure for the management of the project consists of the following:

- The national co-ordinators. They ensure availability of chemicals, protective cloths, and spraying machines. Salaries of workers are also determined by them.
- Regional co-ordinators. The task force consist of; the regional minister, chief farmer in the region, the regional cocoa manager, and the regional representative from licensed cocoa buying companies. They distribute chemicals, protective cloths and spraying machines to the various districts.
- The district co-ordinators. The task force comprise; the district chief executive, the district cocoa manager, the district chief farmer, and the district representative from licensed private cocoa buying companies in the district. They ensure fair distribution of chemicals, protective cloths and spraying machines to the spraying gang in the selected communities. Supervision for effective utilisation of materials is also done by them.
- Local co-ordinators. The task force consist of; the local chief farmer, supervisor of the spraying gang, assemblyman, and local representative from licensed private cocoa buying companies. The spraying exercise is done by the spraying gang which consist of six members and supervision is done by a supervisor.

COCOBOD recommended the four-times spraying in a year, within July, August, September, and November recommended by the project may be untenable due to inadequate logistics and finance. The Cocoa Research Institute of Ghana (CRIG) recommended the insecticides and fungicides to the CODAPEC for effective and efficient control of pests and black pod on cocoa. These Insecticides are Confidor and Cocoster. The Fungicides include Champion, Kocides, Fungaram and Ridomil. The exercise involves spraying of farms in all cocoa growing areas against the black pod diseases and cocoa pests with approved fungicides and insecticides. The Cocoa Diseases and Pests Control Exercise Committee (CODAPEC) were instituted to manage the project, and the project simply known as the mass cocoa spraying exercise was code-named CODAPEC.

## **METHODOLOGY OF THE STUDY**

### **Study Area**

The study was conducted in Ahafo Ano South District located at the North-Western part of Ashanti Region. The district, which is part of the major cocoa producing areas in Ghana, covers a total land area of about 1241kmsq representing about 5.8% of the regions total surface area. The district capital, Mankraso is located 34km on the Kumasi-Sunyani Highway. As established by the Meteorological Service Department (2004), the District lies within the wet semi-equatorial zone and marked by a double maxima rainfall between April-July and September-November with an annual rainfall of between 1105mm and 1524mm. The mean monthly rainfall of the area is about 91.2mm with a temperature of about 26-30C. The district is endowed with forest ochrosols which is rich in humus and is generally suitable for plantation and food crops. The vegetation is the moisture laden semi-deciduous forest which covers an area of about 300sqkm representing about 28% of the land area. The district economy is basically agrarian. About 63.2% of the active labour force is estimated to be engaged in agriculture. Farmers engage themselves in the production of food crops – cocoyam, yam, plantain, cassava; life stock - sheep, goat and cattle. For some time now, cocoa has been a major cash crop produced by many farmers in the district. The target group for the study was mainly cocoa farmers who have been into production for at least ten (10) years.

### **Sampling Techniques**

Accepting 10% error at 90% confidence level, a sample size of 120 cocoa farmers was estimated using the formula below:

$$S = (z/e)^2$$

Where:

S = sample size

Z = degree of confidence (in this case 90% → 1.64)

e = the accepted error as a proportion of the standard deviation (in this case 10%)

Judgemental sampling technique was used to select twelve communities to make sure that at least every corner of the district was fairly represented in the study. Random sampling method was then used to select ten cocoa farmers from each of the twelve communities selected. Well structured questionnaires made up of both open ended and close ended questions, were used to solicit the information needed to pursue the objectives of the research. The questionnaires were pre-tested to ascertain their validity and the necessary changes made to ensure accurate data collection. A team of enumerators administered the questionnaires by interpreted the questions for farmers in their own language for necessary response.

### **Analytical Procedure**

Descriptive analysis of the data was executed using frequency, percentages, and pictograms such as bar chart and pie chart. Inferential statistics mainly Z-statistic was used to test difference between the means of socio-economic indicators 'before' and 'after' the CODAPEC programme to determine its impact. Correlation analysis was also conducted to find out the relationship between output of cocoa production and personal characteristics. Impact of the CODAPEC project was determined using 'before' and 'after' comparison. To make them comparable over the period all monetary values were deflated to get their real values. Consumer Price Index (CPI) of 1997 base year was used to deflate monetary values using the following formula.

$$\text{Real Value} = \frac{\text{Nominal value}}{\text{CPI}_n/\text{CPI}_0}$$

Where

CPI<sub>n</sub> = Consumer Price Index at the current year

CPI<sub>0</sub> = Consumer Price Index at the base year

### ***'Before' and 'After' Comparison***

'Before' and 'After' comparison, recommended by Gittinger (1982) as one of the approaches used to isolate the changes arising from an intervention, was used to compare farmers well being before inception of the CODAPEC and afterwards. He has recommended the 'With' and 'Without' comparison as the more appropriate tool for this purpose because of its ability to take care of the changes inherent in a project and those identified by Maitima, Rodriguez, kshatriya and Mugatha (2007) as arising out of external factors that are not related to the project. In conducting *ex post* impact assessment, Swallow (2000); Shaw (2003) used a combination of the two approaches to generate a counterfactual for comparison that is devoid of changes arising out of external factors that are not related to the project. However, since all the cocoa farmers across the country were beneficiaries of the project, combining the two approaches was untenable. Hence 'before' and 'after' comparison became the next appropriate tool for determining the impact of CODAPEC.

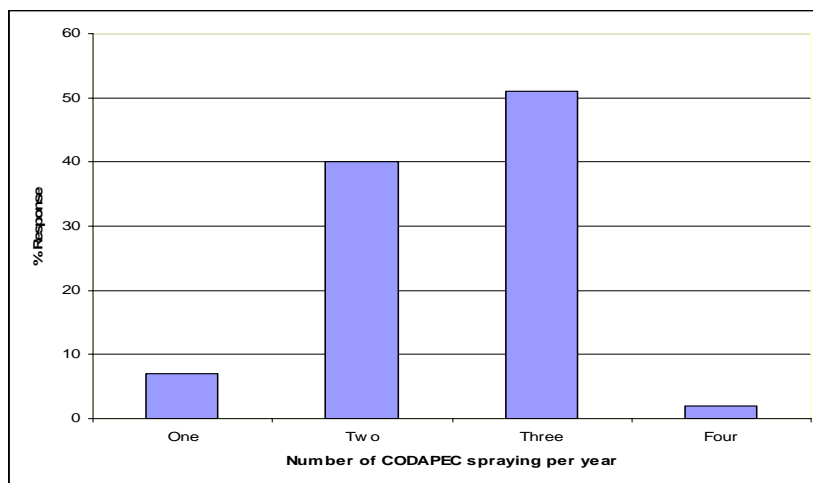
## RESULTS AND DISCUSSIONS

### The CODAPEC Spraying Project

The effectiveness of the spraying programme was assessed by looking at the frequency of spraying per year and farmers' perception of the effectiveness of the programme.

#### *CODAPEC Spraying Periods and Frequency of Spray*

Frequency of spray is depicted in Figure 1. Majority of the farmers had their farms sprayed three times a year. This is closer to the four times recommended by COCOBOD.



Source: Survey data, 2009

**Figure 1: Frequency of CODAPEC spraying per year**

However, only 3 out of 120 farmers had their farms sprayed four times a year. This observation was expected to have militated against the intended objective of the programme.

It is recommended by The Cocoa Research Institute of Ghana (CRIG) that pesticide be sprayed on cocoa from July to September and November. Table 1, however, indicates that not all the farmers had their cocoa farms sprayed within each of the four months when insect and fungus infestation is high.

**Table 1: CODAPEC Spraying Period**

Period of Spraying	Frequency	%
July	45	38
August	58	48
September	71	59
November	21	17

Source: Survey data, 2009.

The project failed to reach its full potential since it was not able to fully fulfil its spraying mandate.

#### *Farmers' Perception of CODAPEC Spraying Programme*

Farmers' perception of the CODAPEC spraying programme was assessed. Table 2 shows that a little over half of the farmers (58%) rated the exercise as effective, while 24% claimed it was very effective.

**Table 2: Farmers Perception of CODAPEC Programme**

Perception	Frequency	%
Not effective	21	18
Effective	70	58
Very effective	29	24
Total	120	100

Source: Survey data, 2009.

About three quarters of the respondents did not consider the programme as very effective. This observation stemmed from inefficiencies spelt out in Table 3.

#### ***Inefficiencies in CODAPEC Spraying Programme***

Though majority of farmers perceived the project as effective, they enumerated a number of inefficiencies that saddled the project.

**Table 3: Inefficiencies in CODAPEC Spraying Programme**

Setback	Frequency	%
Some farms are not spray at all	69	57
Delayed spraying	24	20
Stealing of pesticides by gangs	10	8
Inadequate supply of fuel for spraying	7	6
Insufficient spraying frequency per year	6	5
Insufficient spraying personnel	3	3
Insufficient supply of pesticides	1	1
Total	120	100

Source: Survey data, 2009.

As is seen in Table 3, more than half of the farmers indicated that some cocoa farms were not sprayed at all over the first five years of the project. Delayed spraying was also identified as major setback.

#### **Cocoa Production Trend in Ahafo-Ano South District**

Trend in cocoa production over the years was found to be influenced by age of farmer, experience in cocoa production and farmer's educational level as is presented in Table 4. The correlation co-efficient of -0.181 indicates a degree of association between the age of farmer and output of cocoa produced. The correlation indicated an inverse relationship between the age of a farmer and his or her output in cocoa production. At old age farmers might not be physically strong to tend their cocoa farms. Positive correlation co-efficient of 0.321 between experience in cocoa production and output is an indication that, as farmers' experience increased they are better able to correct their mistakes, adopt new technology and become more productive.

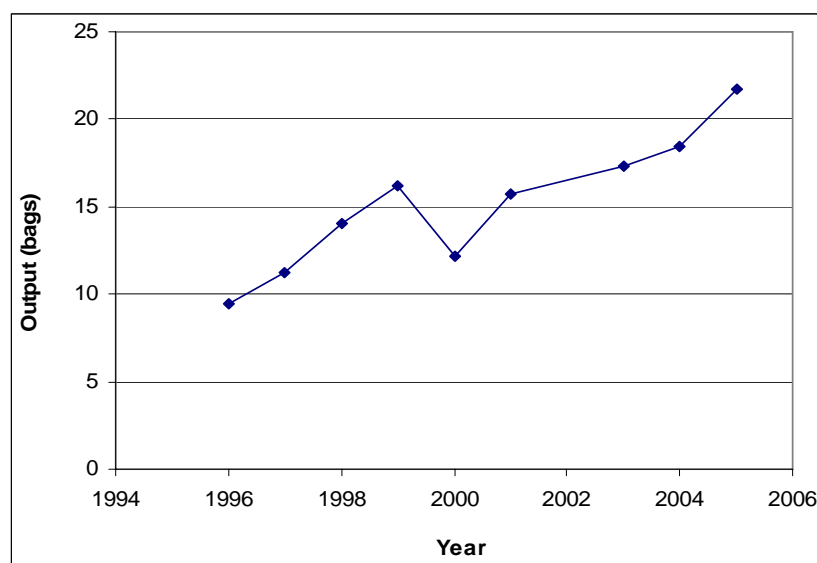
**Table 4: Correlation between output of cocoa and personal characteristics**

Matrix	Output of cocoa	Age of Farmer	Years in cocoa production	Years in education
<b>Age of farmer</b>				
Pearson correlation	-0.181**	1.00		
Significant (2-tailed)	0.47	–		
N	120	120		
<b>Number of Years in Cocoa Production</b>				
Pearson correlation	0.321***		1.00	
Significant (2-tailed)	0.000		–	
N	120		120	
<b>Years in Education</b>				
Pearson Correlation	0.215**			1.00
Significant (2-tailed)	0.18			–
N	120			120

Source: Survey data, 2009 \*\*\*Correlation is significant at 0.01 level; \*\*Correlation is significant at 0.05 level

There was a positive correlation coefficient of 0.215 between farmers’ level of education and output indicating that as farmers’ years in education increased, output realised from cocoa production increased. Farmers’ ability to read and write enabled them to select appropriate planting methods, adopt cultural practices, manage their expenditure and improve their productivity.

Cocoa production, five years before the intervention as shown in Figure 2, was increasing. It started declining in the year 2000 just before the onset of CODAPEC. This might have stemmed from high incidence of diseases and pests.



Source: Survey data, 2009

**Figure 2: Trend in cocoa production over the ten year period**

CODAPEC brought a remediation in 2001 and cocoa production started picking up. It took three years after the intervention before cocoa production caught up with the previous peak in 1999. It can be stated that the CODAPEC spraying programme was timely in rescuing the declining cocoa production in the year 2000.

**Farmers Income from Cocoa**

As cocoa production level increased gradually over the ten-year period, nominal income obtained from cocoa increased rapidly as a result of annual upward review of cocoa prices. Table 5 shows the nominal as well as real incomes over the ten-year period. Annual incomes from cocoa were deflated using the 1997 base year set by Ghana Statistical Services (GSS). It was, however, noticed that a wide inflationary gap existed between the nominal and real incomes.

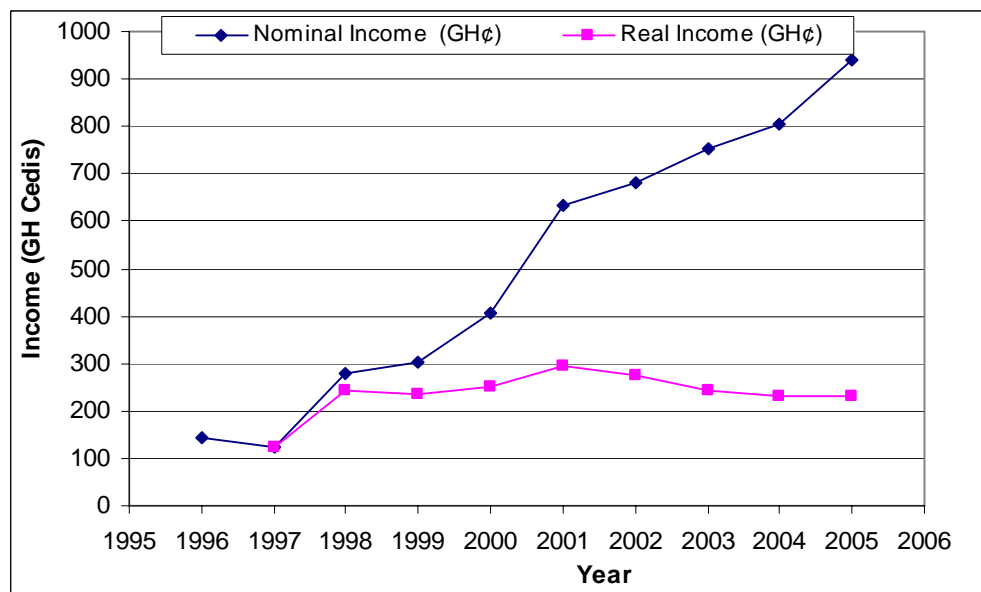
**Table 5: Farmers Income from Cocoa**

Year	Nominal Income from Cocoa (GH¢)	Consumer Price Index (CPI)	$CPI_n/CPI_o$	Real Income from Cocoa (GH¢) = <u>Nominal value</u> CPI /CPI
1996	144.93	-	-	-
1997	121.73	100.00	1.0000	121.73
1998	278.21	114.62	1.1462	242.73
1999	300.83	128.89	1.2889	233.40
2000	407.24	161.31	1.6131	252.46
<b>Mean</b>				<b>212.58</b>
2001	631.50	216.39	2.1439	294.56
2002	679.93	246.15	2.4615	276.23
2003	753.34	311.81	3.1181	241.61
2004	805.49	351.19	3.5119	229.36
2005	939.34	404.27	4.0429	232.34
<b>Mean</b>				<b>254.82</b>

Source: Survey data, 2009; Ghana Statistical Service (GSS) data files, 2007

$CPI_n$  = Consumer Price Index of the current year;  $CPI_o$  = Consumer Price Index of the base year (1997)

Figures 2 and 3 indicate that as the rate of increase in nominal income, over the period, was tremendously higher than that in the output level of cocoa, real income decreased rather. The inflationary gap was predominant and widened over the period weakening the purchasing power of farmers. The project could not impact positively on the socio-economic lives of farmers as a result of increasing inflationary component of their income. Their real income depreciated over the first five year period of the programme making them worse-off.



Source: Survey data, 2009

**Figure 3: Inflationary effect on income from cocoa**

### Living Standard of Cocoa Farmers

The socio-economic life of farmers was assessed to determine how CODAPEC spraying programme has impacted on the farmers.

#### *Access to Quality Basic Education*

Farmers, appreciating the importance of education, invested in their children's education by taking them to school. Children access to quality basic education, over the period, is depicted in Table 6.

**Table 6: Access to Quality Basic Education**

	Before		After	
	Statistic	percentage	statistic	Percentage
Average no. of school going children	4.30	-	4.50	-
Average no. of school going children in public school	2.7	62.8	2.9	64.4
Average no. of school children in private school	1.6	37.2	1.6	35.5

Source: Survey data, 2009.

The general observation was that, the CODAPEC spraying intervention did not bring any significant change in access to quality basic education.

#### *Access to Basic Educational Needs*

To achieve higher educational standard there is the need to provide children with basic educational needs like school uniform, bags, pens, pencils, books, footwear, and other relevant materials.



**Table 7: Household ability to provide basic educational needs**

Basic needs	Before		After	
	Frequency	Percentage	Frequency	Percentage
School Uniform	67	55.8	91	75.8
School Bags, Pens, Pencils	64	53.3	89	74.2
Books	57	47.5	77	64.2
Footwear	59	49.2	81	67.5

Source: Survey data, 2009.

As is evident in Table 7, a little over half of the farmers' were able to provide their wards with school uniform before the CODAPEC programme and this increased to 75.8% after the programme. The willingness and ability of farmers to provide their children with basic educational needs increased after the project probably due to increased commitment to child education. It can be concluded that the CODAPEC intervention has improved households commitment to providing quality child education.

#### *Access to Health Care*

The commonest diseases affecting the farmers were malaria, headache and typhoid. The farmers had three major mode of treating ailments. It was observed, as in Table 8, that even before the CODAPEC spraying programme, majority (59.2%) of the farmers preferred treatment at the hospital which is the proven method of treating ailments.

**Table 8: Treatment of Common Diseases in the Communities**

Treatment	Before		After	
	Frequency	%	Frequency	%
Self Medication	28	23.3	28	23.3
Hospital	71	59.2	82	68.3
Herbal Treatment	15	12.5	7	5.8

Source: Survey data, 2009.

After the inception of the programme, farmers who accessed treatment at hospitals increased to 68%. This indicated an improvement in access to health care brought about by the CODAPEC intervention. Self medication and herbal treatment reduced after the intervention giving way to medical treatment.

#### *Basic Assets of Cocoa Farmers*

Assets values were deflated using 1997 base year and the result depicted in Table 9. Asset value, five years after the intervention, was not significantly different from that observed before the intervention.

**Table 9: Basic Assets of Cocoa Farmers**

Year	Nominal value of basic assets (GH¢)							Total Real Value (GH¢)
	Radio	Television	Iron	Furniture	Mattress	Vehicle	Total	
1996	14.24	1.35	0.56	5.63	13.41	0.31	35.50	-
1997	0.14	0.00	0.00	0.00	0.06	0.00	0.20	0.20
1998	0.10	0.09	0.00	0.71	0.900	55.83	57.09	49.81
1999	0.16	0.00	0.12	0.17	0.12	23.48	24.05	18.66
2000	0.08	0.00	0.16	0.29	0.00	0.00	0.53	0.33
<b>Mean</b>								<b>17.25</b>

2001	0.33	1.21	0.42	0.15	1.92	37.51	41.54	19.38
2002	8.92	13.42	4.11	19.52	25.80	122.12	193.8	7877
2003	0.21	0.17	0.03	2.50	0.46	0.00	3.37	1.08
2004	0.70	3.58	0.57	2.01	2.50	0.00	9.36	2.67
2005	3.34	14.92	1.47	3.29	2.64	0.21	25.87	6.40
<b>Mean</b>								<b>21.66</b>

Source: Survey data, 2009.

Though the programme brought a significant improvement in cocoa production, farmers did not become better-off in terms of asset acquisition. Whilst their nominal income increased drastically, their purchasing power rather deteriorated due to high inflationary effect.

### CONCLUSION AND RECOMMENDATION

Though majority of farmers perceived the project as effective, they enumerated a number of inefficiencies that saddled the project. The setbacks identified with the programme include delayed spraying, stealing of pesticides by sprayers, insufficient spraying personnel, inadequate supply of fuel for spraying, insufficient spraying frequency and insufficient supply of pesticides. In spite of its numerous setbacks, farmers' preferred its continuity.

Cocoa production has started declining in the year 2000 just before the onset of CODAPEC. The programme was able to resuscitate cocoa production in Ghana by raising output tremendously. The incremental benefit brought about by the programme was overwhelming for farmers with higher level of education. This increase in output coupled with annual upward review in cocoa prices, over the first five years of the programme, did not translate into increasing farmers' real income due to pronounced inflationary effect. As a result of this the programme could not improve farmers' purchasing power and their socio-economic life did not improve.

Implementing the following recommendations will help improve the efficiency of the programme and make it result oriented.

- Since the project is on-going, it is advisable for CODAPEC to closely monitor the spraying gangs and also encourage farmers to report periodically on the project
- Separate institution should be established at the district level to address numerous problems faced by both farmers and spraying gangs, and inject efficiency into the programme
- The farmers should be sensitized on the need to adopt recommended agronomic practices, besides CODAPEC spraying, on their cocoa farms to improve productivity
- Subsequent spraying exercises should be accompanied with provision of non-formal education to enable farmers appreciate the need to adopt good agronomic practices
- Producer price of cocoa should be periodically reviewed to compensate for increase in general price levels in the economy. This will improve the purchasing power of farmers

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