



# Can Income Diversification be a Leading Tool for Improving the Livelihood in Rural Areas? Lessons Learned from a Region in the Center of Benin (West Africa)

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## Abstract

Income improving is a key component for poverty reduction and economic development strategy in rural areas where it, unfortunately, remains a real challenge. In the present study we analyzed the impacts of income diversification on the livelihood on people in rural areas of central part of Benin. For this purpose, 120 producers were randomly selected in four villages of the center of Benin and diverse analytical tools including farm income statement, multi-linear regression and multinomial logistic model were used. The results showed that diversification has a positive effect on the total annual income of farmers. Moreover, our results showed that the total income of farmers was significantly influenced by the size of their farm, the sex of the farmers, their regular contact with extension services and their involvement in some off-farm activities. Among factors that influenced farmers' decision to diversify their income-generating activities, access to land was the only one factor that had a significant effect. By providing to farmers an additional income of 1.31 \$/day (corresponding to 41 percentage of their total income), income diversification reinforces the purchasing power of farmers and can, therefore, contribute to farmer's poverty reduction.

## Introduction

Income diversification occurs in developed as well as in developing countries (Maxwell, 1995; de Haan, 1997; Moser, 1998; Ellis, 1998). This practice is; however, much widespread in poor countries because of the precariousness of farm earnings since farming is the main economic activity in these countries (Courade and Devèze, 2006). Usually, income diversification strategies are implemented ex-ante to reduce income risk, and ex-post to maintain food security in response to low farm productivity and income shocks such as

drought. These strategies are also implemented to mitigate market uncertainty while earning cash income to finance farm investments to supply for the lack of credit (Reardon, 1997). In West Africa, the majority of people belong to rural communities and have, due to low farm productivity, difficulties to permanently assure food security for their families and thereby improve their living conditions (Courade and Devèze, 2006). Income diversification is therefore undertaken by farmers as a strategy to overcome the diverse

constraints faced by them in their daily needs. In Benin, many risks and uncertainties related to agriculture that remains the main employment and income source (PAM, 2014), constitute a constant threat to the livelihood of the populations in rural areas (Lawin *et al.*, 2012; CEDEAO, 2013). This phenomenon is particularly observed in the central part of Benin where perverse effects of climate change and the rising land pressure have nowadays considerably affected the potential of the agriculture in terms of employment and income, thereby considerably worsening the living conditions of the populations. The current situation in this region is characterized by the dominance of very small-scale farms resulting from the traditional land inheritance policy. This is coupled with low farm productivity, a lack of access to credit and to basic social services, the emergence of a class of landless farmers and an increase of rural exodus (PAM, 2014). For their survival, people in rural areas are constrained to resort to the income diversification by simultaneously undertaking many economic activities. Although income diversification is current in Benin, studies that give deep insights into its impact are very rare. Recent studies in the country tackled the question of income diversification but did not do more than analyzing the problematic of climate change and its related adaptation strategies developed by farmers to maintain their income (Ganglè *et al.*, 2012; Yegbemey *et al.*, 2014). More studies are therefore necessary to better understand the economic and social importance of income diversification in Benin. In that respect, the present study aims at highlighting the role of income diversification in the livelihood of farmers in the center of Benin, and will help determining whether farmers really improve their living conditions by diversifying their income. The results from the study could be of great importance for researchers, policy-makers and development organizations interested by the questions

of agricultural development and poverty alleviation in rural areas.

## Review of Literature

The large number of studies devoted to income diversification witness the interest that many authors have given to this topic (Ellis, 2000; Barrett *et al.*, 2001; Courade and Devèze, 2006; Yaro, 2006; Olale and Henson, 2013; Alobo Loison, 2015). The understanding of the concept of “Income Diversification” varies, however, from an author to the other, as there is no universal definition for this terminology (Barrett *et al.*, 2001). Considered by Olale and Henson (2013), as the multiplication of the sources of income or income generating activities, income diversification refers, according to Alobo Loison (2015), to income strategies of rural individuals or households by which they increase the number of their activities regardless of the sector and the localization. As for Meraner *et al.* (2015), they considered “Income Diversification” as a reallocation and a recombination of agricultural resources far from the basic farm activity to generate another form of income, while Reardon (1997) defined “Income Diversification” as an allocation of the family labor outside the farm in order to face food security, shocks on income and market failures. But since very few people collect all their income from a single source, hold all their wealth in the form of a single asset, or use their assets in just one activity, diversification is, according to Barrett *et al.* (2001) the norm.

Relying on these authors, one can consider income diversification as the fact of devoting oneself to many economic activities at the same time for generating substantial incomes. Income Diversification is, therefore, synonym to “pluriactivity” (Gondard-Delcroix, 2009) or additional employments (Phélinas,

2004). It harbors the idea of a survival strategy (Alobo Loison, 2015), risks management strategy (Gondard-Delcroix, 2009), adjustment (Barbieri and Mohaney, 2009), or still a tool for reducing the vulnerability of the livelihoods ((Niehof, 2004) by enlarging the base of the farm income (Meert *et al.*, 2005). Income diversification should, however, not be assimilated to livelihood diversification that is rather a process by which farm households build a portfolio of various activities and possibilities of social support in order to survive and to improve their living standard (Ellis, 2000a).

The decision of a farmer to diversify his activities is often determined by ‘push’ as well as ‘pull’ factors. ‘Push’ factors are generally considered as negative factors that constraint the farm households to resort to additional employments within their farms or outside theses (Alobo Loison, 2015). The push factors tend to prevail in agricultural areas with low potential and that are subjected to drought, flood and other environmental degradation events (Haggblade *et al.*, 2007). Some of these factors are often connected to different forms of risks, such as seasonality and climatic uncertainties. Others are related to land pressure, lack or insufficiency of market factors and to problems of market access (Ellis, 2000b; Barrett *et al.*, 2001). Besides differences among diverse agro-climatic regions that can be a source of income diversification (Reardon, 1997), social factors such as social positions, networks, religion and culture (Ellis, 1998), but also some social inequalities, restriction of work market opportunities, and limited access to main resources for women (Oya, 2007; Alobo Loison, 2015) can be important causes of income diversification. These factors induce, therefore, a form of income diversification called in the literature the “survival based diversification” (Ellis, 1998; Barrett *et al.*, 2001;

Reardon *et al.*, 2007; Lay *et al.*, 2008) whose aim is to manage risks, and to compensate the low resources endowment of the households. Some of the push factors are also linked to the absence of formal education and required skills that often constraint some households to carry-out labor intensive off-farm activities with low remuneration, dragging them into the trap of the structural poverty; whereas rich households tend to specialize in farm or off-farm activities with high income potential (Ellis, 1998; Losch *et al.*, 2012).

In contrast, ‘Pull’ factors represent the attraction or incentive factors that bring farm households to undertake income diversification for improving their living standard (Alobo Loison, 2015). Such factors tend to prevail in less-risky and dynamic farm regions (Haggblade *et al.*, 2007). Commercialization of farm products and emergence of opportunities of off-farm works markets, make up some pull factors. Supply factors such as improved technology, expansion of education, and increased demand for non-food products and services are also considered as pull factors (Reardon *et al.*, 2007; Losch *et al.*, 2012). In respect to these factors, income diversification is viewed as a strategy that is deliberately chosen by households to generate goods for accumulation and reinvestment (Ellis, 2000b). Through this income diversification called “opportunities-based diversification” wealthy households get involved in high-return off-farm activities, favorable work markets, or take advantage of opportunities provided by technological progress, possibilities of new markets or the proximity of urban centers or improved infrastructures (Lay *et al.*, 2008; Losch *et al.*, 2012).

Regardless of the type of factors, income diversification has some impact in rural areas. Many studies reported that there is, for instance in Africa, a

positive relation between the non-farm income, the consumption, the nutrition and some welfare indicators of the households (Ellis, 1998; Barrett *et al.*, 2001; Ellis, 2005). Barret (2005) found that income diversification in rural African areas results in higher income and greater income mobility. Moreover, findings in Burkina Faso and in Senegal show that income diversification through non-farm activities has a positive impact on the farm productivity and food security. Therefore, farm households that lack non-farm incomes become more vulnerable and their food security is more threatened by seasonal changes (Alobo Loison, 2015). Although the impact of income diversification strategies on income growth in the farm households is easily renowned, its impact on income distribution in rural areas remains, however, mitigated.

In some cases non-farm activities reduce the inequality whereas in other cases they tend to increase this inequality (Reardon, 1997; Barrett *et al.*, 2001; Haggblade *et al.*, 2005), especially where high-return non-farm activities are unequally distributed in favour of relatively richer households (Canagarajah *et al.*, 2001). This suggests that increasing the equal access of poor households to high-return non-farm activities could help improving outcomes and incomes for disadvantaged populations thereby reducing income inequality in rural areas.

It results from all these findings in the literature that income diversification holds a considerable potential for growth and poverty reduction. By analyzing not just whether income diversification in Benin offers this potential, but also whether local people have the capacity of really taking advantage from it, the present study will greatly complement past studies for better understanding what is viewed by some authors as a pathway out of poverty.

## **Empirical Approaches for Analyzing Income Diversification**

There are two approaches commonly used in the economic literature to analyse income diversification: the household economic model (Singh *et al.*, 1986; Ellis, 1993) and the livelihood approach (Chambers and Conway, 1992; Scoones, 2009).

The household economic model considers the household as a production unit that maximizes its utility by combining labor and other inputs to produce output that is subject to prices and resource constraints (Ellis, 2000a). Income diversification is therefore, viewed as a function of the remuneration of the labor from farm activities compared to off-farm activities (Singh *et al.* 1986). Given a set of resource, the farm household makes its choices by comparing the return from the use of its labor in the farm activity to the return that could result from the off-farm activities (Yaro, 2006). It is assumed, therefore, that increases in off-farm incomes will provide incentives for farm households to diversify their activities. According to Ellis (1998; 2000a), the approach failed to take into account the inter-temporal dimensions of livelihoods and failed also to capture survival strategies of households under stress. Moreover, the approach has been criticized for not considering the social relationships among household's members which, in many cases, have a strong influence on the choices made by the household. In reality, division of responsibilities and tasks between men and women in the household affects their production decision and income distribution (Ellis, 1993). Because the approach assumes that markets are perfectly functioning, it has been also criticized to simplify reality, since in developing countries, households are frequently exposed to incomplete or imperfect markets that limit their choices and thus affect their behavior (Ellis, 1993;

De Janvry and Sadoulet, 2006).

In contrast, the livelihood approach commonly employs the sustainable livelihoods framework to assess people's livelihood assets and how the external environment of social relations, institutions, organizations, policies, seasonality, trends and shocks modify access to and ability to convert livelihood assets into livelihood outcomes (Ansoms and McKay, 2010; Vedeld *al.*, 2012). The livelihood approach takes a more people-centered view on the study of rural livelihoods in different contexts, even under stress (Alobo Loiso, 2015). The approach has its strength in recognizing the multiple and diverse characters of livelihood (Ellis, 1998; 2000a). Furthermore, it accounts for the influence of institutions on livelihoods and the social and economic characters of livelihood strategies (Ellis, 2000b; Ellis and Freeman, 2004). The approach has been widely used in empirical studies of livelihood strategies and adaptation and livelihood diversification (Ellis, 2000a; 2000b). Despite its strength, the approach has been, however, criticized because many of its components are difficult to measure and often require the use of proxy indicators, which are sometimes difficult to find. Moreover, the approach also failed to account for prices and wages, which are necessary when comparing the costs and benefits of different livelihood outcomes (Barret and Reardon, 2000).

For this present study, it is the household economic model or the utility maximization model that is relevant. The research unit was, however, not the household but the individual farmer. Therefore, one can suppose that a farmer will diversify his income if the expected utility of diversifying income is higher than the expected utility of specializing in a particular activity. But because the utility is unobservable, one can be interesting in the impact of income

diversification on total income in place of utility. Following Olale and Henson (2013), the impact of income diversification on a farmer's income can, therefore, be specified as follows:

$$NR_i = R_{i1} - R_{i0} \quad (1)$$

Where  $NR_i$  is the net income of the farmer  $i$ , as a result of diversifying income via non-farm work;  $R_{i1}$  is the total income when farmer  $i$  engages himself into non-farm activities; and  $R_{i0}$  is the total income if farmer  $i$  specializes in farm work.

## Methodology

Many methods were used in the present study for analyzing the income diversification in the study area.

### Income Diversification Impact Analysis

In a first step, we used the income statement of each activity carried-out by each farmer and then, we estimated his total off-farm income and his total farm income. Both income parts were used to estimate the total income of the farmer. The income diversification impact has been evaluated by using the method described in section 3. For highlighting the relative importance of the income diversification impact, we estimated the share of the income in the diversification in relation to the total income of the farmer, as follows:

### Impact of the income diversification in percent =

$$\frac{R_{id}}{R_{it}} \times 100 \quad (2)$$

Where,  $R_{id}$  is the income from the diversification of farmer  $i$ ; and  $R_{it}$  is his total income.

### Determinants of the Farmer's Income

By assuming that income level of farmers is function of

$$\bar{Y} = E(Y|X_1, \dots, X_p) = \beta_0 + \beta_1 X_1 + \dots + \beta_p X_p = \beta_0 + \sum_{k=1}^m \beta_k X_{ki} + \sum_{k=(m+1)}^{l=p} \beta_k X_{ki} + \mu_i \quad (3)$$

Where,  $\bar{Y}$  is the average total income;  $K=1, 2, m, m+1, \dots, p$  et  $X_{1i}, X_{2i}, \dots, X_{mi}$  are the quantitative variables;  $X_{(m+1)i}, X_{(m+2)i}, \dots, X_{pi}$  are the qualitative variables related to the farmers;  $\beta_k$  are the parameters

$$\ln(\bar{Y}_i) = \beta_0 + \left[ \sum_{k=1}^n \beta_k \ln(X_{ki}) \right] + \left[ \sum_{k=(n+1)}^l \beta_k X_{ki} \right] + u_i \quad (4)$$

With  $\ln(\bar{Y}_i)$  is the logarithm of the average income of the  $i^{\text{th}}$  farmer;  $\beta_k$  are the factor-elasticity of the average income for quantitative variables, when  $k$  varies from 1 to  $n$ .

From the explanatory variables described in table 1,

$$\ln(\bar{Y}_i) = \beta_0 + \beta_1 \ln(\text{Farmsize}_i) + \beta_2 \ln(\text{Householdsize}_i) + \beta_3 \ln(\text{Age}_i) + \beta_4 (\text{Educationlev}_i) + \beta_5 (\text{Farmorganization}_i) + \beta_6 (\text{Sex}_i) + \beta_7 (\text{Landaccess}_i) + \mu_i \quad (5)$$

Where  $\bar{Y}_i$  stands for the average income of the  $i^{\text{th}}$  farmer; Farm size <sub>$i$</sub>  is the size of the farm in ha; Active members is the number of the active household members; Age is the age of the  $i^{\text{th}}$  farmer; Education Le <sub>$vi$</sub>  stands for educational level;

Farm organization is the membership of farmer's organization; Sex <sub>$i$</sub>  is the sex of the  $i^{\text{th}}$  farmer; and Land access stands for the access of the  $i^{\text{th}}$  farmer to land; The  $\mu_i$  indicate the error terms, assumed to be normally distributed  $N(0, \sigma)$ ; and the  $\beta$  are estimates to be determined. The estimates  $\beta_1$  to  $\beta_3$  directly give the factor-elasticity of the average income for the

some factors related to the farm such as the farm size, and some socioeconomic factors of the farmers, namely, age, sex, education level, and land access, it can therefore be mathematically expressed as:

to be estimated; and  $\mu_i$  are the error terms. Applying the natural logarithm function to the quantitative variables of equation 3, we obtain the following equation:

and whose choice was based on Demeke (2003) and Gujarati (2004), and the personal observations in the study area, the complete equation of the empirical model can be expressed as follows:

quantitative variables, and  $\beta_1$  to  $\beta_3$  allow knowing the change in percentage of the income when an explanatory dummy variable varies from one modality to another. According to Gujarati (2004) this change corresponds to  $(e^{\alpha_i} - 1) \times 100$ . Therefore, for an explanatory dummy variable  $X$ , the model equation is  $\ln Y_i = \alpha_0 + \alpha_1 X_i$ . When  $X$  varies from 0 to 1,  $Y_i$  varies from 1 to  $e^{\alpha_i}$ , and the variation change in percentage of  $Y_i$  is given by  $(e^{\alpha_i} - 1) \times 100$ .

### Determinants of the Farmers' Decision to Diversify In Specific Activities

Considering the household economic model, one can assume that the decision for income diversification is based on the rational choice made by each farmer. Moreover, one supposes that the farmer has a perfect discernment capacity between many strategies of risk management (Meraner *et al.*, 2015). This implies that the choice of the optimal strategy made by each farmer reflects his utility maximization option and by doing so, the observable diversification choices are always the optimal ones. However, as the true utility function cannot be directly observed, one can, therefore, suppose that the observable optimal choice is a linear function of the socio-demographic and economic characteristics of both the farm and the farmers' (Meraner *et al.*, 2015). Based on this knowledge, we analyzed the decision to diversify specific activities in relation to farm activity by using a multinomial logit model, whose logic of construction follows that of the binary choice model.

### Specification of the Binary Choice Model

Following Meraner *et al.* (2015), the general diversification decision can be interpreted as choosing a binary model. Therefore, the latent utility difference between the diversification and non-diversification  $y_i^*$  is supposed to be determined by a linear function of observed characteristics and a non-observable error term  $\varepsilon_i$ .

$$y_i^* = \beta_1 x_i + \varepsilon_i \quad \varepsilon_i \sim \text{Logistique} (0, 1)$$

(6)

$$\text{With } y_i = \begin{cases} 1 & \text{si } y_i^* > 0 \\ 0 & \text{si } y_i^* < 0 \end{cases}$$

Where,  $x_i$  represents a vector of socio-demographic and

economic characteristics; and  $\varepsilon_i$  is the error term assumed to follow a standard logistic distribution. The probability that the observable dependent variable  $y_i$  is one equals the probability that the utility difference is positive.

### Specification of the Specific Diversification Activity Model

The probability to adopt a specific diversification activity can be modelled as a separate binary choice model for each activity (see equation 6). But here,  $y_i^*$  describes the unobserved difference between the utility obtained from the specific activity and the utility gained from any other diversification activity. In that respect, both farm and off-farm activities ( $j=1$ ), only off-farm activities ( $j=2$ ), and farm activity ( $j=0$ ) are used to simultaneously estimate utility differences among the groups of activities. As stated by Verbeek (2008) and Meraner *et al.* (2015), the multinomial choice model is constructed using a latent variable indicating the difference in utility gained from each possible group of activities.

$$y_i^* = \beta_{ij} x_{ij} + \varepsilon_{ij} \quad \varepsilon_{ij} \sim \text{Logistique} (0, \sum) \text{ et } j = (1..2) \quad (7)$$

$$\text{With } y_i = \begin{cases} 1 & \text{si } y_{i1}^* > 0 \\ 2 & \text{si } y_{i2}^* > 0 \\ 0 & \text{otherwise} \end{cases}$$

Where,  $\beta_{ij}$  is a vector of parameters specific to the  $j$ -th alternative associated with the vector  $x_{ij}$ , which contains the observable farm's and farmers characteristics; and  $\varepsilon_{ij}$  are the error terms, assumed to be multivariate normally distributed with mean zero.

**Table 1: Variables Introduced in the Two Models**

Model	Variables	Modalities	Hypothèses	Expected Signs	Related literature to the hypotheses
1 and 2	Age	Quantitative	Younger farmers diversify more their activities and generated more income	+	Meraner <i>et al.</i> (2015)
1 and 2	Sex	Qualitative 1 if farmer is a man 0 if not	The women devote themselves more to the diversification. It results however from their activities relative low incomes.	+/-	Niehof (2004) Degla (2001)
1 and 2	Education level	Qualitative 1 if farmer is educated 0 if not	The educated farmers diversify more their activities and generate a relative high income level.	+	Cinner <i>et al.</i> (2010)
1 and 2	Household size	Quantitative	More the size of the household, more the farmers devote themselves to the diversification and more is the generated income.	+	Nilsson (2002) Hassink <i>et al.</i> (2007) Meraner <i>et al.</i> (2015)
1 and 2	Farm size	Quantitative	More the size of the farm, less the farmers diversify, generating however a relative high income level.	-/+	Mishra <i>et al.</i> 2004 Meraner <i>et al.</i> (2015)
1 and 2	Membership of a farm organization	Qualitative 1 if farmer is member of a farm organization 0 if not	The membership of a farmer organization favours the diversification and the realizing of a relative high income level.	+	Olale et Henson (2013)
1 and 2	Access to land	Qualitative 1 if farmer has difficulty in accessing to land 0 if not	Farmers with strong difficulties for accessing to land diversify more. They generate however a relative low income level.	+/-	Degla (2001)
2	Off-farm income	Quantitative	Higher the expected income from the off-farm activities, more the farmers diversify, and higher is the generated total income	+	Olale et Henson (2013)

### Study Area and Data Base

The study was conducted in two municipalities in the center of Benin, namely Zakpota and Zogbodomey, that were selected because of their importance in farm production. The municipality of Zogbodomey is located between latitudes 6°56' and 7°08' N, and longitudes 1°58' and 2°24' E, whereas Zakpota is located between latitudes 7° 13' 41" N and longitudes

2° 12' 4" E (cf. figure 1). With 70percentage and 55percentage of the households living under the poverty line in Zakpota and Zogbodomey, respectively, the two municipalities count among the poorest municipalities of Benin, and especially among those of the central part of Benin (PAM, 2014). In this region the density of the population, estimated in 2013 to

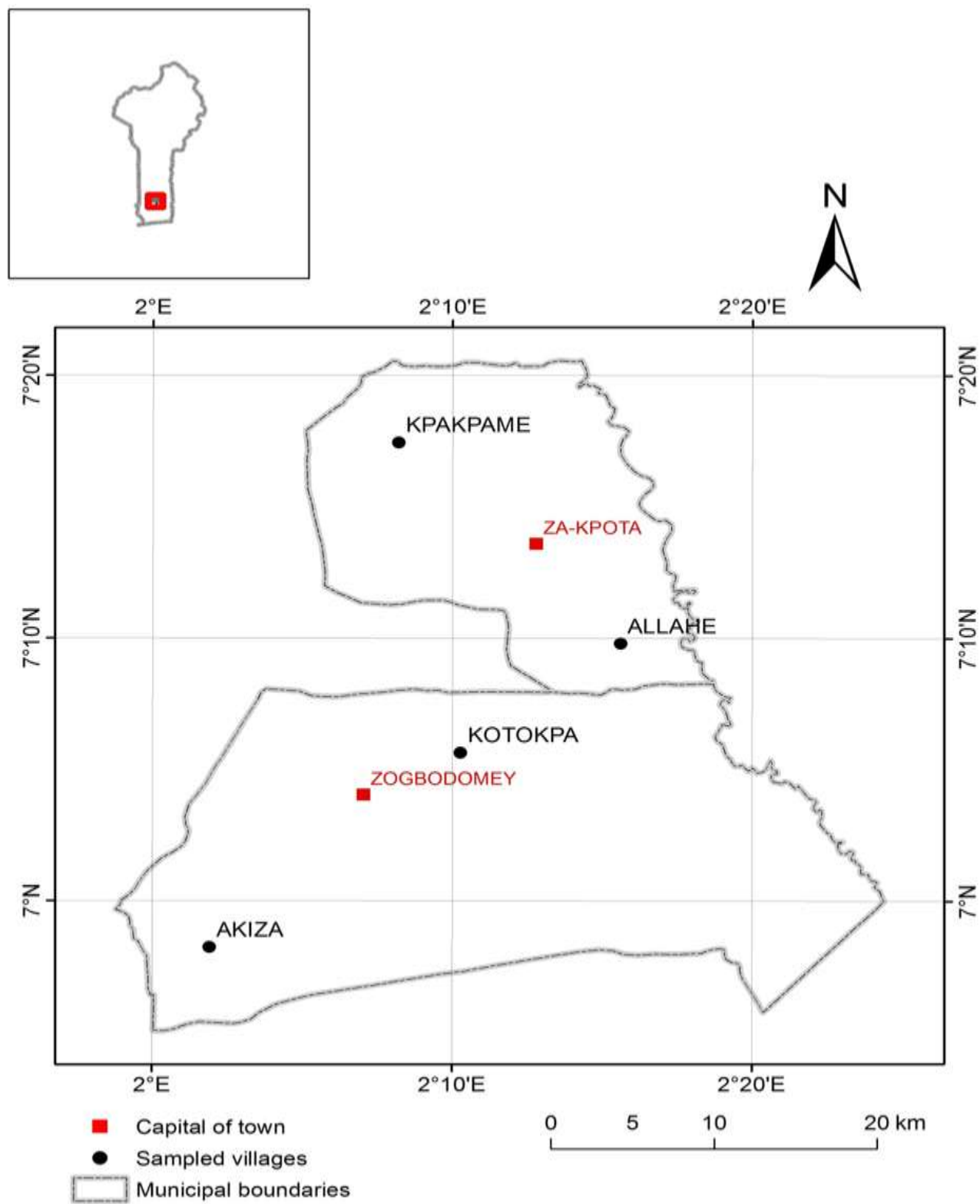


about 434-738 inhabitants/km<sup>2</sup> (which is higher than the national average of 87.2 inhabitants/km<sup>2</sup>), has favored not just land fragmentation through land inheritance practices, but has also induced the emergence of landless farmers. In 2013, more than 61percentage of the farm households had used less than 1.99 ha of land for farming. The farm production that remains until now rain fed and of family type is characterized by a low productivity due to soil impoverishment and traditional land use practices that often do not include the use of mineral fertilizers. For instance, any of the land used in 2013 by more than 72percentage of the farm households in the region has benefitted for mineral fertilization (PAM, 2014). Land pressure, soil impoverishment and uncertainties related to the perverse and much evident effects of climate change during the last years (Nouatin *et al.*, 2014; Yegbemey *et al.*, 2014) have considerably weakened the farm production in its role of the first income source in the study area. According to PAM (2014), the local populations have more and more difficulties to meet their basic needs, and many households are constraint to turn to the income diversification to ensure their survival.

In each municipality, two villages were chosen based on their importance in farm production and in off-farm activities, and also on their accessibility. Then in each village, 30 farmers were randomly selected from a list of farmers built by the local agricultural extension services. The sample was therefore composed of 120 farmers.

To achieve the study objectives, both primary and secondary data were used. The primary data were collected through individual structured survey (on the sampled producers) and focus group discussions. Additionally, some participative observations were used to cross-check the collected information and to

correct evident errors that might occur during the interviews. The secondary data were collected from different documentation sources. The data were analyzed by using SPSS 20 and R statistical package.

**Figure 1: Localization of the Study Area**

## Results

### Demographic and Socioeconomic Characteristics of the Farmers

The main variables which describe the sampled farmers are summarized in Table 2. It comes out from this table that most of the farmers were men (62percentage) and relatively young (38 years  $\pm$  11). Their household is in average composed of 4 actives  $\pm$  3. The average area cultivated by the farmer who had access to land was about 4.71 ha  $\pm$  5.82. Those lands have been acquired

either by inheritance (44percentage), hiring (9percentage), purchasing (3percentage), inheritance and purchasing (11percentage), inheritance and hiring (7percentage), or purchasing and hiring (3percentage). The most landless farmers were women and represented 23percentage of the respondents. Almost all the respondents were married (95percentage) and were in touch with the agricultural extension services (61percentage). Among the farmers, 34percentage had received a formal education and 49percentage belong to a farmer's organization.

**Table 2: Demographic and Socioeconomic Characteristics of the Selected Farmers**

Qualitative variables	Absolute Frequency	Relative Frequency (%)
Sex (Men))	62	52
Married	114	95
Formal education	41	34
Contact with agricultural extension services	73	61
Farmers organisation membership	59	49
Inheritance	53	44
Land purchasing	4	3
Land hiring	11	9
Inheritance and land purchasing	13	11
Inheritance and land hiring	8	7
Land purchasing and hiring	4	3
Landless	27	23
Quantitative variables	Mean	Standard deviation
Age	38	11
Cultivated area	4,71	5,82
Active household members	4	3

### Components of Income Diversification in the Study Area

As already mentioned, income diversification implies that farmers undertake many activities at once. In an analytical purpose we grouped these activities in three categories, namely: farm activities, off-farm activities, and farm and off-farm activities. The diversification can occur either in a category of activities or concern many categories. In contrast to farm activities, non-farm or off-farm activities occur outside of the farm

and concern a range of activities summarized in Table 3. Those activities are either capital or labor intense; the requirement of capital or skill is, however, little for most of them. Many of the activities were low-return.

**Table 3: Different Types of Off-Farm Activities**

Activities	Description	Characteristics	Income potential
<b>Petty-Trade</b>	Trade of farm and/or imported products	Little up high requirement for capital	Low and High-return
<b>Traditional cottage industries</b>	Production of local schnaps from palm wine (Sodabi)	high requirement for capital	High-return
	Processing of cassava into Gari	Little requirement for capital	Low-return
	Processing of palm nuts in palm oil	Little requirement for capital	Low-return
	Processing of bean or soybean into fritter or cakes	Little requirement for capital	Low-return
<b>Rearing</b>	Extensive rearing of small domestic animals	Little requirement for skill and capital	Low-return
<b>Selling of Workforce</b>	Labor intensive works outside of the farm	Little requirement for skill	Low-return
<b>Handicrafts</b>	Unskilled local plaits and baskets factories, burning charcoal or collecting firewood	Little requirement for skill and capital	Low-return
<b>Transport activities</b>	Taxi-moto	High requirement for skill and capital	High-return

Most of the farmers (62percentage) diversify their income sources by combining farm with off-farm activities. Among these farmers 66percentage were men and 34percentage were women (Table 4). The

other farmers were involved either only in farm activities (17percentage), or only in off-farm works (22percentage).

**Table 4: Distribution of the Farmers According To the Category of Activities**

	Farm activity	Off-farm activities	Farm and off-farm activities
<b>All farmers (%)</b>	17	22	62
	from which		
<b>Men (%)</b>	60	4	66
<b>Women (%)</b>	40	96	34

Farmers involved only in off-farm activities were those who had difficulties to access to land or those who have become landless. They usually combined more than two off-farm activities, and this makes their classification difficult when one is interested in the analysis of these activities. For instance, it is common to meet farmers involved simultaneously in rearing of small domestic animals, petty-trade and two or three processing activities. Most of these activities are with little capital or skill requirements and above all low-

returned. Some of them provide lower returns than farming.

### **Factors Influencing the Decision of Engaging In Specific Income Diversification Activities**

The decision of a farmer to undertake specific income diversification activities can be governed by a certain number of demographic and socioeconomic factors related to the producer. The knowledge of these factors

could be of a great importance in analyzing the diversification process. The analysis made based on the fore described theoretical model did not, however, lead to many exploitable results. There are, of course, some factors in relation to the farm production that influence

the decision of the farmers to engage themselves in a specific diversification activity; but their influence is, however, significant only with the access to land (Table 5).

**Table 5: Determinants of the Choice of Specific Income Diversification Activities**

Variables	Farm and off-farm activities	Off farm activity
Constant	-4,382	-6,303**
Sex	-0,082	0,040
Age	0,035	0,067
Formal education	-1,026	-0,416
Active household members	0,418	0,442
Contact with agricultural extension services	-0,712	-0,145
Membership of farmers organisation	0,226	0,987
Cultivated Area (in ha)	-0,074	0,021
Access to land	5,046***	5,667****
Model summary Farm activity is the base outcome Log-likelihood -60,717 ddl : 222 * : ** ; *** ; **** = significant at 10%, 5%, 1% and 0.1% respectively		

Thus, it comes out that when access to land become more difficult, the probability that the farmer decides to diversify his income sources, in relation to the farm activity, increases. This is more so when the farmer owns just a little piece of land or is landless, as he is constrained to devote himself to additional works for assuring his survival. Depending on the type of activity and his financial possibilities, the farmer will choose one of the labor or capital intensive off-farm activities described in table 3, but whose returns are often lower than that from farm production.

### **The Economic and Financial Performance of the Farmers**

The activities summarized in table 3 can be ranged into three income groups that are: farm income, off-farm income, and both farm and off-farm incomes. Thus,

farmers that diversify their activities earned farm and off-farm incomes; those that engaged themselves only in off-farm activities were concerned with off farm incomes and the other ones that didn't diversify obtained only farm incomes (cf. Table 6). From this categorization, it results that the incomes earned vary significantly not only from an income group to the other, but also within the groups.

**Table 6: Distribution of the Average Incomes by Categories of Activities**

Groups of farmers	Number of Farmers	Mean (in FCFA)*	Standard deviation	Error standard	Minimum (in FCFA)	Maximum (in FCFA)
<b>Group 1</b>	20	331 108	395 660	88 472	11 300	1 700 000
<b>Group 2</b>	26	94 180	139 993	25 494	7 000	660 750
<b>Group 3</b>	74	689 510	723 244	84 075	7 460	4 310 000
<b>All Farmers</b>	120	500 788	642 290	58 633	7000	4 310 000
F = 10.566; ddl. =119 ; $p = 0,000$						

Group 1 = farmers with farm activities only

Group 2 = farmers with off-farm activities only

Group 3 = farmers with both farm and off-farm activities

\*= Local money in fix parity with Euro (1Euro = 656 F CFA)

In average, farmers of group 3 realized yearly a total income of  $689\,510 \pm 723\,244$  FCFA. Their average farm income being  $408\,592 \pm 533\,983$  FCFA, one can deduce that diversification have provided them with an average of  $280\,918 \pm 346\,277$  FCFA, that account for 41percentage of their total annual income. Compared to the off-farm income ( $94\,180 \pm 139\,993$  FCFA) for farmers of group 2, the share of off-farm income from the farmers of group 3 is significantly different. Based on their land endowment that averaged  $6.46 \pm 6.38$  ha, and that is relatively higher than the national average (2 ha per person), farmers that diversified their activities in the study area can be considered as wealthy. This let suppose that they undertook off-farm activities not because they were constrained to do it, but only just because they aimed at exploiting evident gain opportunities from off-farm activities such as production of Schnapps (the local spirit), whole trading and intensive rearing of poultry or small ruminants, commonly considered as capital-intensive activities with high returns. In contrast, because the farmers of group 2 were landless, they engaged in off-farm activities such as processing of farm products, hiring of their workforce, petty-trade, unskilled handicrafts and extensive rearing of poultry and small ruminants, known in the study area as labor intensive or little

capitalized activities with very low returns, even lower than the returns from farming (cf. Table 6). So, they resort to those activities just to avoid falling deeper into poverty and, above all, for assuring their survival. When one, however, consider the financial performance of both groups (group 2 and group 3) by comparing, for instance, the internal return rate of their activities, namely the net income in relation to the total cost, it comes out that farmers that diversified their activities (group 3) were not significantly different from farmers of group 2, and were, in contrast, less efficient than farmers of group 1 (Table 7).

**Table 7: Distribution of Internal Return Rates According To the Farmers Groups**

	Internal Return Rate (IRR)		
	Farm activity	Off-farm activities	Farm and off-farm activities
<b>Group 1</b>	9.69	-	-
<b>Group 2</b>	-	2.46	-
<b>Group 3</b>	4.37	3.11	3.79

This difference could be attributed to the higher costs incurred by farmers of group 3 in conducting their off-farm activities. In contrast, there is no significant difference between farmers who diversified (group 3) and those specialized (group 1) when only their farm incomes earned by hectare (i.e. 82 660 FCFA/ha and 83 605 FCFA/ha respectively), were compared.

#### Factors Influencing the Income Level of Farmers

Another point of interest when analyzing the

diversification in rural area could also be the knowledge of the determinants of farmers 'income level. In that respect, and based on the empirical model described in section 4.2, the analysis revealed that farm size in terms of the cultivated area, sex of the farmer, regular contact with agricultural extension services, and engagement in off-farm activities positively influence the level of the annual total income of farmers (cf. Table 8).

**Table 8: Results of the Estimation of the Regression Model**

Variables	Estimates ( $\beta$ )	Standard-error	Student statistic T	Significance probability ( $p$ )
Constant	9.468	1.326	7.155	0.000****
Age (lnAge)	0.237	0.363	0.652	0.516
Cultivated area in ha (lnArea)	0.463	0.125	3.700	0.000****
Sex of the farmer	0.517	0.233	2.221	0.029**
Matrimonial status	0.470	0.623	0.754	0.453
Contact with extension services	0.737	0.210	3,504	0.001***
Membership of a farmer's association	0.034	0.110	0.307	0.760
Engagement in off-farm activities	0.607	0.209	2.905	0.005****
<b>Summary of the model</b> Dependent variable : Ln(Total income) R2 Adjusted: 0.572 Standard Error: 0.81769 Fischer probability: 0.000 Durbin-Watson : 2.074 * : ** : *** : **** = significant at 10%, 5%, 1% and 0,1% respectively				

their activities. More a farmer can use the available

Available cultivable land is, as aforementioned, an important factor in the decision of farmers to diversify

land, more it contributes to the total income that he can

realize. Given that the estimate represents here the partial elasticity, one can deduce that any increase in the use of 1percentage of the available land would, *ceteris paribus*, induce an increase of 0.46percentage of the total income. This increase remains, however, less proportional than that of the cultivated area. The sex of the farmer significantly influences his total income level. By diversifying their activities, men realize more income than women. Therefore, by moving from female to male, the total income is susceptible to increase by 67.70percentage [=100\*(e+0,517-1)]. The regular contact with agricultural extension services has a positive impact on the level of their total income. Through new training's approaches in Benin such as the "Management Advice for Family Farm", farmers

could acquire some important management tools that will enable them to improve the financial and economic performance of their farms. Thus, from a farmer with no contact with extension services to another who regularly benefited from technical support, an increasing of the income of 109percentage [=100\*(e+0,737-1)] can occur. The engagement in off-farm activities positively affects the level of the total income of farmers. In that respect, a farmer who is involved in off-farm activities is, compared to another farmer who does not diversify, is likely to increase his total annual income by 83,43percentage [=100\*(e+0,607-1)]. Such an increase could represent an important contribution to the annual budget of these farmers.

### **Impact of Income Diversification on the Livelihood of Farmers**

Livelihood constitutes the living conditions that determine the wealth or the poverty of an individual or a household. Because the living conditions are generally bad in rural areas, most rural people are

concerned with poverty. Therefore, poverty is commonly used to characterize the situation of an individual or a group of persons who do not have sufficient resources to meet their basic needs. It is measured through the poverty line or poverty threshold that is recently fixed by the World Bank at 1.25 \$ per day. In that respect, one can assume that earning of sufficient income could be the best way for improving one's livelihood and to keep him above the poverty line. Looking at the situation in the study area, especially at the incomes of the three farmers groups described in section 5.4, it appears that farmers' group 1, farmers' group 2 and farmers with diversified income (group 3) have at their disposal per day, 1.54 \$, 0.439 \$ and 3.20 \$, respectively. Assuming that the selected farmers did not have any other income sources rather than the activities taken into account in this study, one can notice that only farmers with diversified activities were better off. Farmers who devoted themselves only to farm activities (group 1) were above the poverty line; but they were, however, too close to this line and could, therefore, have just a little room for decently meeting their basic needs. More critical is the situation of farmers involved only in off-farm activities because they were landless (group 2). The activities that they undertook did not provide them enough cash resources for raising them out of extreme poverty. Any support in terms of improving their access to credit could help them taking advantage of more profit-generating off-farm activities, alike farmers of group 3. By considering only the farm activity carried-out by farmers of group 3, it appears that they would have at their disposal just 1.91 \$ per day, what would put them almost at the same capacity's level as farmers of group 1, in meeting their basic needs. But by providing farmers of group 3 an additional earning of 1.31 \$ per day, income diversification reinforced their purchase power and doing so could contribute to substantially



improving their livelihood.

## Discussion

Many studies have reported that income diversification in rural areas in Africa are induced either by negative or positive factors. and that, under the influence of negative factors farmers are constrained to diversify their incomes to assure their survival whereas positive factors give farmers the opportunity to generate assets for accumulation and reinvestment (Ellis, 1998; 2000b; Losch *et al.*, 2012; Aloba Loison, 2015). The results of the present study agree with this thesis that considers diversification in rural area as a survival strategy for some farmers and a source of additional wealth for other ones. Our results also support the findings by Ellis (1998), Barrett *et al.* (2001), and Losch *et al.* (2012), who stipulated that the endowment of resources such as land give farmers the best opportunities for income diversification. Whereas some authors such as Okere & Shittu (2013) and Meraner *et al.* (2015) have found a cause-to-effect relation between many demographic and socioeconomic factors and the decision by farmers to diversify their activities, our results were, in contrast, less conclusive. Indeed, in our study, only the variable 'Access to land' is the only factor that had significantly influenced farmers' decision to carry-out specific income diversification activities in the study area, and this is concordant with Degla (2001). With respect to the economic importance of income diversification, our findings are in line with those of Barret *et al.* (2001) who showed that there is a strong relationship between the share of off-farm income and the total income of farmers from some West African countries. Even though the contribution of income diversification activities was relatively low in the study area (40percentage), it is, however, higher than the 37,1percentage highlighted by Okere and Shittu (2013) in Nigeria, and remains in the range of

15-93percentage found by Haggblade *et al.* (1989), Reardon (1997), Ellis (1998), and Barret *et al.* (2001) in their respective studies in West Africa. Based on its contribution to the total income, income diversification could positively impact the purchase power of farmers and represents, therefore, a useful strategy for improving the living standard of these farmers. However, and concordantly with Ellis (1998), Block and Webb (2001) and Aloba Loison (2015), the diversification can increase the income inequality among farmers' groups when these groups are subjected to a persistent unequal access to high-return off-farm activities. The income difference between farmers who carry-out just farm activities (1.54 \$/day) and those who diversify their activities (3.20 \$ /day) on the one hand, and between farmers who undertake only petty off-farm activities (0.439 \$/day) and those who diversify their income, on the other hand, are an evident illustration of this income inequality in rural areas. As also mentioned, groups 1 and 3 are quite equal in respect to their farm income per unit of cultivated area, so the difference between these two groups of farmers could be attributed, *ceteris paribus*, to the impact of income diversification strategies. This result highlights therefore the role of the diversification of income sources in the rural areas and supports the thesis of Kinda and Loening (2010) who stated that although the agriculture holds a large potential for growth, it cannot solely meet the challenge of rural development. It supports also the finding by authors like Escobal (2001), Barret (2005) and Deininger *et al* (2007) who advocated that income diversification is a pathway out of poverty.

With respect to the determinants of farmers' income level, the correlation highlighted between cultivated area and total income confirms the findings by Yabi *et al.* (2013). The regular contact of farmers with

extension services allows them to acquire new knowledge, thereby reinforcing their abilities or skills and improving their performance. This contact has, therefore, some positive impact on the income level of farmers engaged into income diversification strategies, thereby confirming the results raised by Degla (2014). Owing to the limited access of women to main resources such as land, most women in the study area were those persons who were more subjected to the influence of push factors and were, therefore, constrained to undertaking less profitable activities. The level of their total income is of course relatively lower than that of men that is susceptible to increase by 67.70percentage when one moves from female to male. This result supports the main observations made by Ellis (1998) and Aloba Loison (2015) on the particular situation of women engaged in income diversification activities in Sub-Saharan Africa. Off-farm activities are the basis of the diversification and contribute considerably to the total revenue of the farmers. Thus, by moving from a farmer who is specialized only in farm production to another one involved in additional off-farm activities, the total revenue might increase by 83.43percentage. In that respect, diversification can have a positive impact on the livelihood of farmers in rural areas and could be considered as a pathway out of poverty.

## Conclusion

In the central part of Benin, income diversification remains a common practice for most farmers who wished to improve their living conditions. Whereas some wealthy farmers can take advantage of opportunities accrues from lucrative activities by realizing relatively important incomes, others, namely the landless farmers, content themselves with low incomes gained from low profit-generating activities that they are constrained to carry out to ensure their

survival. The level of the total income realized by farmers is significantly influenced by the size of the cultivated area, the sex of the farmers, their regular contact with the agricultural extension services, and their engagement in off-farm activities. Among the factors that are susceptible to influence the decision of farmers to diversify in specific off-farm activities, only the effect of access to land appeared significant in the present study. Thus, this result suggests that additional analyses in framework of future researches are necessary for having better insights into the motivation that guide the choice of farmers when diversifying their activities.

By contributing for about 41percentage to the total annual income or providing 3.20 \$ /day to farmers engaged in income diversification activities, one can conclude that income diversification can play an important role in the study area by improving the welfare of the population. Any agricultural policy aiming at the promotion of income generating-activities through improvement of credit access and supply of technical supports to the majority of farmers could help in significantly reducing poverty in the center of Benin.

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