

# COMPARATIVE ANALYSIS OF AGRICULTURAL LABOUR PATTERNS' IMPACT ON FOOD CROP PRODUCTION IN THE BENIN REGION: A PANACEA FOR FOOD SECURITY IN NIGERIA

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## Abstract

*This paper carried out comparative analysis of agricultural labour patterns impact on food crops production in the Benin region. Data were sort through questionnaire instrument in the sampled area. Systematic random sampling technique was used in selecting household farmers who were directly involved in farming while purposive sampling was used in selecting two rural areas each from the seven local government areas that make up the Benin region. A total of 761copies of questionnaire were used in the study. Data were analyzed through descriptive statistics and frequency counts, bar chart, tables and percentage. The chi-square was used to examine the significant differences among the crop types in the study area. Time series analysis was used to examine the trend of the overall agricultural productions in five planting seasons (2007, 2009, 2011, 2013 and 2015) using the three major agricultural labour supply patterns (family labour, hired labour and both f/h labour). Findings revealed that majority of the farmers (84%) used hired labour in virtually all the farming activities ranging from ploughing, planting, weeding, harvesting and transporting. The study also showed the R-squared values of the three labour patterns: 0.959 (hired labour), 0.638 (both f/h labour) and 0.882 (family labour) respectively, indicating that the trend line of hired labour fit the data more closely and provided a better fit than the other two patterns of labour supply. The steady upward trend of "hired labour" was an indication that agricultural production with hired labour rose consistently in the period as against the two other patterns and was likely to maintain an upward trend in the long run. Thus, in year 2016 and beyond, employment of hired labour is likely to achieve an agricultural production of more than 10000 units and higher as the year extends in the Benin region. It is recommended that farmers should be encourage to hire more wage labour in all their farming activities in order to boost agricultural production increase as a measure for sustainable food security in Nigeria.*

**Keyword:** Farm Labour Patterns, Impact, Food Crops Production, Food Security, Nigeria.

## Introduction

The food crisis in Nigeria is at present multi-faceted. An aspect that is in most cases neglected is the recognition of the patterns of agricultural labour workforce with the highest output and distribution activities in foodstuff trade (Ikelegbe, 2011). Agriculture in Nigeria over the years had declined and/or dormant due to its failure on food availability, per capital income, housing and farm household domestic needs. Harwood (1990) cited in Awotodunbo, (2008) observed that Nigeria had experienced a decline in per capita food production during the last two decades and that farmers have little or no access to external fund for proper farm finance, lack proper agricultural advisory services and have access mainly to their own labour and those of their families. These force farmers to depend on their own labour and could not make any appreciable improvement in their production. Human labour in agriculture is about the only main source of labour

available to small-holder farmers in Nigeria, and small-holder farmers contribute over 85% of domestic agricultural output (Akanni and Dada, 2012). However, there are various agricultural labour use patterns. The desire and quest for increased crops production by farm household is anchored on the types of agricultural labour used. According to Oladele (2008), family labour use pattern in agriculture is a pattern where wives, children and other dependants' residing together form agricultural labour force. Hired labour pattern is a sort of human labour used in working for another person and receiving payment in return. Payment could be yearly depending on the agreement reach between the farm owner and the wage labour while family and hired labour together are combination of labour use pattern. In most cases, farmers used hired labour to complement their family labour force. Okuneye (2000) stated that hired labour contributes 88% of the total labour-use on farms thus emphasizing its importance in agricultural crop production activities. World Bank (2001) reported that farming household is thus adjudged food secure when the trio of food availability, accessibility, and affordability is assured in the required quantity and quality. Agricultural productivity is linked to food security as higher agricultural productivity would translate to larger food supplies, lower food prices, higher farm income and higher purchasing power for other basic necessities for the attainment of household food security (Wunderlich and Norwood, 2006 cited in Omotesho *et al*, 2014). Nigeria's food deficient situation has been worsened by declining farm productivity owing to inefficient production techniques, poor resource base and insufficient farm labour supply among others, labour has been found to constitute a large proportion of cost in the food crop production process in Nigeria and its productivity has become increasingly low because farm households largely comprised fairly old people and very young children coupled with the use of crude implements which impede their ability to raise yield of food crops and income with subsequent reduction in poverty level (Tanko *et al*, 2006 cited in Nmadu, 2015). In view of the above studies on agricultural labour used patterns in Nigeria, the impact of the main pattern of agricultural labour use with the highest food crops production for sustainable food security has remained neglected. This paper therefore examined comparative analysis of agricultural labour patterns impact on food crops production in the Benin region.

## Materials and Methods

The study area-rural Benin is in the southern part of Edo State, Nigeria. The region is made up of seven (7) local government areas namely: Egor, Ikpoba-Okha, Oredo, Ovia South West, Ovia North East, Orhionmwon and Uhunmwode bounded by rural communities which are predominantly involved in agricultural based economy as their main source of livelihood (Ikelegbe, 2011). Primary data were used and obtained by means of oral interviews, focus group discussions with the community leaders through the use of questionnaire instrument. Purposive sampling was used in selecting two (2) rural areas each from the seven (7) Local Governments that make up the Benin region. The choice of the selection was based on the areas that were predominantly agrarian as well as evidence of various labour used patterns while the systematic random sampling technique was used in selecting household farmers who were directly involved in farming. A total of fourteen (14) rural areas were selected for this study. The population of fourteen (14) rural areas selected for this study in the Benin region according to 2015 National Population Projection is 164, 325 persons. In view of the above, the study adopted Onaiwu (2015) sample size determination. Consequently, a sample fraction of 0.005 was applied on the total household resident population of 164, 325 people in the

selected rural areas and it yielded a sample size of 821 persons for the study. A total of 761 copies of questionnaire were successfully retrieved from the study. Descriptive and Inferential statistics like frequency count, percentages, tables, bar chart were used in the study. The chi-square was used to examine the significant differences among the crop types in the study area. Time series analysis was used to examine the trend of the overall agricultural productions in five planting seasons (2007, 2009, 2011, 2013 and 2015) using the three major agricultural labour supply patterns (family labour, hired labour and both f/h labour). The purpose of this test was to identify the pattern of labour supply that had the largest part of agricultural produce in the five planting seasons studied and to further predict the labour pattern that had the highest tendency of producing more in future planting seasons.

The formula for the linear trend line projection is given as:

$$Y_t = b_0 + b_1t.$$

where:  $Y_t$  = the trend forecast for time period  $t$   
 $b_1$  = the slope of the trend line  
 $b_0$  = the trend line projection (value of  $Y$ ) at time  
 $0$   $t$  = time period

## Results and Discussion

### Farm Sizes of Respondent Farmers

The respondents' farm sizes were explored among the fourteen (14) sampled villages in the five (5) planting seasons ranging from 2007 to 2015. In the Benin region, the total land size in 2007 was 2169 hectares of land available for use by the farmers. It was observed that there was a gradual increase of land size for farming in 2009, 2011, 2013 (2178.5, 2258.5, 2297.5 hectares of farm land in the selected areas). However, there was an observable little declining rate in 2015 with about 30 hectares of farm land size. The steady increase in those years might be attributed to the new change and/or availability of labour supply in the region. Also, from the table, it was observed that apart from Iyanomo village, the land sizes (in hectares) of the respondents in the other villages increased in each of the five planting seasons evaluated. In Iguikpe village, the respondents' farm sizes in the five planting seasons remained at 146.5 hectares at the end of 2015 which was the same as five seasons before (2007). The respondents in Iyanomo village had a cumulative total of 80 hectares of land in 2007 which eventually decreased to 55 hectares in 2015. Also, apart from Iguikpe and Iyanomo villages, the land sizes of respondents from the other 12 villages increased from what it was as at 2007. The result also showed that Egor had the highest farm land size cumulatively of about 2024 hectares from 2007 to 2015. The Chi-square cross-tabulation test indicated that there were significant  $\chi^2 = 323.2$ ,  $df = 252$ , and  $p$  value = 0.002 (significant) differences in the respondents land sizes with respect to years among the villages and local government areas.

### Class of Crops Produced by the Respondents Farmers

Table 1 showed the categories of crops grown by the sampled respondents. The overall result of crops produced by farmers showed that cassava was the most grown crop by the indigenous farmers in the study sample in the Benin region. Yam and plantain came second and third respectively while maize and melon followed in that order. However, even though cassava dominated the crops produced by all the respondents, the story was not the same in the villages. For example, the crop mostly produced by farmers in Nikorowa (Ovia SouthWest) and Igieduma Villages was plantain while cassava

production dominated in the remaining 12 villages. It could be deduced from the findings that cassava was the major and predominant food crop produced in the Benin region, Nigeria. The chi-square results of the crop types indicated that there was a significant difference ( $\chi^2 = 361.3$ ,  $df = 126$ ,  $p\text{-value} = 0.000$ ) among the crop types in the villages.

Table 1 Category of Crops Produced by the Sampled Farmers

LGA	Village	Plantain	Yam	Maize	Cassava	Melons
		n	m	e	a	n
Oredo	Iguikpe	16	34	15	40	8
	Umegbe	14	17	13	45	9
Egor	Egbiri	14	37	15	68	4
	Unureri	26	42	31	75	8
Ikpoba-Okha	Iyanomo	9	7	10	14	5
	Ologbo	38	55	33	71	19
Ovia South West	Ugbogui	32	8	12	40	5
	Nikorowa	37	15	9	35	11
Orhionmwon	Evoboosi	26	24	15	42	11
	Ugo	35	35	13	52	15
Ovia North East	Ugbiogiobo	31	36	23	48	11
	Evboneka	20	23	20	42	12
Uhunmwode	Igieduma	44	26	9	43	19
	Oke	29	15	10	29	11
<b>Overall Frequency</b>						
=		<b>371</b>	<b>374</b>	<b>228</b>	<b>644</b>	<b>148</b>

Source: Fieldwork, 2016  $\chi^2 = 361.3$ ,  $df = 126$ , and  $p\text{-value} = 0.000$  (significant)

### Categories of Agricultural Work Farm Labourers were Employed for

Table 2 showed the category of agricultural activities farm labourers were hired to do in the seven (7) sampled LGAs in the Benin region. Evidence from the table showed that 49 (7%) respondents employed hired labour solely during weeding (including clearing). 29 (4%) respondents used wage labour only for ploughing, 23 (4%) respondents said they engaged the services of hired labour solely for the purpose of planting, while the majority of 555 respondents, representing about 84% engaged the services of hired labour for virtually all farming activities. The result buttressed the study by Oluyole *et al.* (2013) which examined Farm Labour Structure and its determinants among cash crops farmers in Nigeria. The result showed that most of the farmers used hired labour in virtually all the farming activities suggesting that most farmers had lost their youths through migration. The scenario again confirmed that majority of the farmers who used hired labour as a pattern of agricultural labour supply practically engaged the services of wage labourers in all agricultural activities as against those that used farm labourers for some particular farm work. The proportional increase in agricultural production in the examined years could therefore, be attributed to the methods of agricultural activities in the Benin region.

**Table 2** Categories of Agricultural Activities the Farm Labourers are hired for

CATEGORIES	A	B	C	D	E	F	G	Total
a Ploughing	1	18	1	3	6	0	0	29
b Planting	0	18	2	1	1	1	0	23
c Weeding	5	9	2	10	10	8	5	49
d Harvesting	0	2	0	3	0	0	1	6
e Transporting	0	0	0	0	0	2	0	2
f Both a - e	48	96	81	85	82	95	68	555

Source: Fieldwork, 2016

Where: Zone\_A = Oredo; Zone\_B = Egor; Zone\_C = Ikpoba-Okha; Zone\_D = Ovia South West; Zone\_E= Orhionmwon; Zone\_F = Ovia North East; Zone\_G = Uhumwode

### Overall Variation of Crop Production Using the three (3) Patterns of Agricultural Labour Supply in the Benin Region

Figure 1 to 8 presents the overall level of individual crop production among the entire sample using each of the three (3) patterns of labour supply in five (5) planting seasons. The purpose was to identify the labour pattern that produced a higher agricultural output and to observe the trend overtime. Specifically, figures 6 take the cumulative sum of each crop production in five (5) seasons; figure 7 presents the overall percentage of the entire crop production (pooled together), and figure 8 presents the trend analysis.

Figure 1 shows the overall plantain production in the entire sample (the Benin region). In 2007, the quantity of plantain produced using family labour was 5890 (35%). While using hired labour, the production quantity rose to 36% (6097) of the total plantain production in the Benin region. The farmers that applied both family and hired labour accounted for the remaining percentage production of about 29% (5118) of the entire plantain produced in the Benin region. Then from 2009, the quantity of plantain produced using hired labour began to outnumber the production using family labour and both family and hired labour. Proportionally, 2009 production using hired labour gave 38% of the plantain produced in the region, family labour produced 32% and using both patterns for farming amounted to 30%. In 2011 farming season, the production quantity using hired labour tremendously rose to about 56% of the entire production, family labour reduced drastically to 9%, while a combination of both patterns produced 35%. The trend in 2013 graph showed that the overall output using hired labour again progressively rose to 60%, family labour 5%, while the remaining 35% were produced using both family and hired labour. The data in 2015 production showed that plantain heads had a total of 61% (11,512) using hired labour but only 5% were attributed to the use of family labour while using both labour patterns amounted to 34% (6514) heads of plantain. What this result revealed was that the use of wage labour is the most effective pattern of agricultural labour supply in the Benin region.

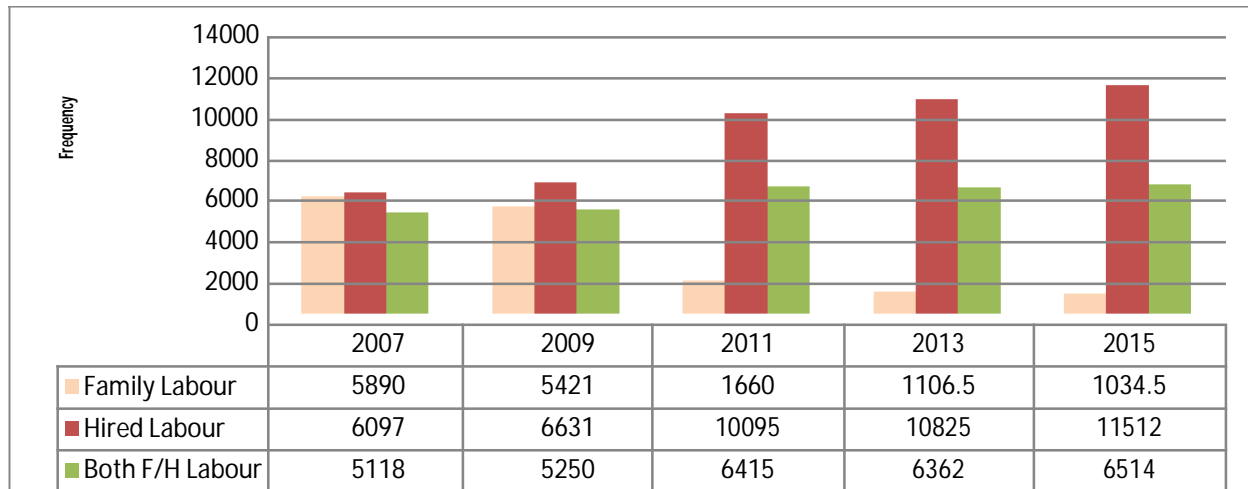


Figure 1: Overall Plantain Production in the Five Planting Seasons

Figure 2 revealed the overall yam production using either of the patterns of agricultural labour supply in the Benin region in 5 farming seasons. The Figure below showed the entire respondents that used either family labour, hire labour, or both family and hired labour supply in 2007 farming season. The quantity of yam produced by each of these categories of farmers was 2641 (23.5%), 6939 (57%), 19.5% (2185) respectively. The data from 2009 farming season showed that the proportion of yam produced using hired labour in the Benin region increased to 63% while farmers that use just family labour alone produced 19% and then those that use both family and hired labour amounted to 18%. Proportionally, the production using hired labour produced 73.3% of the entire yam production for the region in 2011 farming season while the use of family labour production stood at only 7%, and using both patterns amounted to 20%. In 2013 planting season, yam production using hired labour progressively increased to 77.5% of the entire production, family labour reduced drastically to 3% while a combination of both patterns of agricultural labour supply produced 19.5%. In the 2015 farming season production, the number of yam rows produced amounted to 393 or 3% (family labour), 11078 or 79% (hired labour) and both (2624 or 18%). It was observed that in all the seasons of farming covered by this study, the use of wage labourer by indigenous farmers continuously increased yam production right from 2007 to 2015, showing that with more wage labour on a farm land, production quantity could continue to increase agricultural productivity of farmers in the Benin region. It might also be attributed to the fact that wage labourers engaged by indigene farmers were younger and had more strength to work on farm land than the aged and the children left behind by household migrant farmers. The result also showed that in 2007 to 2009, family labour was the second pattern of agricultural labour that produced more yams after hire labour. However, in 2011, 2013 and 2015, the use of family labour on farms recorded a very low production rate while those farmers that used both patterns of agricultural labour in those seasons took the lead after hired labour.

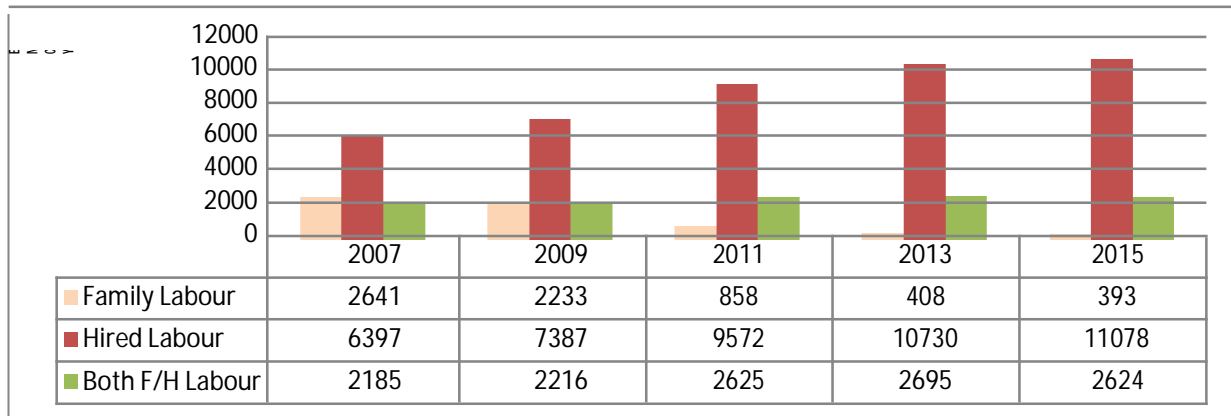


Figure 2: Overall yam production in the five planting seasons

In Figure 3, the overall production of maize by the entire sampled indigenes that used either family labour (FL), hired labour (HL) or both family/hired labour (F/HL) patterns of farm labour in the five (5) farming season in the Benin region is presented. In 2007, the use of family labour produced 2288 (18%) bags of maize which stood as the lowest production, while the quantity of production using hired labour stood at 3474 (27%) bags of maize. The result further showed that using both family and hired labour significantly produce the highest quantity of maize 6912 (55%) in the Benin region. The 2009 farming season result revealed that the proportion of maize produced using hired labour increased to 32%, as against the 2007 production while using family labour production reduced to 2029 (15%). The use of both family and hired labour again maintained the record of producing the highest quantity of maize like in 2007 in the Benin region with 53%.

Proportionally, maize production using hired labour in 2011 farming season produced 46% of the entire quantity in the region; family labour produced only 5%, while using both patterns of agricultural labour supply amounted to 49%. In 2013, production of maize using hired labour increased to 48% of the entire production, while the use of family labour decreased to 2%. The data analysis further revealed that the combination of both patterns of farm labour again maintained the quantity of maize and stood at 50% in the Benin region. In 2015 farming season, the production quantity of maize (bags) amounted to 243 or 1% for family labour while hired labour finally increased and took the lead in that season with a quantity of (bags) 8046 (52%) and applying both patterns of agricultural labour simultaneously amounted to 7281 bags of maize (47%). It was observed in the analysis that farmers that used both patterns of agricultural labour supply (family and hired labour) had the highest production rate then the respondents that used either family or hired labour except in 2015 where those farmers that employed the use of hired labour increased above the other patterns of labour supply.

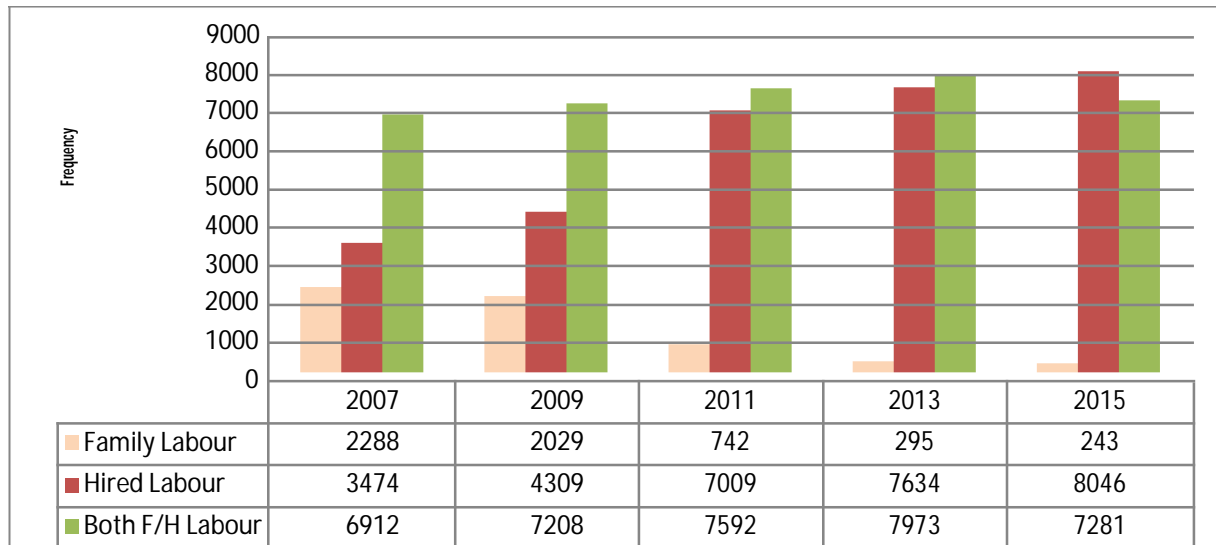


Figure 3: Overall maize production in the five planting seasons

Figure 4 showed the graphical representation of the cassava produced by all the sampled indigenous farmers that used one of the required patterns of agricultural labour supply in five (5) farming seasons in the Benin region. It showed that in 2007, the respondents that used family labour produced 7473 (35%) bags of cassava which were higher than the quantity produced using the other two patterns. The quantity of produce using hired labour was 6748 (32%) which was seen as the second highest, while using both family and hired labour resulted to 6892 bags of cassava which was 33% of the total cassava production in the Benin region in that year. In 2009 farming season, the proportion of cassava produced by respondents that used hired labour increased to 37% using family labour as a source of farm workforce produced a quantity of 6628 (30%) while the respondent farmers who relied on both family and hired labour could only produce 33%. Proportionally, cassava production using hired labour supply in 2011 produced 53% (13,104 bags of cassava) of the entire quantity in the region; family labour produced only 12% quantity, while using both patterns of agricultural labour supply only amounted to 35%. In 2013 planting season, farmers using hired labour had 56% of the entire cassava production, family labour reduced to 9%, while a combination of both patterns produced only 35%. In 2015, production amounted to 2330 or 9% for family labour, 15467 or 58% (hired labour) and applying both patterns of farm labour simultaneously 8725 bags of cassava (33%).

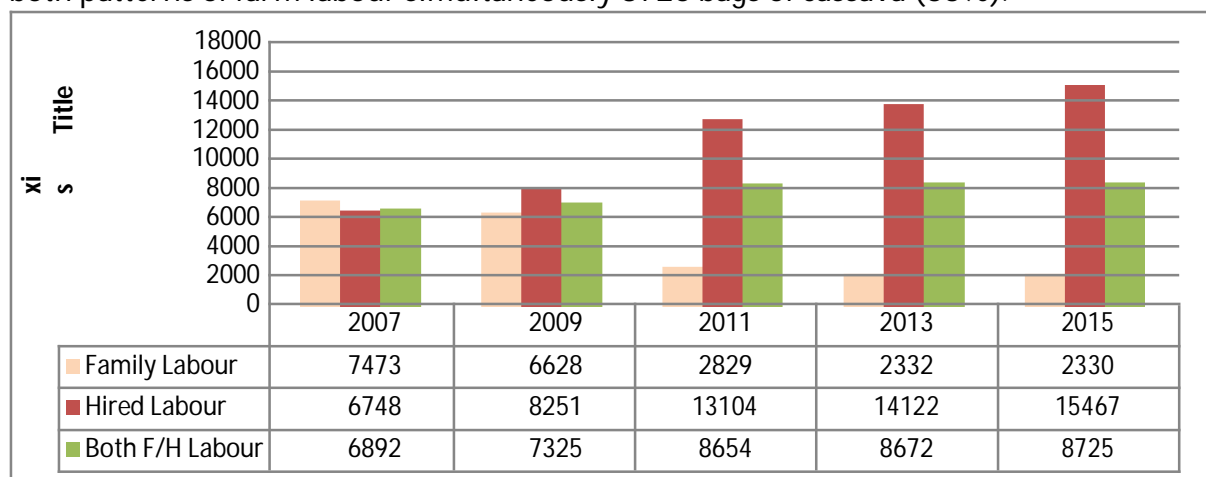


Figure 4: Overall Cassava Productions in the Five Planting Seasons

Figure 5 showed a graphical representation of melon production of all the sampled indigenes using each of the patterns of agricultural labour supply during the 5 farming seasons in the Benin region. In 2007, the use of family labour produced 1755 (15%) bags of melons. The quantity of produce using hired labour was 8195 (69%), while using both family and hired labour produced 1845 melon bags which was 16% of the total melon production in the Benin region in 2007 planting season. In 2009, the proportion of melon bags produced using hired labour by farmers increased to 75% using family labour reduced the production to 1766 bags (12%) while both family and hired labour amounted to 13% of the entire harvests. Proportionally, the production of melon in 2011 by respondent farmers was 83% (16583 bags of melon) of the entire quantity produced in the region, using family labour produced only 4%, while using both patterns amounted to 13%. In 2013 farming season, agricultural production using hired labour increased to 90% of the entire melon production, family labour reduced drastically to 1%, while a combination of both patterns produced 9% respectively. The result of 2015 production showed that melon bags produced were 290 or 1% for family labour, 20186 or 91% (hired labour) and those that applied both patterns of agricultural labour supply recorded a 1868 bags of melon (8%). The graph clearly revealed that farmers that relied on hired labour had more production quantity than those who used the other patterns of agricultural labour supply. What could be deduced from the result was that with the use of hired labour force by farmers, production always progressively increased and eventually caused farm household income to also increase; a scenario that continued to encourage reliance on hired labour force.

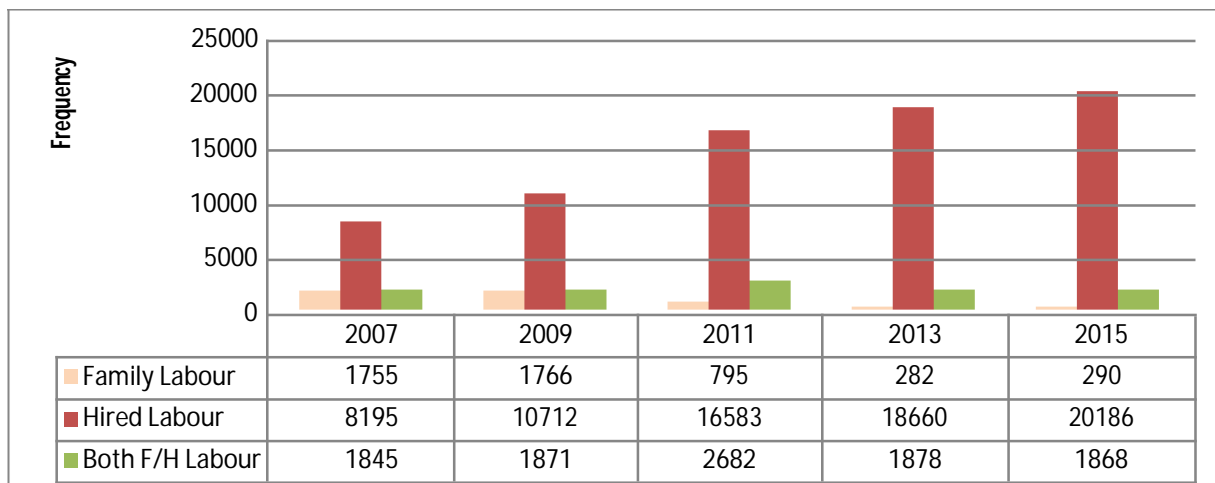


Figure 5: Overall Melon Production in the Five Planting Seasons

### Overall Average and Percentage of Agricultural Production in Five Farming Seasons

Figures 6 and 7 are closely related. The former presented a cumulative average (frequency) of the entire crops produced by the indigenes in all the LGAs in five (5) farming seasons while the latter presented the percentage representation of the frequencies in the former in order to make a concise conclusion. The results indicated that in 2007, the overall (41%) crop production using hired labour in the Benin region which superseded the agricultural production using only family labour was 31%, while both patterns of agricultural labour supply was 28%. In 2009 the volume of production using hired labour by indigenous farmers increased by 4% making the total production 45% while that of family labour declined by a further 5% which amounted to 26% as

against 31%. In 2007, the respondent farmers that used both labour supplies slightly increased by 1% making it 29%. In 2011, agricultural production progressively rose to 59% with the use of hired labour in the Benin region while the farmers that relied only on family labour on their farm land had just 11% of the overall agricultural production. Those that used family and hired labour produced a total quantity of 30%. Furthermore, in 2013 farming season, a total of 64% agricultural production quantity was recorded by farmers that used hired labour while those that employed both patterns (family and hired labour) came out as second producers of the overall agricultural production with about 29% production rate. They were followed by those that used family labour alone with just 7% during the year under investigation. Finally, in 2015 farming season, those farmers that made use of only family labour had the lowest crop production with just 6% overall production rate while those in the second lowest category were those that used both family and hired labour supply with 27% quantity production. The highest production was again from the farmers that employed the services of hired labour to carry out all farming activities with 67% overall production quantity in the Benin region.

The study also revealed that the farmers that used both family and hired labour had a low quantity production in the five (5) farming seasons compared with those that used hired labour alone. That could be attributed to the fact that some farmers employed the services of hired labour to complement one aspect of their family farm work like weeding, harvesting or planting while those farmers that used hired labourers for all their farm work ranging from weeding, ploughing, planting, harvesting to gathering of farm produce had the highest production as against those that used family labour as well as those that employed both family and hired labour. In that scenario, the farmers who employed hired labour to carry out all their farm work had more production quantity than other farmers. During the focused group discussions with the indigenous farm owners, it was revealed that most of the household farmers that still had a few of their children at home with them found them reluctant to work long hours on the farm, and that even their participation in farm work yielded no significant input.

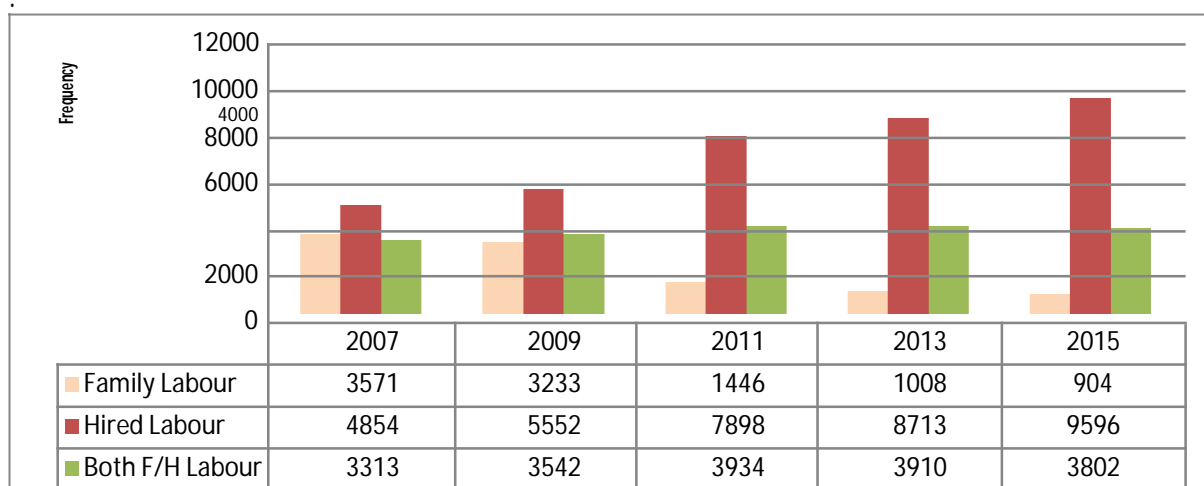


Figure 6: Overall Average of Agricultural Production in Five Planting Seasons

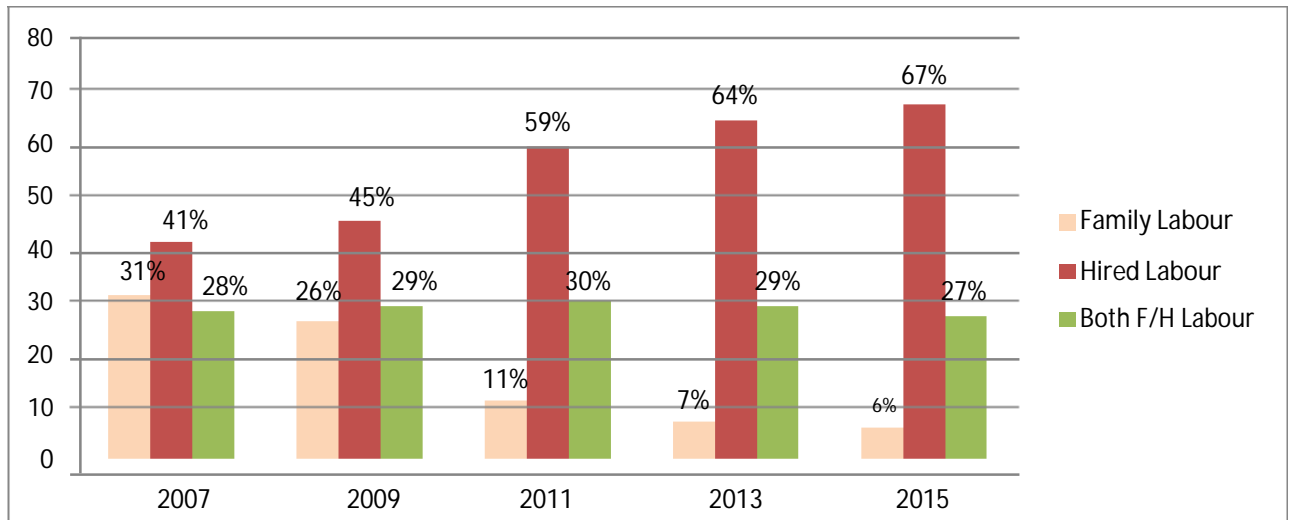


Figure 7: Overall Percentage of Agricultural Production in Five Planting Seasons

### The Trend Analysis of Agricultural Production in the Benin Region

The linear trendline chart in Figure 8 the R-squared values of the three (3) labour patterns showed 0.959 (hired labour), 0.638 (both f/h labour) and 0.882 (family labour) respectively. That indicated that the trendline of hired labour fit the data more closely and provided a better fit than the other two patterns of labour supply. The steady upward trend of "hired labour" was an indication that agricultural production with hired labour rose consistently in the period and was likely to maintain an upward trend in the long run. Thus, in year 2016 and beyond, employment of hired labour is likely to achieve an agricultural production of more than 10000 units and higher as the year extends in the Benin region. Agricultural production, using both family and hired labour showed a relatively steady trend from 2007 to 2009, then an upward trend in between 2010 and 2012, and a steady trend afterwards. On the part of family labour, a downward trendline was evident after 2008 and continued till 2012 before a lowly steady trend continued from after 2012 till 2015. That suggested that there was probably a drastic reduction in family labour sources after 2008 which triggered a lower agricultural output for indigenes that relied solely on family labour.

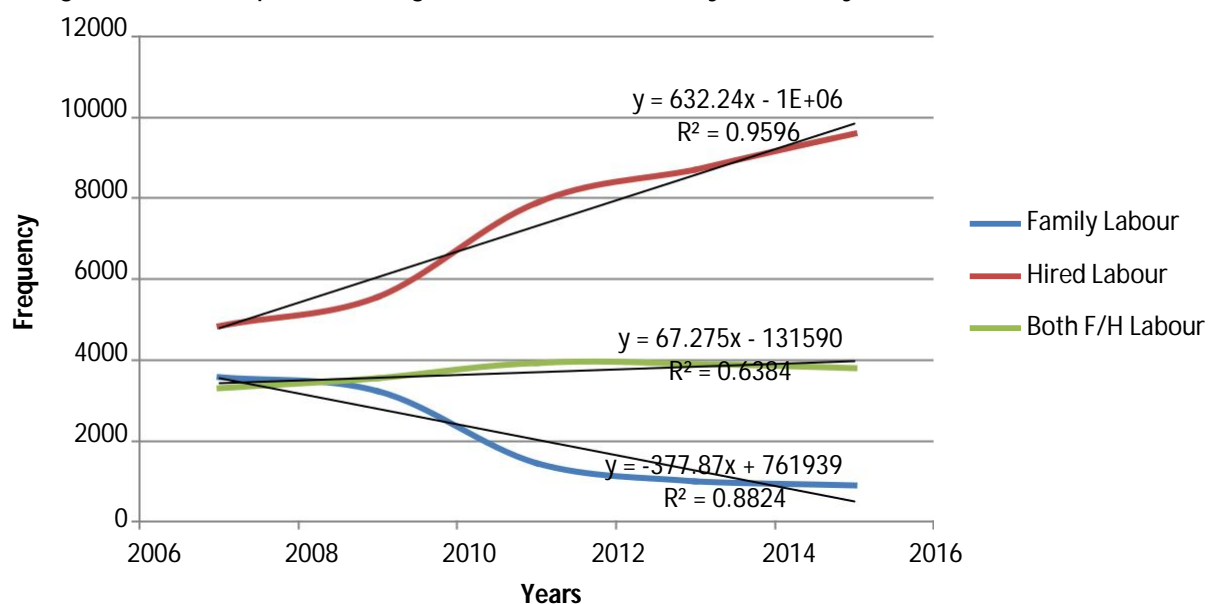


Figure 8: Trend Analysis of Agricultural Production in Benin Region

## Conclusion

The study comparatively analysed the agricultural labour patterns impact on food crops production in the Benin region as a panacea for food security in Nigeria.

1. The study concluded that among all the food crops production sampled in the region during the years examined, cassava was the major and predominant food crop produced in the Benin region, Nigeria.
2. The study also revealed that majority of farmers used hired labourers in virtually all agricultural activities suggesting the reason for increased crops production during the years examined.
3. The linear trendline chart in Figure 8 showed the R-squared values of the three (3) labour patterns 0.959 (hired labour), 0.638 (both f/h labour) and 0.882 (family labour) respectively. The steady upward trend of "hired labour" was an indication that agricultural production with the use of hired labour rose consistently in the period and was likely to maintain an upward trend in the long run. Thus, in year 2016 and beyond, employment of hired labour is likely to achieve an agricultural production of more than 10000 units and higher as the year extends in the Benin region.

## Recommendations

1. It is recommended that farmers should be encouraged to hire more wage labour in all their farming activities in order to boost agricultural production as a measure for sustainable food security in Nigeria.
2. The study also recommended that government should as a matter of fact provide adequate financial loans to farmers to enable them meet up the task of employing more wage labour.
3. It is also recommended that government should setup marketing distribution channel in rural area to enable farmers sell produce that are perishable as quickly as possible in order to avoid loss at the long run.
4. The study further recommended that hire labourers should be adequately trained towards new and sustainable method of farming.

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