IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)
e-ISSN: 2319-2380, p-ISSN: 2319-2372. Volume 10, Issue 7 Ver. III (July 2017), PP 63-72
www.iosrjournals.org

Effects of Diabetic Prevalence and Mortality on Households Farm Labour Productivity in Benue State

[1*]Teran, A D, [2]Enete, A. A, [3]Chidebelu, S. A.N.D
[1,2&3] Department of Agricultural Economics, University of Nigeria Nsukka
Corresponding Author: Teran, A. D

Abstract: *The study examined the socio-economic factors and dietary habits that influence the prevalence of diabetesand estimated the effects of diabetic costs, prevalence and mortality rates on farm labour productivity in Benue State, Nigeria. A multi-stage random sampling technique was used to select 340 yam farming households with emphasis on 2015 farming season primary data were obtained using a well-structured and pretest questionnaire. Descriptive and inferential statistics were used to realizethe prevalence and mortality rates, ordinary least squares regression model was used to examined the socio-economic factors, lifestyles and dietary habits that influence the prevalence, while labour productivity model was used to analyze the effects of diabetic costs, prevalence and mortality on farm labour productivity. The results revealed that prevalence rate was 24.9% while mortality rates was 8.61%. Age of the household head negatively and significantly influence diabetic prevalence at 1% level, while farm income was positively and significantly related to diabetes prevalence at 1% level. Gross labour productivity of household per annum (GLP) was 845.55 kg/man-days, annual maximum net labour productivity of household in monetary terms (NLP) was ₦80, 625.00, household average labour productivity (ALP) was ₦67, 506.00. The study therefore recommendedthe creation of massive awareness, education and establishment of diabetic testing and treatment centres in the agrarian rural communities by both private and public sector for easy accessibility and affordability to curtail the prevalence and mortality rates of diabetic scourge for effective and efficient productivity.*

Date of Submission: 15-07-2017 Date of acceptance: 28-07-2017

I. Introduction

The effects of diseases on productivity are felt on two key farm production parameters: first, labour quality and quantity. The second factor for household agricultural production is the availability of disposable income. During episodes of illness, households financial resources could be diverted for medical treatment to meet the financial cost, such resources could otherwise be used to purchase agricultural inputs (Iya, Purokayo&Gbado, 2012). According to Umeh (1991), the quantity and quality of labour supply is highly dependent on the health of the people under consideration. This also implies that the labour force of a community diminishes in the event of any diseases outbreak.

In many developing countries, manual work account for a large portion of the agricultural and industrial production output (Weil, 2001). Nigeria, the most populous black African country with 60% of its livelihood thriving on agriculture is fast gaining its share of diabetes scourge (World Health Organization (WHO), 2004; National Bureau of Statistics, (NBS), 2007; Federal Ministry of Health (FMOH), 2009). A recent research has shown that one in every 20 Nigerians is at the risk of being diagnosed with diabetes (Nwafor&Owhoji, 2001).In the United Kingdom (UK),diabetes economic impact is enormous, gulping about£23.7 billion annually inform of direct, indirect social and productivity costs (National Health Service (NHS), 2010).

The prevalence in Nigeria is now estimated at 6-10 percent among rural dwellers and 10 -18 percent among urban adults (Akinwusi, 2015). Most literature on the prevalence of diabetes in the North Central States of Nigeria, Benue State inclusive is mere hypothetical propositions and scanty generalizations of about 15 percent in relation to agricultural productivity (Diabetes Association of Nigeria (DAN), 2014).Estimates indicate that, diabetes will account for 52 percent of deaths in Nigeria by the year 2025, out of this figure, 23 percent is estimated to come from Benue State (DAN, 2014). This is because of lifestyle, consumption pattern andnonchalant attitude towards comprehensive and routine medical checkup (Duru, 2012).

Diabetes imposes direct health burden as its victims suffer physical and psychological pains which may result in mortality, (Mbanya, 2009). The economic activities of diabetic victim and their caregivers are usually impaired, giving rise to losses in the agricultural output (Kornum, 2008). This may likely have negative impact on agricultural production and household labour supply.

Available records from International Diabetic Federation (IDF), (2010) indicates that access to

appropriate diabetes cure in Sub-Saharan Africa is extremely limited because of inadequate health care system, shortage of doctors, unaffordability of medication and other equipment. The poor, especially farmers, resort to traditional source or resign to fate, leading to improper management. Therefore, farmers who are victims or caregivers face farm labour supply shortage. This had impaired food crop production. The focus of this study is on the effects of diabetic scourge on yam crop farmers in Benue State. The choice of yam for the study is largely to the fact that yam is the predominant crop cultivated by farmers in the State.

II. Methodology

The study area was Benue State, Nigeria. "The Food Basket of the Nation", was created in 1976 with its name derived from River Benue, the second largest river in Nigeria. The administrative headquarters is Makurdi and it is composed of 23 Local Government Areas and 423 Council Wards. The State is located in the North Central region of Nigeria, which is the transition zone from the Northern and Southern ecologies. It lies between longitude $6^0 31'$ E and 10^0E and Latitudes $6^0 30'$ N and $8^0 10'$N (BNARDA, 2005). The State shares boundaries with five neighbouring states: Nassarawa to the North; Taraba to the East; Cross River and Enugu to the South-East; Enugu and Kogi to the West. The eastern part of the state is also bounded with the Republic of Cameroun. Benue State has a total land mass of about 33, 955 km^2 (BNARDA, 2005). Agriculturally the State is divided into three zones:Zone A (Katsina-Ala, Ukum, Ushongo, Vandeikya, Logo, Kwande and Konsisha, LGAs); Zone B (Gboko, Tarka, Buruku, Gwer-east, Gwer-West, Guma and Makurdi, LGAs); and Zone C (Ado, Agatu, Apa, Otukpo, Ohimini, Okpokwu, Ogbadigbo, Obi and Oju, LGAs). The state has a total population of 4, 219, 244 people and 413, 159 households (National Population Commission (NPC), 2006; BNARDA, 2005).

The state has favourable agro-climatic ecologies for arable crops, tree crops and livestock production and enjoys two distinct seasons; rainy season, beginning from April to October, and dry season, from November, to March. Annual rainfall records vary from 1700mm in the southern part to 1250mm in the northern ecology of the state with annual temperature variations of 30^0C and 35^0C (Benue State Government (BNSG), 2011). The three major ethnic groups are the Tiv, Idoma and Igede. Other smaller ethnic group are Etulo, Abakpa, Akwaya and Jukun. Yam is the major crop produced in the State; and it is consumed in a variety of forms with sauce and soup, including pounded yam, roasted, fried and porridge (BNARDA, 2004). Yam is used as delicacy during marriage, birthday, funeral and other social and religious ceremonies in large quantities. Benue State, the Food Basket of the Nation with 70% of its population depending on agriculture as their main source of livelihood (BNARDA ,2004) ranked very high among the diabetic endemic States in Nigeria (DAN, 2014).

III. Data And Analytical Technique

Data for this study were collected from primary sources. The primary data were collected from the diabetic yam farming households using a well-structured and pretested questionnaire. The questionnaire was administered with the assistance of extension agents from Benue State Agricultural and Rural Development Agency and Diabetes Association of Nigeria, Benue State chapter with emphasis on 2015 farming season. The data collection instrument focused on prevalence and incidence of diabetes, socio-economic characteristics of households, direct and indirect cost in form of registration fees, consultation fees, laboratory test, transportation, productivity lost by diabetic patients, caregivers and substitute labour. The questionnaire also capture information on dietary habits, lifestyle, technical efficiency as well as factors influencing choice and coping strategies of the households. The instrument was administered to the household head. Diabetes prevalence and mortality were achieved using descriptive and inferential statistics.

Ordinary least squares regression model

The ordinary least squares regression was used to examined socio-economic factors and dietary habits that influence the prevalence of diabetes,Coelli(1995) presented the functional form as follows:

$Y = \beta_i X_i + \varepsilon_i$…… 1

where:

Y = prevalent rate (number of male and female with diabetes in a household divided by the households size at particular time X 100);

β_i = Vector of regression coefficients which measure the effect of the regressors on the dependent variable;

X_i = vector of socio-economic and demographic variables, lifestyle and dietary habithypothesized to influence diabetic prevalence in the farm households;

$X_{1=}$ Age of household head (years);

X_2 = Level of education of household head (number of years);

X_3 = Farm income of household head (₦);

X_4 = Non-farm income of household head (₦);

X_5 = Remittance of household head (₦);

X_6 = Sex of household head (male =1, female =0);

X_7 = Exercise by the household (Yes =1,No =0);
X_8= Potatoes consumption of the household (high =1, low =0);
X_9 = Rice consumption of the household (high =1, low =0);
X_{10} = Sorghum consumption of the household (high =1, low =0);
X_{11}= Maize consumption of the household (high =1, low =0);
X_{12} = Alcohol consumption of household (high =1, low =0);
X_{13}= Locally brewed millet consumption of the household (high =1, low =0);
X_{14}= Soft drink consumption of the household (high =1, low =0);
X_{15}= Bread and tea consumption of the household (high =1, low =0);
X_{16}= Fruits and vegetable consumption of the household (high =1, low =0);
X_{17}= Tobacco/smoking of the household (smoking =1, otherwise =0),
X_{18}= Yam consumption of the household (high =1, low =0); and
ε_i = Error term.

Note: A threshold of 50% of the food consumed and above was used as a standard cut off point indicating **high consumption,** while a threshold of below 50% indicated **low consumption**.

Four functional forms (linear, semi-log, double-log and expotential) were used to analyzed the data and lead equation was selected for the analysis.In case of the double-log functional form, the zero dummy variable was transform into base (0.001) and then log. The criteria for the selection of the lead equation were:
i) the value of coefficient of determination R^2;
ii) significance of *F* value where appropriate; and
iii) the size and signs of the parameter estimates.

The general formof eachof the functional form is expressed below;

i) The linear functional form was explicitly expressed as:

$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \ldots \beta_{18} X_{18} + \varepsilon_i$ ..(2)

ii) The semi-log functional form was specified as:

$Y = \beta_0 In(X) + \beta_1 + \varepsilon_i$ ……………………………………………………………….…. (3)

i) The exponential functional form was specified as:

$In(Y) = \beta_0 + \beta_1 ln \times_1 + \beta_2 ln \times_2 + \beta_3 ln \times_3 + \cdots + \beta_{18} ln \times_{18+} \varepsilon_i$. …………….. (4)

iv) Thedouble-log functional form was specified as:

$In(Y) = \beta_0 + \beta_1 \times_1 + \beta_2 \times_2 + \beta_3 \times_3 + \beta_4 \times_4 + \beta_5 \times_5 \ldots + \beta_{18} \times_{18+} \varepsilon_i$. ……… (5)

Where:
Y = prevalent rate (number of male and female with diabetes in a household divided by the households size at a particular time X 100);
β_s = coefficient factors, parameter to be estimated;
$X_{1=}$ age of the household head (years);
X_2 = level of education of household head (years);
X_3 = farm income of the household head (₦);
X_4 = non-farm income of the household head (₦);
X_5= remittance of the household head (₦);
X_6= sex of the household head (male =1, female =0);
X_7= exercise by the household (Yes =1, No =0);
X_8 = potatoes consumption of household (high =1, low =0);
X_9 = rice consumption of the household (high =1, low =0);
X_{10} = sorghum consumption of the household (high =1, low =0);
X_{11}= maize consumption of the household (high =1, low =0);
X_{12} = alcohol consumption of the household (high =1, low =0);
X_{13} = locally brewed millet consumption of the household (high =1, low =0);
X_{14}= Soft drink consumption of the household (high =1, low =0);
X_{15} = bread and tea consumption of the household (high =1, low =0);
X_{16}= fruits and vegetable consumption of the household (high =1, low =0);
X_{17}= tobacco/smoking consumption of the household (smoking =1, otherwise =0);
X_{18}= yam consumption of the household (high =1, low =0);
ε_i = error term; and
In = natural logarithm.

Labour productivity model developed by Upton (1996) and used by Chianu,Chianu and Akintola(2001) was used to realized the effects of diabetic costs, prevalence and mortality on farm labour productivity. LPM is explicitly stated as:

ALP = [TPP] / [Ψ] /man-days…………………………………....................... (6)
GLP(Kg/man-days)= ∑[q•p] / [Ψ] ……………………………………………….(7)

NLP (₦/man-days) = [∑ (q• p) – ∑(L)] / [Ψ]…….. ……..(8)
Where:
TPP = total physical product (kilogramme of the yam cropproduced in the household);
ALP = households average labour productivity;
GLP = households gross labour productivity;
NLP =households net labour productivity;
q = Output (kg of yam crop produced in the household);
p = unit price / kg of output;
L =household labour cost; and
Ψ = number of man-days of labour.Diabetic prevalence (number of male + female prevalence in the households divided by the household size at a particular time), morbidity and mortality were regressed on GLP in order to see their influence on farm labour productivity as follows:

$$GLP = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon_i \ldots\ldots\ldots\ldots\ldots\ldots (9)$$

Where:
GLP = labour productivity of the households in Kg,
β_s = coefficients;
X_1= cost associated with diabetes in the household;X_2 =households male prevalence;
X_3 =households female prevalence;
X_4 =households morbidity rate;
X_5 = households mortality rate;and
ε_i= error term.
Ezeh, Akpankpan and Moro (1994) conducted a similar studied on labour productivity and sustainable yam production in Nigeria using labour productivity model.

IV. Results And Discussion

The prevalence, mortality and morbidity rates of diabetes among the farming households are presented in table 1. Results showed a prevalence rate of 24.9%. The result also showed that households headed by men were the most hit with a mean of 1.38 persons, while that of female was 0.92 persons. On the average, a household had 2.13 diabetic cases. This shows a high prevalence of diabetes among the yam farm households. This finding is higher than that of IDF (2010) that the current prevalence of diabetes mellitus in Nigeria was not known but estimates may likely be in the region of 8-10. Nyenwe*et al*. (2003) alluded that the prevalence of diabetes in Nigeria varied between 1-8% depending on the area of the country that was surveyed. Wokoma (1999) reported that the prevalence of diabetes in Nigeria ranged from 1-18%.

However, FMOH (2009) submitted that there was increase in the average prevalence rate of diabetes from 2.7 -3.9%. A greater preponderance of male diabetic patients was earlier observed by Aguocha, Ukpabi, Onyeonoro, Nyoku and Ukegbu (2013). The reason for this could be that males inthe area had consumed a lot of starchy food and may drink heavier alcohol. Studies on the prevalence of diabetes mellitus among Nigerians in Port Harcourt correlated with socio-economic status and found as high as 23.4% among the high class and 16% among the low class (Ebenezer, Osaretin, Anele, Aaron &Babtunde, 2003). Suleiman (2015) reported an average of 22.4% diabetes prevalence among patients attending General Hospital Katsina,between (2000- 2005). According to Oladepo*et al*.(2010), the estimated prevalence of people with undiagnosed diabetes in Nigeria could reach up to 27%.

Steyn*et al.* (2014) opined that the prevalence and pattern of diabetes varied considerably: whereas in some cases the incidence may increase remarkably in the young adults between 20 and 25 years, in other cases, there would be increase among older people of 55 years, and above. The household diabetes prevalence might be as a result of the quality of food consumed by the people in the study area. This affects productivity and income, thus perpetuating ill health and poverty which will further jeopardize food security and economic development in the study area.

The analysis also showed a mean mortality rate of 8.6% with male deaths accounting for higher mean of 5.6 and female 3.0. Death in a household as result of diabetes affects farmlabour availability as healthy individual divert their time and energy from the farm to mourning and attending to the funeral and related matters. These have impact on farm labour and food crop production. When a household head gets sick, arrangements are made to take care of the person and this aggravate the households' labour situation (WHO, 2003). The causes of death were attributed to complications such as hypertension or high blood pressure leading to stroke, low immune status, the contribution of herbal concoctions with unknown active-ingredients, high cost of treatment and ignorance (Aguocha*et al.,* 2013). Aguocha*et al*.(2013) asserted that effective intervention to reduce diabetes-related morbidity and mortality are not comprehensive. Unachukwu*et al*. (2008) noted that the pattern of mortality observed in the country still suggest low access to diabetic care services. Mortality rate amongwomen was generally lower than men.

The pattern of morbidity rate which is the pain, suffering, anxiety, weakness of the body and grief associated with diabetes showed an average mean of 14.88, with 1.16 family members incapacitated of which 0.71 were for males and 0.45 females.

Table 1: Prevalence, Morbidity and Mortality rates of Diabetic Farming Households (n=340)

Variables	Minimum	Maximum	Mean	Standard deviation
Diabetic cases	2	8	2.13	1.266
Male prevalence	290	295	1.38	1.072
Female prevalence	20	45	0.82	2.507
Prevalence rate	1.75	75.6	24.9834	16.61034
Household size	1	57	9.36	4.119
Death from diabetes	2.60	11.00	0.8147	1.28908
Male deaths	2	8	5.6	1.064
Female deaths	0	3	3.0	0.541
Mortality rate	0.00	80.00	8.6435	13.90964
Family members incapacitated	0.00	4.0	1.1618	0.71664
Males incapacitated	0	4	0.71	0.637
Females incapacitated	0	2	0.45	0.565
Morbidity rate	0.00	85.00	14.8898	13.20226

Source: Field survey data, 2015.

Complications associated with diabetes prevalence of the respondents.

Analysis of complications associated with diabetic farming households in line with objective i, is presentedin table 2. Majority of the households(49%) reported that they had hypertension complication. This is in keeping with the findings of Adebisi, Oghagbon and Akande (2009) in their study on the possibility of diabetic patients developing higher risk of cardiovascular complications such as hypertension or high blood pressure in North Central Nigeria. However, the percentage of hypertension complication was far higher than 20.2% reported by Omueme, Okorjie and Omueme (2007) in rural community in Edo State. Mezie-Okoye, Babatunde and Onwuchekwa (2012) reported 18.3% hypertension complications in rural community in Niger Delta region of Nigeria, while Asekun-Olarinmoye, Akinwusi,Adebimpe,Isawmi and Hassan (2013) reported 13.1% in South Western Nigeria. The result shows that malaria and fever complications were reported by 13.8% of the households, followed by blindness 8.8%.The combined effects of malaria and fever related ailment on householdslabour force could reduce the quantity and quality of labour input, reduce economic output and result to resources under-utilization (Eboh&Okeibunor, 2005). ADA (1999) observed that most of the complications if not properly handled could lead to other illnesses and subsequently death. A blind farmer, who is trapped down with malaria/fever, cannot be able to engage in any meaningful productive venture.

There is no doubt, that the above diabetic complications have tremendous effect on labour and food productivity in the study area. Amidst the numerous complications of diabetes illness on households, Nigerian's subsistent farmers spend a lot of money on treatment of diabetes to minimize the risk of other complications associated with this epidemic of the 21st century (Unachukwu& Young, 2008). Diabetes complications have devastating human, social and economic consequences. The least common complications were amputation of limbs/leg (3.5%), erectile dysfunction (3%) and ulcer (2.1%).

A study by Oguntola (2011) asserted that complications couldstill be controlled or reduced to the barest minimum by application of some basic principles like taking medications strictly as prescribed by the medical practitioners, close monitoring of blood sugar, following a sensible diet, refusal to skip meals and exercising regularly. Additionally, the findings of these studies are similar to that of Skyler (2004) who stated that diabetes is associated with numerous complications. Although an intervention with diets and exercise resulted in 58% risk reduction for diabetes complications.

Table 2: Distribution of Respondents by Complications associated with Diabetic Prevalence (n=340)

Complications	Frequency	Percentage (%)
Arthritis	26	7.6
Blindness	30	8.8
Body weakness	23	6.7
Boil/amputation	12	3.5
Constant urine	19	5.5
Malaria/fever	47	13.8
hypertension	165	49
Erectile dysfunction	11	3.0
Foot ulcer	7	2.1

Source: Field survey data, 2015.

Health care providers of the respondents and diabetic prevalence

The results of the health care providers were presented in table 3. Health care providers play a vital role in curtailing prevalence of diabetes, related complications and mortality rate in many developing nations (WHO, 2013). Majority of the respondents (40%) accessed public health facility in their community. This result agreed with the findings of Sifelani (2006) who observed that the number of people seeking medical assistance for diabetes was rising in Nigeria and Africa at a time when health experts reported that the continents health system was overburdened and ill-equipped. Many of the respondents expressed their inability to afford public health facility due to their high cost. The analysis also showed that 13% accessed their health care through traditional healers/herbalist. Yusuff, Obe and Joseph (2008) attributed preference for traditional herbalists to non-adherence to therapy among diabetic patients due to large number of drugs with attendant side effects in addition to high cost of prescribed drugs. The result agreed with the findings of a survey of plants traditionally used in diabetes management in different part of Nigeria byAbo,Fred-JaiyesimiandJaiyesim (2008); Muhammed (2009) andSoladoye, Chukuma&Owa (2012). These traditional plants are used either alone as primary therapeutic or in conjunction with conventional medicines. The use of culturally supported medicines is common among West Africans. It is estimated that between 70 and80% of West Africans use traditional medicines for the management of both communicable and non-communicable diseases, diabetes inclusive (WHO, 2013). About 10% of the respondents accessed their health care through spiritualism, religion, and divine intervention, among others. This could be associated with the beliefs by some diabetic farmers that their condition was diabolical. Furthermore, the superstitious explanation of disease related ailments in Nigeria as being caused by "evil spirit" is also fundamental (Iwueze, 2000).

Table 3: Prevalence of diabetesand Health care Providers of Respondents (n =340)

Health care providers	Frequency	Percentage (%)
Self-medication	50	14.7
Public health facility	136	40.0
Pharmacy/chemist	76	22.3
Traditional Healers/herbalist	45	13.0
Others	33	10.0

Source: Field survey data, 2015.

Parameter estimates of the influence of Households Socioeconomics Characteristics, Lifestyle and Dietary habits on the Prevalence of Diabetes.

The results in table 4 showed the influence of household's socioeconomic characteristics, lifestyles and dietary habits on the prevalence of diabetes in the study area. Four functional forms of the ordinary least squares regression model were analyzed: double log, semi log, linear and exponential. The exponential with superscript b was selected as the lead equation because it had the highest R^2 (0.52) and highest number of significant coefficients. The R^2 of 0.52 implied that 52% of the variations in the prevalence of diabetes was explained by changes in socioeconomic characteristics, lifestyle and dietary habits. The result showed that age of household head negatively (-0.058) and significantly influenced diabetic prevalence at 1% level. This implied that as the age of the household headincreased the chancesof the household contracting diabetes could on the average be reduced by 58%. Older household head could became more conscious of what their household consume and avoid sedentary lifestyles.This agreed with the findings of Steyn*et al.* (2014) whoreported a decrease in diabetes prevalence among elderly people in China between 2005 -2012, age 60 years and above.

Farm income was positively and significantly related to diabetes prevalence at 1% level. This could be that as households income increased, they tended to consume junk, sweetened food with high carbohydrate and fats and did not have time for physical activity. Potatoes consumption was positively and significantly associated with diabetes prevalence at 1% level This is in line with the study by Schulze and Hu (2005) that diets rich in starchy staples such as cereal, roots/tubers increased the risk of diabetes mellitus. Likewise, Sorghum consumption was positively and significantly related to diabetes prevalence at 5% level. This implied that households that consumed more of thishigh carbohydrate foods were likely to have high prevalence of diabetes. Millet burukutu was found to be negatively and significantly related to diabetic prevalence at 5% level. This implied that households, who indulged in the drinking of the locally brewed alcohol from millet, stood a better chance of reducing diabetes illness. Several studies have suggested that moderate alcohol intake, especially red wine and traditionally brewed alcohol, reduced diabetes scourge. Nam *et al.* (2012) stated that among 2, 000 male physicians, those consuming between two and four drinks per week had a lower incidence of diabetes compared with non-drinkers. Yam consumption was found to be positively and significantly associated with diabetic prevalence at 5% level. This implied that households who consumed a lot of yamswere at risk of contracting diabetes. Yam is the major staple food crop in the study area.The crop contributes more than 200 dietary cal/person for an estimated 60 million people in Northern Nigeria (Asiedu, 1993). However, the rich carbohydrate content of yam increases diabetes prevalence due to the high sugar content.

Table 4: Influence of Households Socioeconomics, Lifestyle and Dietary habits on the Prevalence of Diabetes (n=340)

Variable	Coefficients			
	Double log	Semi log	Linear	Exponential[b]
Constant	1.649 (0.627	1.368 (0.644)	1.779 (2.562)	1.172 (1.340)
Age	-2.34 (-3.316)*	-0.440 (-0.888)	-0.016 (-1.701)	-0.058 (-4.779)*
Education	0.099 (3.376)*	0.034 (1.437)	0.011 (0.779)	0.031 (1.789)
Farm income	0.437 (4.837)*	0.145(1.989)**	7.032E -007 (2.027)**	1.694E-006(3.879)*
Household size	-0.198(-1.052)	-0.019(-1.110)	-0.116(-1.306)	-0.239(-5.218)
Nonfarm income	-0.007 (-0.261)	0.009 (0.975)	2.799E-007 (0.449)	3.477E-007 (0.443)
Remittance	0.41 (3.059)*	0.029 (2.700)*	1.322E-006 (0.655)	1.616E-007 (0.636)
Sex	0.215 (0.967)	-0.024 (-0.131)	0.026 (0.156)	0.209 (0.957)
Exercise	-0.047 (-0.970)	-0.061 (-1.559)	-0.169 (-1.644)	0.014 (0.106)
Potatoes	0.053 (1.254)	0.011 (0.326)	0.021 (0.400)	0.214 (3.304)*
Rice	-0.068 (-0.813)	-0.127 (-1.877)	0.013 (0.178)	-0.009 (-0.160)
Sorghum	0.321 (3.318)*	0.223 (2.854)*	0.187 (2.298)**	0.243 (2.375)**
Maize	-0.048 (-1.010)	-0.035 (-0.913)	-0.026 (-0.473)	-0.117 (-1.665)
Beer	-0.057 (-1.523)	-0.035 (-1.156)	-0.044 (-0.949)	-0.066 (-1.137)
Millet Burukutu	-0.098(-2.758)*	-0.050(-1.764)	-0.062 (-1.402)	-0.111 (-1.992)**
Soft drinks	0.000 (-0.003)	0.036 (1.139)	-0.005(-0.101)	-0.037 (-0.633)
Bread and tea	-0.051 (-1.125)	-0.008 (-0.210)	0.119 (2.160)**	-0.049 (-0.702)
Fruits and vegetables	0.042 (0.464)	-0.109 (-1.498)	-0.21 (-2.401)**	0.005 (0.048)
Yam consumption	0.217 (1.944)	0.248 (2.743)*	0.338 (3.627)	0.272(2.318)**
R^2	0.371	0.461	0.489	0.521
F	13.306*	5.577*	6.603*	13.425
SE	1.580	1.275	1.253	1.577
Adjusted R^2	0.343	0.163	0.192	0.346

***,** = significant at 1% and 5% levels respectively**
b= lead equation
Source: Data analysis, 2015.

Influence of Diabetic Cost, Mortality and PrevalenceRates on LabourProductivity and Summary statistics of prevalence, mortality, morbidity and farmlabour productivity

The summary statistics of farm labour productivity in the households area are presented in table 5.Labour productivity can be measured either in terms of total physical output or monetary value (Gupta, 2006). Prevalence rates of diabetic farm households, morbidity and mortality rates was used to validate their effects on farm labour productivity of the household. Given that Nigeria is highly a labour intensive economy, importance must be accorded to having a healthier workforce in order to maximize productivity (Qaisar and Foreman-Peck, 2007). The result showed that the maximum total revenue of ₦1,260,000.00 with an average revenue of ₦352000.53 per hectarewas the value of labour productivity per household. The gross labour productivity (GLP) of households which is defined as the output of yam divided by labour in man-days per hectare in the year under study was on the average of 845.55 kg/man-days. The households maximum net labour productivity (NLP), which is total revenue minus the cost of labour divided by labour in man days per hectare was ₦80,625.00 with an average of ₦78,509.00 while the average labour productivity (ALP) of households referred to as the total revenue divided by labour in man-days was an average of ₦67,506.00 respectively. Labour is one of the most limiting factors among yam farmers (Okorji and Obiechina, 1985).The availability of householdslabour force would reduce the cost of hiring labour, thus saving income for further production (Umoru&Yaqub, 2013). The shortage of labour force may result in reduction of hectarage under cultivation and declining productivity. Therefore, dramatic reduction in life expectancy due to diabetes could negativelyaffects the labour force and hence, productivity. A healthyforce is expected to contribute positively to labour effectiveness and hence higher productivity (Kalemli-ozcan,Ryder and Weil,2009). Ashagidigbi (2004) and Ugwu (2006) found that a farmer loses an average of 22 working days when incapacitated by one sickness or the other. Healthy farmers will enhance work effectiveness, efficiency and productivity through increases in physical and mental capacities.

Table 5: Summary Statistics of Prevalence, Mortality, Morbidity and FarmLabour Productivity/ha (n=340)

Variable	**Minimum**	**Maximum**	**Mean**	**Standard deviation**
Diabetic cases	2.00	8.00	2.13	1.266
Male prevalence	290.00	295.00	1.38	1.072
Female prevalence	20.00	45.00	0.82	2.507
Mortality rate	0.00	80.00	8.6435	13.909
Morbidity rate	0.00	85.00	14.8898	13.202
Total Revenue (TR)/ha(₦)	420.00	1,260,000.00	352,001.52	282,075

GLP=output/ LM(Kg)	43,767.00	87,501.00	845.55	271.036
NLP=TR-cost of labour/LM(₦)	366,672.00	80,625.00	78,509.00	1238.70867
ALP =TR/LM	0.00	41,670.00	67,506.00	6.66114

GLP = gross labour productivity;
NLP= net labour productivity;
ALP= average labour productivity;
LM= labour in man-days; and
TR= total revenue.
Source: Field survey data, 2015.

Parameters estimates on the influence of diabetic costs, mortality and prevalence on farmlabour productivity.

The result in table 6 showed the parameter estimates of the ordinary least squares regression analysis for factors influencing labour productivity in the study area. The double- log had the lowest standard error and was selected as a lead equation because of its conformity with expectations and the level of significance of the coefficients. The R^2 of 0.543 implied that 54.3% of the variation in labour productivity was explained by diabetes cost, mortality and prevalence among the yam farming households. Theresult showed that, the cost of diabetes and prevalence were negatively and significantly associated with labour productivity in the area at 1% level. The cost of diabetes lowered labour productivity of households. Cost of medical consultation, registration, laboratory cost, cost of drugs, transportation, cost of waiting, treatment and funeral cost, in case of death, all according to Suleiman and Festus (2015) affect supply of skilled labour and productivity. During the days of absenteeism and complete incapacitation, the economic activities of diabetic victims and their caregivers are usually impaired. Mortality rate is rising as a result of cost and managerial difficulties associated with diabetes scourge. Nam *et al*. (2011) agreed that the epidemic strikes people in their prime years when they are most productive, thus reducing labour in quality and quantity. Farm labour quality measured in terms of productivity is reduced during period of illness. The supply of such labour by households would fall when the person dies. Moreover, considerable productive time is devoted by other households members to take care of the sick, all these affect the availability of farmlabour. This is consistent with the submission of Umeh (1991) that the quality and quantity of labour werehighly dependent on the health of the people under consideration. Similar evidence exists on the effects of diabetes prevalence, cost and mortality on labour productivity. This can be attributed to the fact that majority of the respondents divert some productive labour and time to care for the sick diabetic victim and also divert some money meant for the purchase of farm inputs to medical expenses. The income lost to diabetes could have been saved or invested to improve per capital income and standard of living capable of employing additional labour for further crop production. Corroborating this effect of diabetes prevalence, cost and mortality on labour productivity Kolawole,Adeboye and omotola (2007) said that the combined effects of diabetes related mortality, morbidity and debility on householdslabour force on community as a whole manifested in reduced quantity and quality of labour input, reduced economic output and resource under- utilization. Apart from labour substitution from the extended family members, diabetes households employ hired labour because of the debilitating effects of the illness. Chidebelu (1991) found out that hired labour was the dominant source of labour (90%),followed by the farmer himself (70%), family member (69%), friend(16%), and tractor as much as 13% among small holder farmers in Anambra, South Eastern, Nigeria. This would have adverse effects on the long-term productivity of households. Household labour availability improves farm productivity (Oguniyi, 2008).

Table 6: Ordinary Least SquaresRegression Parameters showing Influence of Diabetic Cost, Prevalence and Mortality on Farm Labour Productivity (n=340)

Variable	**Double log[b]**	**Semi log**	**Linear**
Constant	8.438(6.254)	1790.831(1.076)	932.935(6.680)
Cost of diabetes	-0.295(-2.830)*	-253.327(-1.967)	-0.001(-1.284)
Mortality rate	0.303(1.586)	725.465(3.076)*	38.822(7.540)*
Morbidity rate	0.045(0.998)	-34.29(0.610)	8.493(1.670)
Male prevalence	-0.150(-2.383)*	-251.682(-3.248)*	-262.218(-4.138)*
Female prevalence	-0.057(-1.199)	-50.343(-0.860)	-91.748(-3.171)
R^2 SE	0.543 1.31360	0.473 1620.967	0.475 1162.854
F	4.904	6.200	14.202
Adjusted R^2	0.421	0.245	0.247

***Significance of 1% level**
Values in parentheses represent t-ratio.
Source: Data analysis, 2015.

V. Conclusion And Recommendations

The study had obtained scientific evidence on the effects of diabetic prevalence and mortality on farmlabour productivity and yam crop production in Benue State with a view of assisting in managing diabetes and improving yam crop production.The study concluded that there is increasing prevalenceand mortality rates of diabetes scourge among yam crop farmers in Benue State. Its prevalence is rapidly on the rise as result of lifestyle, nutrition, dietary pattern which affects labour of yam crop farmers in their active and productive age bracket of between 21 – 60 years.

The study concluded that diabetic scourge is associated with a lot of complications such as hypertension, fever, blindness, arthritis, body weakness, boil/amputation and thus leading to high cost of management (direct and indirect). Diabetes affects farmlabour productivity, and efficiency of yam crop farmers in the study area.Health care providers play a vital role in curtailing the prevalence of diabetes related complications and mortality rates of diabetic farm households. While the technical efficiency of the sampled diabetic farmers was less than 100% indicating that the diabetic yam farm households were operating below frontier in the study area. The study also concluded that the ratio of government and non-governmental organization assistance to diabetic yam farming households in the study area was low.

The study recommends creation of massive awareness, education and establishment of diabetic testing and treatment centres in the agrarian rural communities by both private and public sector for easy accessibility and affordable price to curtail the prevalence, morbidity and mortality rate of diabetes scourge for effective and efficient productivity.Regular aerobic exercise and diabetic friendly diet should be encourage as they are long-term cost-effective strategies at optimizing management while ensuring adequate control of plasma glucose and blood pressure. This would minimize the incidence and slow down the onset as well as progression of diabetic and cardiovascular complications with attendant effects on households farmlabour and food crop productivity in the study area.

References

[1] Abo, K. A., Fred-Jaiyesimi, A. A. &Jaiyesim, A. E. (2008). Ethnobotanical Studies of Medicinal plants used in Management of Diabetes in South Western Nigeria. Journal of Ethnophamocology, 115, 67 – 71.

[2] Adebisi, S. A., Oghagbon, E. K. &Akande, T. M. (2009). GlycatedHaemoglobinand GlycaemicControlofDiabetesinIlorin. African Journal of Clinical Practice, 3, 87 -88.

[3] Aguocha, B., Ukpabi, J. O., Onyeonoro, U., Nyoku, P. &Ukegbu, A. U. (2013). Pattern of Diabetes Mortality in a tertiary Health facility in South-East Nigeria. African Journal of Diabetes Medicine, 21, 14 – 16.

[4] Akinwusi, O. (2015). Diabetes. A paper presented at 1st Annual Lecture, Faculty of Clinical Sciences, UNIOSUN, Osogbo, Nigeria.

[5] American Diabetes Association (1999). Nutrition Recommendations and Principles for people with Diabetes. Diabetes Care,22, 10 - 52.

[6] Asekun-Olarinmoye, E. O., Akinwusi, P. O., Adebimpe, W.O., Isawmi, M. A. & Hassan, M. B. (2013). Prevalence of hypertension in rural adult population of Osun State, South Western Nigeria. International Journal of General Medicine, 6, 317 -322.

[7] Ashagidigbi, W. M. (2004). EffectsofMalariaonruralHouseholdsProductivityinIdoLocalGovernmentAreaofOyoState. Unpublished M.Sc thesis, University of Ibadan, Nigeria.

[8] Asiedu (1993)

[9] Benue State Agricultural and Rural Development Authority (2004). "Sex, Shame and Poverty". Report of a Rapid Appraisal of Health Needs in Rural Benue, DFID, Abuja, Nigeria.

[10] Benue State Agricultural and Rural Development Authority (2005). Benue State Agricultural and Rural Development Authority, Makurdi, Nigeria. Annual Report prepared by Planning, Monitoring and Evaluation Unit pp. 8-13.

[11] Chianu, J. N., Chianu,J . T. &Akintola, J. O. (2001). Comparative Analysis of Labour Productivity in Cassava/Maize Production Systems in South Western Nigeria. Journal of Nigeria Agricultural Development Studies, 2(1), 97 – 109.

[12] Chidebelu, S. A. N. D. (1991). Hired Labour on Smallholder Farming in Southern Nigeria. In C. Doss and C. Olson (eds). Issues in African Rural Development. USA:Winrock International. Arlinton.

[13] Diabetes Association of Nigeria (2014). Proposal for National Diabetes Centre, Port-Harcourt, Nigeria. http://www.diabetesnigeria.org (Retrieved 6th September, 2014).

[14] Duru, P. (2012). Six million Nigerians suffer from diabetes. Retrieved from: http://222.vanguardngr.com.(retrieved 18th December, 2012).

[15] Ebenezer A., Osaretin, O., Anele, E. I., Aaron, O. &Babatunde, S. (2003). Types 2 diabetes in adult Nigerian: A study of its Prevalence and risk factors in Port –Harcourt, Nigeria. Diabetes Research and Clinical Practice,62, 177 – 185.

[16] Eboh, E. C. &Okeibunor, J. C. (2005). Malaria Prevalence and Impact on Farm Households Labour use and Productivity in the irrigated rice Production system of Omor Community, Nigeria. Tanzania Health Research Bulletin,7(1), 1-8.

[17] Etuk, E. U. &Muhammed, B. J. (2009). Informant Consensus Selection Method: A reliability assessment on medicinal plant used in North Western Nigeria for the treatment of diabetes mellitus. African Journal of Pharmacy and Pharmacology, 3, 496 – 500.

[18] Federal Ministry of Health (2009). Federal Ministry of Health. The National Health Policy of Nigeria, Abuja.

[19] Gupta, I. (2006). Health Investment for Economic Growth Building: Blocks for pro-poor development. Institute of Economic Growth, New Delhi ADB Panel Discussion.

[20] International Diabetes Federation (2010). Diabetes Atlas, Brussels.

[21] Iya, I. B., Purokayo, S. G. &Gbado, Y. (2012). The Effects of HIV/AIDS Scourge on Production and Income among rural households in Adamawa State of Nigeria. Global Journal of Health Science, 4(1),6-15

[22] Kalemli – Ozcan, S., Rydar, H. & Weil, D. N. (2000). Mortality Decline, Human Capital Investment and Economic Growth, Journal of Development Economics,3(1), 1029 -1059.

[23] Kolawole, B. A., Adeboye, C. &Omotola, J. A. (2007). Epidemiology of Diabetes Mellitus in Nigeria population. Nigerian Journal of Clinical Practice,8, 28 – 30.

[24] Kornum, J.B.(2008). Diabetes, glycemic control, and risk of hospitalization with pneumonia, a population-based care-control study.

Diabetes Care, 31(8), 41 – 5.
[25] Mbanya, J.C. (2009). Making a Difference to Global Diabetes. Diabetes Voice, 54(3),21 – 34.
[26] Mezie-Okoye, M. M., Babatunde, S. &Onwuchekwa, A. C. (2012). Prevalence of Hypertension in Kegbara-Dere, Rural Community in the Niger Delta Region, Nigeria. Public Medical,22(3), 340 -346.
[27] Nam, S., Chesla, C., Stotts, N. A., Kroon, L.& Jason, S. L. (2011). Barriers to Diabetes Management: Patient and Provider factors. Diabetes Research and Clinical Practice,92, 1- 9.
[28] National Bureau of Statistics (2007). The Nigerian Statistics facts Sheets on Economic and Social Development, p. 309.
[29] National Health Service (2010). NHS referee cost. Leeds.
[30] National Population Commission (2006). National Population Census, Federal Republic of Nigeria Official Gazette, 94,3-5. Lagos, Nigeria.
[31] Nwafor, A. &Owhoji, A.(2001). Prevalence of Diabetes Mellitus among Nigerians in Port-Harcourt Correlates with Economics Status. Journal of Applied Science and Environmental Management,7(5), 75-77.
[32] Nyenwe, E. A., Odia, O. J., Thekwaba, A. E., Ojule, A. &Babatunde, S. (2003). Type 2 Diabetes in Adult Nigerians: A study of its prevalence and risk factors in Port Harcourt, Nigeria. Diabetes Research and Clinical Practice, 62, 177-185.
[33] Oguniyi, L. T (2008). Profit efficiency among Cocoyam Producers in Osun State Nigeria. International journal of Agricultural Economics and Rural Development,1(1), 38 -46.
[34] Oguntola, S. (2011). Why men develop diabetes more easily than women. http://www.tribune.com.ng (retrieved 6th September, 2012).
[35] Okorji, E. C. &Obiechina, C. O. B. (1985). Bases for farm resources allocation in traditional farming system: A Comparative study of Productivity of farm resources in Abakiliki area of Anambra State, Nigeria'. Agricultural System,17, 197 -210.
[36] Oladepo, O. O., Salako, L., Sodiq, O., Shoyinka, K., Adedapo, K &Falase, A. O. (2010). A Prevalence of Cardiometabolic risk factors among rural Yoruba people of South Western Nigerian: A Population – based survey. Cardiovascular Journal of Africa,21 (1), 26 – 31.
[37] Qaisar, A. & Foreman-peck, J. (2007). Human Capital and Economic Growth: Pakistan, 1960 – 2003. NRPU Projects, Pakistan.
[38] Schulze, M. B. & Hu, F. B. (2005). Primary Prevention of Diabetes. What can be done and how much can be prevented? Annual Reviews Public Health,26, 445 – 467.
[39] Skyler, J. S. (2004). Effects of Glycemic Control on Diabetes Complications and on Prevention of Diabetes. Clinical Diabetes,22(4), 162 – 166.
[40] Soladoye, M. O., Chukuma, E. C. &Owa, F. P. (2012). An Avalanche of plant species for the traditional cure of diabetes mellitus in South-Western Nigeria. Journal of Natural Product and Plant Resources,2, 60 -72.
[41] Steyn, N. P., Mann, J., Bennett, P. H., Temple, N., Zimmet, P., Tuomilelto, J., Lindstrom, J.&Louheranta, A. (2014). Diet, Nutrition and the Prevention of type 2 Diabetes. Public Health Nutrition, 7(1), 147 – 165.
[42] Suleiman, A. S. & Festus, A. J. (2015). Cost of Illness among Diabetes mellitus patients in Niger Delta, Nigeria.Journal of Pharmaceutical Health Services Research, 6, 53-60.
[43] Ugwu, P. C. (2006). Effects of farmers' Health on the AgriculturalProductivity of thePrincipal farm operator in BorguIgbaofNigerState. Unpublished M.Sc thesis, University of Ibadan, Nigeria.
[44] Umeh, J.C. (1991). Rural Health and Labour Supplies: Empirical evidence from the World Bank – assisted Agricultural Development Project in KwaraState, Nigeria. Social Science Medicals, 32 (2), 151 – 60.
[45] Umoru, D. &Yaqub, J. O. (2013). Labour Productivity and Health Capital in Nigeria: The Empirical Evidence. Journal of Humanities and Social Science ,3 (4), 199-204.
[46] Unachukwu, C. N., Uchenna, D. I. & Young, E. (2008). Mortality among Diabetes in-patients in Port-Harcourt, Nigeria. African Journal of Endocrinology and Metabolism, 7, 1- 4.
[47] Unachukwu, C. N., Uchenna, D. I. & Young, E. (2008). Mortality among Diabetes in-patients in Port-Harcourt, Nigeria. African Journal of Endocrinology and Metabolism, 7, 1- 4.
[48] Upton, M. (1996). TheEconomicsof Tropical FarmingSystems. Cambridge: Cambridge University Press.
[49] Weil, D. (2001). Accountingforthe Health onEconomicGrowth.Memeo:Brown University Press .
[50] World Health Organisation (2004). The Global Burden of Diseases, Geneva
[51] World Health Organisation (2013)., Geneva. The World Health Report-Health System: Improving Performance.
[52] Yusuff, K., Obe, O. & Joseph, B. (2008). Adherence to anti-diabetic drug therapy and self-management practice among type -2 diabetic in Nigeria. PharmacWorld and Science, 30, 876 – 883.

Teran, A D. "Effects of Diabetic Prevalence and Mortality on Households Farm Labour Productivity in Benue State." IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS) 10.7 (2017): 63-72.