Statistical Overview of the Spread of Liver Cirrhosis and Hepatitis in Plateau State of Nigeria (A Case Study of Pankshin, Shendam and Langtang Local Government Areas)

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Abstract

The focus of this study is on the pervasiveness of liver cirrhosis and hepatitis diseases in Plateau State of Nigeria. From the secondary data collected from the three General Hospitals located in the three local government areas of Pankshin, Shendam and Langtang in the state, the study finds that although the diseases affect more adults than children, the rates at which they spread among the two age groups are not statistically, significantly different. The spread of the diseases among the three local government areas are also significantly equal. Hence, all efforts should be made by all and sundry to drastically ameliorate, if not completely eradicate the spread of the diseases, the research recommends.

Keywords: *Liver disease, alcoholic consumption, vomiting of blood, split-plot design.*

1.0 Introduction

Sound mind lives in a healthy body, health is wealth and health first are popular ways by which people acknowledge the essence of good health of mind and body. The need for good health of a person or nation can hardly be overemphasised. Despite the overall awareness and the general need for good health, different kinds of diseases have, since the origin of man, been in existence. Some of the diseases last long and cause havoc before they are got rid of. At one time or the other, in the history of mankind, one or more deadly diseases rear their ugly heads up, tormenting, harassing and buffeting man.

Liver cirrhosis and hepatitis are among the deadly diseases of these days.

Centers for Disease Control and Prevention (2012) states that liver cirrhosis occur when something attacks and damages the liver; liver cells are killed and scar tissue is formed. This scarring process is called fibrosis and it happens slowly over many years. Any illness that affects

the liver over a long period of time may lead to fibrosis and eventually, cirrhosis.

Cirrhosis of the liver, according to Duan (1983) is a disease which destroys liver cells. The liver cannot function well as an excretory organ which removes wastes from the blood if it is infected.

Heavy drinking and viruses (like hepatitis B and C) are common causes of cirrhosis. Brenda and Springg (2012) argue that hepatitis is most commonly caused by viral infection and that 3.2 million Americans and 170 million people worldwide are living with chronic form of the infection.

Cirrhosis may be caused by build-up of fat in the liver of people who are overweight or have diabetes. Liver disease can also be caused by inherited genes. Other causes of cirrhosis include certain prescribed and over-the-counter medicines, environmental poisons, and autoimmune hepatitis. Public Health Agency of Canada (2012) describes autoimmune disease as a situation in which the immune system may mistake the liver as a harmful object and begins to attack it, hindering liver function. Symptoms of cirrhosis can include serious problems like bleeding varices (internal bleeding from large blood vessels in the oesophagus), ascites (a build-up of fluid in the belly), encephalopathy (confusion from the build-up of toxins in the blood) or jaundice (yellowing of the eyes and skin). Bleeding vertices may make one vomit blood, or stool turn black and tarry. Ascites can make abdomen enlarge like a balloon filled with water, the legs can get swollen too, eating can be a problem because there is less room for food, breathing can be a problem especially when the victim is lying down (Arroyo et al, 2009; Caldwell et all, 1999; Sanyal et al, 2003).

Encephalopathy may lead to confusion in the brain due to toxic substances like ammonia (which comes from the intestine) and allowed to go into the brain instead of being got rid of by the liver, if the liver is not working well. Signs of encephalopathy include trembling and hand "flapping" and this may occur when there is infection or internal bleeding. Jaundice can be caused by too much alcohol and some medicines can also lead to jaundice.

Alcoholic hepatitis is a distinct manifestation of alcoholic liver disease that is characterized by jaundice and liver failure. This condition, Lucey et al (2009) assert, develops in person with a history of prolonged and heavy alcoholic use. A lot of studies have been carried out and a number of therapies have been evaluated for the treatment of alcoholic hepatitis but only two drugs have been incorporated in the treatment guidelines

published by the European Association of the Study of Liver (2012) and O'shea et al (2010).

Practicing good hygiene is the main way to avoid contacting hepatitis, Thomas et al (2009) affirms. To avoid further liver damage, patient who drink alcohol must stop all alcohol consumption. Diet of patient should be of low salt (sodium). It is not too much water intake that causes the build-up of ascetic fluid in the abdomen, but it is actually the body that is keeping in too much sodium (salt). Thus, it is important to cut down on salt intake not water intake. (D'Amice et al, 1995; Lewis and Stine 2013 and Zoma, 2013) are of the view that both hepatitis and liver cirrhosis can be treated. Diuretic therapy ("water pills") help the body to get rid of extra sodium and water through the kidneys.

A healthy labour force is regarded as the greatest asset to the growth of the economy anywhere in the world. Despite the general awareness of the importance of a healthy population to growth and national development, it was speculated that most localities in Plateau State had cases of Hepatitis which might eventually lead to cirrhosis. It was this speculation that made Odinachi et al (2014) carry out a study which revealed that 16.7% of the newly admitted students of the University of Jos were seropositive to Hepatitis B surface antigen (HBsAg).

In or to enhance a healthy labour force, Plateau State Government was poised and spurred to the establishment and commissioning of various General Hospitals within some highly populated Local Government Areas (LGAs). The researcher deems it absolutely necessary to further investigate the aforesaid speculation.

This study is therefore focussed on the overview of the spread of the reported cases of liver cirrhosis and hepatitis in Plateau State of Nigeria.

2.0 Methodology

Secondary data collected from the General Hospitals of Pankshin, Shendam and Langtang Local Government Areas of Plateau State were used for this study. Time series and split-plot statistical techniques are used for the analysis of the data. Time series model determines the rate of the spread of the two diseases, liver cirrhosis and hepatitis among children and adults in the LGAs. Split-plot design approach is used to test the hypothesis of the significance of:

1. The spread of the two diseases, liver cirrhosis and hepatitis;

i. Among the three local government areas (Pankshin, Shendam and Langtang).
ii. Between children and adults.

2. The interaction of the spread of the diseases;
   i. Among the three local government areas and the two age groups
   ii. Between the two diseases and the two age groups

Each of the hypotheses is tested at five percent (5%) level of significance.

3.0 Result and Discussion

Tables 1 and 2 show the distribution of liver cirrhosis between adults and children in the three local government areas of Pankshin, Shendam and Langtang of Plateau State. Similarly, tables 3 and 4 are the distribution of hepatitis between adults and children in the local government areas. Each of the tables is an extract from the appendixes while table 5 is the split-plot table that summarizes tables 1 to 4.

Time series model indicates that the trend of the spread of the two diseases among adults is

$$y_t = 224.2 + 3.7t \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

while it is

$$y_t = 24.2 + 1.6t \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

The split-plot model used in the study is given by

$$X_{ijk} = \mu + A_i + B_j + (AB)_{ij} + C_k + (BC)_{jk} + \varepsilon_{ijk} \ldots\ldots\ldots\ldots\ldots (3)$$

Where

$i = 1, 2, \ldots, r$

$j = 1, 2, \ldots, s$

$k = 1, 2, \ldots, t$

The result of the split-plot analysis is summarized in table 6 of this study.

The trends, as shown in equations (1) and (2) of this study, indicate that the spread of the two diseases are increasing among the child and also among the adults with a greater rate of increase among the adults. From table 6 of this study, the ANOVA table of the split-plot analysis shows that:

(1) Although there exists little mean difference in the spread of the two diseases among the three LGAs, Pankshin, Shendam and Langtang, the differences are, not at all, significant in view of the fact that the F-ratio of 'block' in the model shown in the ANOVA table is 0.21 while the table value is 6.94.

(2) There exist fairly large difference in the mean spread of the diseases among children and adults, the difference is fairly not significant since the F-ratio and the table values of the 'whole plot' in the model as shown in the ANOVA table, are 3.90 and 7.71, respectively. This result actually indicates that although the two diseases are mainly adult diseases, children are equally not exempted.

(3) Interaction exists between the spread of the diseases among the three LGAs and the two age groups, but the interaction is just not significant since the block and whole-plot (AxB) interaction indicates, in the ANOVA table, that F-ratio is 1.20 while the table value is 6.94. This implies that one should not liken the incidence of the diseases among the children or adults to any of the LGA's in particular.

(4) Interaction between the age group and the type of disease does not exist at all. This is made clear by the impossibility of the statistical interaction between the whole-plot and the split-plot (BxC).

4.0 Conclusion

Increase in the spread of the two diseases, among children and adults, with a greater rate of increase among the adults is one of the findings of this study. The study also shows that the spread of the diseases, Liver Cirrhosis and Hepatitis, among the three local government areas are significantly statistically equal. Moreso, there exists interaction, in the spread of the diseases among the LGA's and the age of the patients. However, the interaction is not significant. The study also indicates that interaction between the age of patients and the type of disease does not exist at all.

5.0 Recommendations

In view of the findings in this study, the researcher hereby recommends that since health is first for all and sundry, every person, group, institution, organization should make all efforts to drastically ameliorate the spread of the two diseases, liver cirrhosis and hepatitis, if not outright eradication.

This effort might be in the form of enlightenment of the people in all the LGA's of Plateau State and beyond. There should be control, in each area, over the consumption of alcoholic drinks since Lucey et al (2009) linked hepatitis disease with a history of prolonged heavy alcoholic drinks.

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Table 1: Adult Cases of Liver Cirrhosis (From Appendices 1 – 3)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Pankshin	22	42	62	11	22	19	15	15	39	26
Shendam	33	21	19	32	23	40	35	38	40	25
Langtang	62	71	49	42	39	41	59	62	78	98

Table 2: Children Cases of Liver Cirrhosis (from Appendices 1 – 3)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Pankshin	0	5	2	0	1	1	0	0	0	1
Shendam	1	4	5	3	2	6	5	4	1	3
Langtang	2	1	1	3	0	1	3	4	3	2

Table 3: Adult Cases of Hepatitis (from Appendices 1 – 3)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Pankshin	48	33	46	16	8	3	5	4	41	92
Shendam	24	22	28	29	52	36	40	29	50	63
Langtang	61	41	39	28	40	51	64	49	58	62

Table 4: Children Cases of Hepatitis (From Appendices 1 – 3)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Pankshin	7	8	1	3	0	1	3	2	5	13
Shendam	5	5	3	3	6	10	7	6	19	15
Langtang	7	5	3	4	7	2	5	4	6	11

Table 5: Split-plot table for the study (summary computation of tables 1-4)

	Pankshin		Shendam		Langtang	
	Children	Adult	Children	Adult	Children	Adult
Liver Cirrhosis	10	273	34	306	20	601
Hepatitis	43	296	79	373	54	494

Table 6: ANOVA Table of the split-plot analysis

Source of Variation	DF	SS	MS	F-ratio	F-table Value
A	2	39186.5	19513.25	0.21	6.94
B	1	368550.75	368550.75	3.90	7.71
AB	2	226626.5	113313.25	1.20	6.94
C	1	752.08	752.08	0.01	7.71

BC	1	-	-	-
Error	4	377,693.17	94423.29	
Total	11	1012809		

APPENDIX 1

PLATEAU STATE MINISTRY OF HEALTH

GENERAL HOSPITAL PANKSHIN

PANKSHIN L.G.C.

REPORTED CASES OF LIVER CIRRHOSIS AND HEPATISIS

AT

GENERAL HOSPITAL PANKSHIN

(A) Liver Cirrhosis

	Children			**Adult**		
Year	**M**	**F**	**Total**	**M**	**F**	**Total**
2004	-	-	0	15	7	22
2005	2	3	5	26	16	42
2006	1	1	2	46	16	62
2007	-	-	0	6	5	11
2008	-	1	1	11	11	22
2009	1	-	1	15	4	19
2010	-	-	0	8	7	15
2011	-	-	0	6	9	15
2012	-	-	0	27	12	39
2013	1	-	1	17	9	26
Total	**4**	**5**	**9**	**177**	**96**	**273**

Source: General Hospital, Pankshin, Plateau State

(B) Hepatitis

	Children			**Adult**		
Year	**M**	**F**	**Total**	**M**	**F**	**Total**
2004	4	3	7	30	18	48
2005	4	4	8	21	12	33
2006	-	1	1	23	23	46
2007	1	2	3	10	6	16
2008	-	-	0	7	1	8
2009	1	-	1	3	-	3
2010	2	1	3	4	1	5
2011	-	2	2	1	3	4

2012	3	2	5	19	22	41
2013	8	5	13	50	42	92
Total	**22**	**20**	**42**	**168**	**128**	**296**

Source: General Hospital, Pankshin, Plateau State

APPENDIX 2

PLATEAU STATE MINISTRY OF HEALTH

GENERAL HOSPITAL SHENDAM

SHENDAM L.G.C.

REPORTED CASES OF LIVER CIRRHOSIS AND HEPATISIS

AT

GENERAL HOSPITAL SHENDAM

(A) Liver Cirrhosis

	Children			**Adult**		
Year	**M**	**F**	**Total**	**M**	**F**	**Total**
2004	1	-	1	21	12	33
2005	3	1	4	15	6	21
2006	3	2	5	19	0	19
2007	2	1	3	26	6	32
2008	1	1	2	12	11	23
2009	4	2	6	32	8	40
2010	3	2	5	30	5	35
2011	1	3	4	24	14	38
2012	1	-	1	33	7	40
2013	1	2	3	13	12	25
Total	**20**	**14**	**34**	**309**	**64**	**373**

Source: General Hospital, Shendam, Plateau State

(B) Hepatitis

	Children			**Adult**		
Year	**M**	**F**	**Total**	**M**	**F**	**Total**
2004	2	3	5	15	9	24
2005	4	1	5	9	13	22
2006	3	-	3	12	15	28
2007	1	2	3	11	18	29
2008	4	2	6	29	23	52
2009	6	4	10	24	12	36
2010	2	5	7	27	13	40
2011	4	2	6	25	4	29

2012	11	8	19	24	26	50
2013	9	6	15	38	26	63
Total	**48**	**33**	**81**	**144**	**162**	**306**

Source: General Hospital, Shendam, Plateau State

APPENDIX 3

PLATEAU STATE MINISTRY OF HEALTH

GENERAL HOSPITAL LANGTANG

LANGTANG L.G.C.

REPORTED CASES OF LIVER CIRRHOSIS AND HEPATISIS

AT

GENERAL HOSPITAL LANGTANG

(A) Liver Cirrhosis

YEAR	CHILDREN	ADULT
2004	2	62
2005	1	71
2006	1	49
2007	3	42
2008	0	39
2009	1	41
2010	3	59
2011	4	62
2012	3	78
2013	2	98
Total	**20**	**601**

Source: General Hospital, Langtang, Plateau State

(b) Hepatitis

Year	Children	Adult
2004	7	61
2005	5	41
2006	3	39

2007	4	28
2008	7	40
2009	2	51
2010	5	64
2011	4	49
2012	6	58
2013	11	62
Total	**54**	**493**

Source: General Hospital, Langtang, Plateau State