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RESEARCH ARTICLE

KNOWLEDGE, RISK FACTORS AND PREVALENCE OF HEPATITIS B VIRUS INFECTION AMONG DONKEY BUTCHERS IN EBONYI STATE, NIGERIA

***Elom, P.O.,[1], Una, A.F.I.[2] and Onwasigwe, C.N.[3]**

[1]Department of Community Medicine, Ebonyi State University, Abakaliki, Ebonyi, State, Nigeria; [2]Department of Community Medicine, Alex Ekwueme Federal University Teaching Hospital, Abakaliki, Ebonyi State, Nigeria; [3]Department of Community Medicine, University of Nigeria Teaching Hospital, Enugu, EnuguState, Nigeria

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Corresponding author: *Elom

ABSTRACT

The study focused on the **Introduction:** Butchers including donkey butchers are among the high risk groups of HBV infection, which impacts high economic, morbidity and mortality challenges to the infected. As a silent killer disease that exists more in chronic form, the infected butchers and herders can transmit to unsuspected persons. There were many consumers of donkey meat in Ebonyi State, who also served as distribution points to other neighbouring states. Hepatitis B virus infection is regarded as the 4th biggest killer among the world's infectious diseases with 1.2 million deaths per year, after tuberculosis (3 million), diarrhoeal diseases (3.2 million) and acute respiratory infections (4.3 million) due to complications arising from liver cirrhosis and hepatocellular carcinoma. Various National surveys found 11.2% Nigerians chronically living with hepatitis B virus infection. In Ebonyi State, a prevalence of 8.9% has been documented among sexually active youths. **Objective**: This was to study the knowledge, risk factors and prevalence of HBV infection among donkey butchers in Ebonyi State, Nigeria. **Methods:** This was a mixed method cross-sectional study using a systematic sampling method to select 125 respondents in four donkey markets from three senatorial districts of Ebonyi State. Data collection was carried out using semi-structured questionnaires, focus group discussion (FGD) and key informant interviews (KII).Serological test was also done for identification of HBV surface antigen which indicated reaction to HBV infection using high sensitive HBV Enzyme-linked Immunosorbent Assay test kits;use of semi-structured interviewer administered questionnaires to quantify respondents' HBV knowledge and practices within the donkey markets. Thereafter, qualitative data were collected through focus group discussions and key informant interviews to support the findings of the quantitative data. Quantitative data were analyzed using IBM-SPSS Statistics version 26.0 and Microsoft Excel Spreadsheet version 2013. Chi-square, Student *t*-test and multivariate logistic regressions were computed with level of significance set at $p<0.05$, while qualitative data were analyzed by manual Content Analysis using predetermined thematic areas. **Results:** Showed that mean age as at last birth day (Mean ±SD) was42.5±15.8. Majority of the donkey butchers had poor HBV knowledge109 (87.2%) which was corroborated by the qualitative aspects of FGD and KII. Majority of the herders have spent more than 10 years in the market while very few were found to have had any piercing or cut or head injuries, any other wounds or accidents while working in donkey markets. Prevalence of HBV infection among donkey butchers was 8.0%. Only duration of stay was found to be associated with prevalence of HBV ($p=0.047$).

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INTRODUCTION

Current rates of viral hepatitis infection in Nigeria are reflective of the global disease burden involving hundreds of millions of persons. One in every 12 persons worldwide is living with viral hepatitis; approximately 350–370 million persons are infected with chronic hepatitis B virus and another 130–170 million are living with chronic hepatitis C virus infection.[1]

Globally, an estimated 78% of primary liver cancer and 57% of liver cirrhosis cases are caused by viral hepatitis, and 1 million deaths from viral hepatitis occur each year.[2] Across the country, the male to female distribution varies and children are not spared. Cases of viral hepatitis are most commonly found among the age group of 21 to 40 years.[3] Medical personnel, especially surgeons and dentists are at the greatest risk of infection, while other health workers, commercial sex workers, other occupations such as butchers and drivers have also been found to be at significant risk of getting infected.

There is a strong relationship between HBV infection and various forms of Chronic Liver Disease (CLD), including chronic hepatitis, liver cirrhosis and hepatocellular carcinoma. Overall, the risk factors in Nigeria include local circumcision, local uvulectomy, and scarification on the body, tribal marks, surgical procedures, body piercing, delivery at home and receiving blood transfusion.[3] Viral Hepatitis B is a major cause of liver cirrhosis and liver cancer in Nigeria. Some populations, such as men who have sex with men (MSM) and injection drug users (IDUs), have high risk of viral Hepatitis B infection.[4]Most infections in Nigeria occur through horizontal transmission. Hepatitis B virus is 50-100 times more infectious than Human Immunodeficiency Virus (HIV).[4,5]Butchers are more exposed to physical hazards such as knife cuts, punctured wounds, head injury, rashes, and accidents.[6,7,8] Knowledge of viral hepatitis remains limited amongst the general public, at-risk populations, policymakers, and even health-care providers although it is a leading infectious cause of death and claims the lives of many Nigerians each year.[3] As a consequence, most of the 17-21 million Nigerians estimated to be living with viral Hepatitis B do not know that they are infected, placing them at greater risk for severe, even fatal, complications from the disease and increasing the likelihood that they will spread the virus to others.

Previous studies done on HBV infection among butchers showed that slaughter house workers (SHWs) are at higher risk of infectious hepatitis that can be multifactorial and can be evaluated for viral, bacterial and parasitic organisms.[4,9,10] Published research findings were very scarce with respect to study specific for prevalence of Hepatitis B virus infection among donkey butchers in regions of the country, including South East and Ebonyi State in particular, hence the need for this study. Few studies done in Ebonyi State were silent on viral composition of HBV in donkeys and their handlers. The increasing number of patronage for the meat in some parts of Nigeria[11],[12,13] and perceived poor knowledge of HBV infection among the butchers will further enhance the infection spread. Therefore the study was aimed at assessing the knowledge, risk factors and prevalence of HBV infection among donkey butchers in Ebonyi State, Nigeria.

MATERIALS AND METHODS

Description of the study area: Ebonyi State is one of the 36 states in Nigeria and situates at the South Eastern region of the country. It lies at the coordinates of $6^{0}15^{1}$N, $8^{0}05^{1}$E, covering an area 5,533km^2; bounded in the north by Benue State, south by Abia, East by Cross River and West by Enugu States. The state has a population of about 3.5 million by projection of 2006 National census which recorded Ebonyi State population as 2.1 million. There are 13 local Government areas in the state, with capital at Abakaliki, largely inhabited by Igbo speaking tribes. The dialects includeEhugbo, Edda, Izzi, Ezza, Ngbo/ Izhiangbo, Ikwo, Nkalagu/Nkalaha and Ishielu, Eda, Okposi, Uburu, Onicha, Ishiagu, Etc, while Kori language speaking inhabitants are also found in some villages in Ishielu and Ohaukwu Local Government Areas. The people are mainly agrarian in nature, about 95% of the population. In 2016, the human development index (HDI) was put at 0.434 which ranked the state 24th out of 36 states of the country.[14,15] There are four major markets in the state where donkeys are sold, slaughtered and their meat sold to consumers. However, there is no health authority that regulatesthe animal procurement, slaughter, processing and selling of the meat.

Inclusion criteria

- Healthy donkey butchers in Ebonyi State donkey markets.
- Butchers of donkeys who have worked in the markets for at least 12 weeks (3 months) prior to the commencement of the study.
- Butchers of donkeys who have place of displaying their trade in the markets

Exclusion criteria

- Intravenous drug abusers or indiscriminate injection users among donkey butchers
- Donkey butchers who are diagnosed of hepatitis B, including cirrhosis and hepatocellular carcinoma.
- Donkey butchers who refused to sign the consent form

Sample size determination: The following formula (Cochrane formula) was used to determine the sample size which is appropriate for cross sectional studies. Sample size, $n = Z^2pq/d^2$ Where Z = standard normal distribution at 95% confidence interval = 1.96 (constant); p = prevalence based on the local prevalence of previous study, 11.6%[16]; q = 1.00 minus p (1 - p); d = desired level of precision (that is, the margin of error) set at 0.05. A sample size of 125 was arrived at.

Sampling Technique: The respondents were selected through Systematic random sampling method. Proportionate allocation was used to arrive at the number selected from each market.

Study Instruments: These comprised of the following: 1. Questionnaires, 2. Laboratory reagents/HBV test kits, 3. Focus group discussion guide, and 4. Key informant interview guide. The questionnaire was adapted from previous studies.[17,18,19,20]There were four sections in the questionnaires (A - D) which were interviewer – administered. Information were collected from each of the respondents on every section of the questionnaires, including A. demographic characteristics of the respondents, B. past medical and social history, C. knowledge about HBV infections, D. physical hazards investigation of the respondents. The laboratory materials (LabACON HBV test kits, reagent, needles, swabs, spirit, tourniquet, sharps bin, consumables' disposal bag, cryo tubes containers, specimen bottles with racks, latex gloves, face masks) were used by the Laboratory Scientists (research assistants) to collect the appropriate blood samples, run the tests and obtain information on the actual number of participants infected with the virus under study using Hepatitis B serological markers, in this instance, presence or absence of Hepatitis B surface antigens. The focus groups discussion guide was used to better understand the respondents' perceptions, practices and factors which influenced the transmission of Hepatitis B virus infection. The key informant interview of the leaders of donkey butchers was used to collect information on the knowledge and practical measures employed by the donkey butchers to control Hepatitis B virus and halt its transmission within the abattoirs. This was used to validate the reported practice in the questionnaire.

Data collection Methods

Questionnaire data collection: Information was collected from the respondents using the variables contained in the 4 sections of the coded structured questionnaires by the trained interviewers through English language. In some instances, interpreters in Hausa language were employed to explain English language terms to illiterate respondents, who did not understand, whereas Igbo language interpreters were also engaged to interpret English language to the illiterate Igbo respondents. Some of the respondents however preferred use of Pidgin English and were allowed.

Serological component during the laboratory procedure, by using 5ml syringes/needles and plain tubes, after cleaning the sites with alcohol solution soaked swabs, three milliliters (3ml) of intravenous blood samples were collected by the experienced laboratory scientists through puncture of either the radial or brachial veins from each of the participants. The blood samples were allowed to clot for 30 minutes as recommended by the RDT kits producer, thereafter centrifuged for 20 minutes; serum were separated, and transferred into cryo-tubes. The samples were transported to Alex Ekwueme Federal University Teaching Hospital, Abakaliki (AEFUTHA) Laboratory in a cold box for HBV serological tests; which were carried out on the same day of arrival to control for pre-analytical problems that could have occurred due to multiple freeze-thaw cycles of the serum. Laboratory tests were validated and quality control monitored by running positive and negative controls along with each batch of Enzyme – linked immunosorbent assay (ELISA) test kits. The blood samples were tested for Hepatitis B surface antigen (HBsAg) using a rapid diagnostic test kit (LabACON, batch number: RP5110303) that had high sensitivity (>99.9%), 95%C.I (98.2%-100%), high specificity (99.0%), 95%C.I:97.2%-99.8%) and accuracy of 99.4% (95%C.I: 98.3%-99.9%). Positive results were considered HBV current or past infection (ever infected). Serum samples of reactive assays were left in the cryo bottles and stored in freezer at -20^{oC}for quality control, whereas negative samples were discarded appropriately.

Qualitative component: Qualitative data was collected through use of focus group discussions (FGDs) guide and key informant interviews (KIIs) guide. In each session of the FGD, 8 members of the participants were purposively selected among the respondents through non-probability sampling method to ensure that the right respondents in terms of knowledge participated. Among the research assistants were selected time keeper, scribe/note taker and video shooter, while the principal investigator moderated, using the prepared topic guide. There was a total of 4 rounds/sessions of FGDs, that is, one group of discussants per each of the four abattoirs in the four markets. Six (6) KIIs were carried out and respondents included executive members of the association. English and Igbo languages were used by the interviewers to extract information from the respondents during both the FGDs and KII. Participants were assured that whatever information they gave was carefully managed and kept in confidencial among the research team.

Data Management

Measurement of variables: There were 16 independent variables which made up the socio-demographic characteristics of the respondents such as age, marital status, level of education, occupation, religion, employment status, number of rooms in residence, and past medical and social history of respondents. The dependent variables (36) were made up of knowledge about Hepatitis B virus infection, practices and risk factors among the respondents and environmental conditions of the abattoirs and prevalence of HBV among donkey butchers. Twenty (20) questions were used to compute a composite variables to assess knowledge of HBV infection among the respondents.

For each correct answer, a score of one was awarded and zero awarded to wrong answers. The total score was calculated and converted to percentage. This was used to grade knowledge into good or poor knowledge, with 50% as the cut-off. Scores 51% to 100% were graded as good knowledge while scores zero to 50% were regarded as poor knowledge. Physical hazards investigation for donkey marketers were made up of 8 variables used to find out those activities carried out in the donkey markets that made them vulnerable to infectivity by the virus. The variables included, how long one has worked in the abattoir, having had any piercing or cut or head injuries, any other wounds or accidents while working in donkey markets. Questions with 'yes' or 'No' options was used to determine the respondents risky levels. The differences in proportions of the respondents' responses were statistically tested with Chi square to determine association with HBV infection and none of the variables was found to be associated.

Data analysis: The data were double entered first into Microsoft excel worksheet, version 2013, for validation and consistency checking before being transferred toInternational Business Machine-Statistical Package for Social Sciences (IBM – SPSS) version 26.0 software for statistical analysis performance. The data was cleaned by running the respondents' frequencies of responses.Means, standard deviationand proportions were calculated for the respondents' socio-demographic, behavioural and the outcome variables. The prevalence of HBV was expressed in simple proportions. Chi-square test (X^2) was used to determine the relationship between HBV assay results and proportions of the dependent variables in the sections. Level of statistical significance was set at $p<0.05$ with 95% confidence interval. A probability value of less than 0.05 was taken as significant.

Ethical consideration: Ethical clearance for this study was obtained from the Research and Ethics Committee of Alex Ekwueme Federal University Teaching Hospital, Abakaliki (AE-FUTHA), reference number FETHA/REC/ VOL.2/2019/….Consent to carry out the study was also obtained from the leaders of the donkey markets and the respondents. Only those selected respondents who gave consent by signing the informed consent form participated in the study.

RESULTS

There were 125 donkey handlers proportionately selected from four donkey markets across the 3 senatorial zones of Ebonyi State in Ohaukwu, Ishielu and Onicha Local Government Areas of the state to assess their HBVinfection Knowledge, Risk Factors and prevalence. The response rate was 100%. In table 1, Mean age of respondents' as at last birth day 42.5(15.8).

Table 1. Socio-demographic characteristics of the respondents - Original

Variables	Butchers (n=125) N(%)
Age as at last birth day (Mean ±SD) in years	42.5 (15.8)
Age group	
18-27 years	30 (24.0)
28-37 years	27 (21.6)
38-47 years	28 (22.4)
48 and above years	40 (32.0)
Sex	
Male	71 (56.8)
Female	54 (43.2)
Marital status	
Married	90 (72.0)
Single	18 (14.4)
Widowed/Divorced	17 (13.6)
Religion	
Christianity	119 (95.2)
Islam	1 (0.8)
Traditionalist	5 (4.0)
Level of Education completed	
No formal education	36 (28.8)
Primary	38 (30.4)
Junior Secondary	6 (4.8)
Senior Secondary	33 (26.4)
Tertiary	12 (9.6)
Arabic	0 (0.0)
Employment Status	
Self employed	114 (91.2)
Paid employment	7 (5.6)
Unemployed	4 (3.2)
Number of rooms in residence	
Multiple rooms apartment	56 (44.8)
Single room apartment	37 (29.6)
Self-contained apartment	32 (25.6)

Table 2. Respondents past medical and social history – Original

Variables	Butchers (n=125) N(%)
Has been hospitalized before	
Yes	40 (32.0)
No	85 (68.0)
Smokes Cigarette	
Yes	18 (14.4)
No	107 (85.6)
Takes Alcohol	
Yes	66 (52.8)
No	59 (47.2)
Has more than one sexual partner	
Yes	25 (20.0)
No	100 (80.0)
On any drugs of addiction	
Yes	9 (7.2)
No	116 (92.8)
Have ever had any casual sexual intercourse	
Yes	26 (20.8)
No	99 (79.2)
Have received blood transfusion or any blood product within the last 1 year	
Yes	5 (4.0)
No	120 (96.0)

There were more males 71(56.8%) than females 54(43.2%) among the respondents. In addition, more married respondents 90 (72.0%) participated in the study compared with single and divorced/widowed. The religion of the respondents were mainly Christianity 119(95.2%). Highest level of educational attainment was primary school for about one-third of respondents 38(30.4%), whereas majority of the respondents were self-employed 114(91.2%) and over half lived in multiple apartments 56(44.8%). On the knowledge of respondents about HBV infection, tables 3A&B, the proportion of the respondents who have heard about hepatitis B virus infection was 53(42.4%), while majority of the believed that they were not in any way prone to contract HBV infection 101(80.8%). Majority of the respondents also did not believe that they can contract the infection through knife cuts 97(77.6%), piercing wound 122(97.6%), through accidents 123(98.4%) and through risky behaviours such as life donkey handling and processing 120(96.0%). The poor knowledge continued as follows: not aware that HBV can be contracted through sexual intercourse 98(78.4%), not aware that HBV can be prevented 84(67.2%), though 70(56.0%) proportion reported that the infection can be prevented by personal hygiene. The composite grade of respondents' knowledge of HBV infection showed only 12.8% had good knowledge. Eight percent (8.0%) of the respondents were found to be reactive to HBV assay.

Table 3A. Butchers' knowledge about HBV infection – Original

Variables	Butchers (n=125) N(%)
Ever heard of HBV	
Yes	53 (42.4)
No	72 (57.6)
Source of information	
Radio	26 (20.8)
Friend	8 (6.4)
Hospital	7 (5.6)
Phone	7 (5.6)
Market	4 (3.2)
No response/Don't know	73 (58.4)
Meaning of HBV	
Can't remember	8 (6.4)
Disease	28 (22.4)
Infection	16 (12.8)
Don't know	73 (58.4)
Can contract HBV infection as a butcher or herder	
Yes	24 (19.2)
No	101 (80.8)
Can contract the infection through knife cuts	
Yes	28 (22.4)
No	97 (77.6)
Can contract the infection through piercing wound	
Yes	3 (2.4)
No	122 (97.6)
Can contract the infection through accident	
Yes	2 (1.6)
No	123 (98.4)
Can contract the infection through risky behaviours e.g. life donkey handling and meat processing	
Yes	5 (4.0)
No	120 (96.0)
Aware that HBV can be contracted through sexual intercourse	
Yes	27 (21.6)
No	98 (78.4)

Table 3B. Butchers' knowledge about HBV infection – Original Contd

Variables	Butchers (n=125) N(%)
HBV can be prevented	
Yes	41 (32.8)
No	84 (67.2)
Knows that HBV can be prevented by vaccination	
Yes	38 (30.4)
No	
HBV infection can be prevented through environmental sanitation	
Yes	31 (24.8)
No	94 (75.2)
HBV infection can be prevented through wearing protective device	
Yes	7 (5.6)
No	118 (94.4)
HBV infection can be prevented through keeping to one sexual partner	
Yes	4 (3.2)
No	121 (96.8)
HBV infection can be prevented by wearing condom before sexual intercourse with unusual sexual partner	
Yes	13 (10.4)
No	112 (89.6)
Knows that infection with HBV can cause liver cancer	
Yes	15 (12.0)
No	110 (88.0)
Aware that HBV infection can be controlled with drugs	
Yes	32 (25.6)
No	93 (74.4)
Ever vaccinated	
Yes	4 (3.2)
No	121 (96.8)
Completed HBV vaccination	
Yes	2 (1.6)
No	123 (98.4)
Other ways HBV infection can be prevented is personal hygiene	
Yes	70 (56.0)
No	55 (44.0)

Table 4. Respondents' assessment of the donkey markets' environment – Original

Variables	Butchers (n=125) N(%)
Duration of stay	
Mean (SD) in years	10.8 (8.6)
Days of week these markets open	
Daily	47 (37.6)
Once a week	78 (62.4)
Have workers who sweep the markets	
Yes	104 (83.2)
No	21 (16.8)
Frequency of washing or cleaning effluent drainage system	
Daily	23 (18.4)
Weekly	76 (60.8)
Monthly	11 (8.8)
No drainage	15 (12.0)
Frequency of health officials inspection of the donkeys	
Daily	17 (13.6)
Weekly	18 (14.4)
Monthly	17 (13.8)
No inspection	18 (14.4)
Occasionally	7 (5.6)
Don't know	48 (38.4)
Handling of sick donkeys	
Isolated from others	45 (36.0)
Treated	16 (12.8)
Not treated	37 (29.6)
Don't know	27 (21.6)
Handling of carcass of dead donkeys	
Dismembered and sold to the public	24 (19.2)
Cremated	1 (0.8)
Buried	75 (60.0)
Thrown to the bush to rot away	8 (6.4)
Don't know	17 (13.6)
Pattern of disposal of animal dungs and related stuff	
Open dumping on land surface	93 (74.4)
Dump into nearby stream/rivers	2 (1.6)
Drying and burning to ashes	5 (4.0)
Burying inside soil	23 (18.4)
Used for manure	2 (1.6)

Table 5. Between groups comparison of respondents' acquiring physical hazards – Original

Variables	Butchers N(125) N (%)
Duration of stay as donkey handler	
1 – 12 months	8 (6.4)
2 – 4 years	29 (23.2)
More than 4 years	88 (70.4)
Had any injury as a donkey butcher or herder	
Yes	63 (50.4)
No	62 (49.6)
If yes to above, how treated	
Nothing	19 (15.2)
Seek for doctor or medical help	28 (22.4)
Buy drug from chemist shop	78 (62.4)
Had donkey blood splash into your orifices: eyes, nostrils, ears, mouth	
Yes	31 (24.8)
No	94 (75.2)
Had other wounds or accidents while working in donkey markets	
Yes	25 (20.0)
No	100 (80)
Had other wounds or accidents while working in donkey markets, specify	
Donkey kick	1 (0.8)
Fall with bruises	9 (7.2)
Head injury	1 (0.8)
Knife cut	14 (11.2)
None	100 (80.0)

Table 4 was on the respondents' assessment of the donkey markets' environment, and shows that the mean duration of stay in years of the respondents was 10.8(8.6). Majority of the respondents 78(62.4%) reported that the market opens for business once a week and have workers who sweep the markets 104(83.2%). There were divergent reports of frequency of health officials' inspection of the donkeys, but majority of the respondents reported that they don't know 48(38.4%).

On the donkeys' handling, whereas majority of the respondents reported that 45(36.0%) of the sick donkeys were isolated, the report was closely followed by respondents who reported that the donkeys were not treated 37(29.6%). Highest proportion of the respondents 75(60.0%) reported that the dead donkeys were buried. Open dumping on land surface 93(74.4%) was the highest pattern of disposal methods practiced in the abattoirs. Assessment of the respondents' exposure to hazards in the abattoirs showed that 88(70.4%) proportion of the respondents

Table 6. Relationship between butchers' HBV assay result with age and duration of stay in abattoir (N=125) – Original

Variables	Total N(%)	Reactive, R N(%)	Non-Reactive, NR, N(%)	t-test	p-value	Confidence interval (C.I)
Age in years mean(SD)	125(100)	45(13.42)	80(16.07)	0.526*	0.600	Lower-7.61
Age group(years)						Upper+13.12
18-27	24(100)	1(4.3)	23(95.7)	FT=0.637	0.939	
28-37	33(100)	3(7.4)	30(90.9)			
38-47	26(100)	2(7.7)	24(92.3)			
48 and above	42(100)	4(9.5)	38(90.5)			
Duration of stay						
years Mean(SD)	125(100)	10 (15.90)	115(10.30)	2.005*	0.047	Lower 0.069 Upper 11.138
Duration of stay years group						
1-25	117(100)	8(6.9)	109(93.1)	3.308	0.069	
26-35	8(100)	2(25.0)	6(75.0)			

FT=Fishers exact test *=Sample t-test

Table 7. Relationship of butchers' socio-demographic characteristics with HBV assay result (N=125) – Original

Variables	Total N (%)	Reactive, R, N (%)	Non-Reactive, NR N(%)	$\chi2$	p-value
Sex of respondents					
Male (% within HBV Status)	71(100)	7 (9.9)	64 (90.1)	0.772	0.512
Female (% within HBV Status)	54(100)	3 (5.6)	51 (94.4)		
Marital status of respondents					
Married	90(100)	7 (7.8)	83 (92.2)	FT(0.866)	1.000
Single	18(100)	2 (11.1)	16 (88.9)		
Widowed/divorced	17(100)	1 (5.9)	16 (94.1)		
Religion of respondents					
Christianity	119(100)	10 (8.4)	109 (91.6)	FT(0.548)	1.000
Traditionalist	5(100)	0 (0.0)	5 (100)		
Islam	1(100)	0 (0.0)	1 (100)		
Level of education completed					
No formal education	36(100)	2 (5.6)	34 (94.4)	FT(1.004)	1.000
Primary	38(100)	2 (5.3)	36 (94.7)		
Junior secondary	6(100)	1 (16.7)	5 (83.3)		
Senior secondary	33(100)	5 (15.2)	28 (84.8)		
Tertiary	12(100)	0 (0.0)	12 (100)		
Respondents employment status					
Self employed	114(100)	8 (7.0)	106 (93.0)	FT(4.197)	0.127
Paid employment	7(100)	2 (28.6)	5 (71.4)		
Unemployed	4(100)	0 (0.0)	4 (100)		
Respondents' main occupation					
Donkey meat business	97(100)	8 (8.2)	89 (91.8)	FT(3.125)	0.452
Farmer	22(100)	1 (4.5)	21 (95.3)		
Civil servant	3(100)	1 (33.3)	2 (66.7)		
Student	3(100)	0 (0.0)	3 (100)		
Number of rooms in respondents residence					
Multiple rooms apartment	56(100)	5 (8.9)	51 (91.1)	FT(0.555)	0.837
Self-contained apartment	32(100)	3 (9.4)	29 (90.6)		
Single room apartment	37(100)	2 (5.4)	35 (94.6)		

FT=Fishers exact test $\chi2$=Chi square test

Table 8. Relationship of butchers' past medical and social history with HBV assay result (N=125) – Original

Variables	Total N (%)	Reactive, R	Non-Reactive, NR	$\chi2$	p-value
Has been hospitalized before					
Yes	40(100)	3 (7.5)	37 (92.5	0.020	1.000
No	85(100)	7 (8.2)	78 (91.8)		
Smoke cigarette					
Yes	18(100)	2 (11.1)	16 (88.9)	0.277	0.636
No	107(100)	8 (7.5)	99 (92.5)		
Take alcohol					
Yes	66(100)	7 (10.6)	59 (89.4)	1.290	0.212
No	59(100)	3 (5.1)	56 (94.9)		
Has more than one sexual partner					
Yes	25(100)	2 (8.0)	23 (92.0)	0.000	1.000
No	100(100)	8 (8.0)	92 (92.0)		
On any daily drug(s) of addiction					
Yes	9(100)	0 (0.0)	9 (100)	0.843	0.613
No	116(100)	10 (8.6)	106 (91.4)		
Have had any casual sexual intercourse					
Yes	26(100)	2 (7.7)	24 (92.3)	0.004	1.000
No	99(100)	8 (8.1)	91 (91.9)		
Have received blood transfusion or any blood products before					
Yes	5(100)	1 (20.0)	4 (80.0)	FT(1.019)	0.346
No	120(100)	9 (7.5)	111 (92.5)		

$\chi2$=Chi square test FT=Fishers exact test

Table 9. Relationship of butchers' risk factors and practices in the abattoirs and HBV Assay result (N=125) – Original

Variables	Total N (%)	Reactive, R N(%)	Non-Reactive, NR N (%)	χ2	p-value
Ever been vaccinated					
Yes	4(100)	0 (0.0)	4 (100)	0.359	1.000
No	121(100)	10 (8.3)	111 (91.7)		
Complete anti-hepatitis B virus vaccination					
Yes	2(100)	0 (0.0)	2 (100)	0.177	1.000
No	123(100)	10 (8.1)	113 (91.9)		
Donkeys inspected by health officials before slaughter					
Yes	59(100)	5 (8.5)	54 (91.5)	0.034	1.000
No	66(100)	5 (7.6)	61 (92.4)		
Activity performed in this abattoir					
Slaughter	60(100)	5 (8.3)	55 (91.7)	0.017	1.000
Meat seller	65(100)	5 (7.7)	60 (92.3)		
Any piercing or cut or head injury as slaughter or meat seller					
Yes	10(100)	5 (7.9)	5 (50.0)	0.001	1.000
No	62(100)	57 (49.6)	5 (50.0)		
Share/exchange/borrow knives from fellow butchers or meat sellers					
Yes	54(100)	2 (3.7)	52 (96.3)	2.384	0.185
No	71(100)	8 (11.3)	63 (88.7)		
Had donkey blood splash into your orifices; mouth, eyes nostrils and ears					
Yes	31(100)	3 (9.7)	28 (90.3)	0.158	0.708
No	94(100)	7 (7.4)	87 (92.6)		
Had any other wounds or accidents while working in the donkey abattoirs					
Yes	25(100)	4 (16.0)	21 (84.0)	2.717	0.210
No	93(100)	6 (6.4)	87 (92.6)		

χ2=Chi square test

have stayed in the markets more than 4 years; 63(50.4%) have had injury as a donkey butcher, among which 78(62.4%) took treatment from the chemist shop, 31(24.8%) reported having had blood splash in their orifices: eyes, nostrils, ears and mouth. Among the respondents who reported other wound or injuries while working as donkey butchers, the highest was knife cut 14(11.2%). However, majority had no reported injury 100(80.0%) (Table 5). Relationship between butchers' HBV assay result with age and duration of stay in abattoir showed that the mean age in years as at last birth day was 45.00(13.42) and 42.24(16.07) for reactive and non-reactive samples respectively. However their differences were not statistically significant (t = 0.526,p=0.600 at 95% C.I = -7.61+12.12). There was a statistically significant difference (t=2.005, p=0.047 at 95% C.I=0.069+11.138) in mean duration of stay in years of butchers at the abattoirs between HBV reactive and non-reactive samples 10(15.90) and 115(10.30) respectively but not statistically significant when dichotomized (χ2=3.308,p=0.069) (Table 6). On the Relationship of butchers' socio-demographic characteristics with HBV assay, table 7, result showed that there were non-statistically significant differences in the comparison of proportions in all the variables among respondents' socio-demographic characteristics compared with their respective HBV reactive and non-reactive samplesamong the butchers.

Knowledge of Hepatitis B Virus Infection: There was general poor knowledge of the respondents on knowledge of hepatitis B virus infection. The poor knowledge continued in Eke Oshiri donkey butchers' market where a participant opined a misconception that HBV is a disease caused by mosquitoes. Her words;

"*Hepatitis B virus infection is a disease caused by mosquitoes and dirty environment, also corroborated by a fellow discussant" (female discussants, Eke Oshiri donkey market.* In other markets, incidentally all the participants were emphatic that they did not know anything about Hepatitis B virus infection.

Signs and Symptoms of Hepatitis B Virus Infection: Generally there was also poor knowledge of the participants on the signs and symptoms of hepatitis B virus infection. However, two of the discussants displayed fair knowledge of the clinical features of the infection. For instance one of them responded that;

"HBV is characterized by body pains, headache, fever, yellowness of the eyes and lethargy" (male discussant at Nkwo-Izhia donkey butchers market)

Another participant also demonstrated good knowledge of the signs and symptoms of hepatitis B virus infection when he said the following;

"*Symptoms of hepatitis B virus infection includes yellow eyes, liver disease, fever and body weakness" (Male discussant at Eke Oshiri donkey market).*

Due to the general poor knowledge amongst the participants, we tried to draw the participants' attention to the Igbo name of the infection "Ibaochananya" but still they were unable to recognize the infection. One of the respondents said that though he has heard of it in the local parlance but could not decipher its clinical manifestations. He put his statement this way;

"*I have heard of 'ibaochananya' but always thought it to be malaria" (a female participant at Nkwo-Izhia donkey butchers market).*

One of the participants demonstrated knowledge of an end stage clinical feature of the infection when he said that;

"We know the disease by urine appearance, that is, yellowish in colour" (a male discussant, Okwo-Ngbo donkey market)
However, most of the participants responded *"Don't know"* to the question on signs and symptoms of the infection. One of

the participants responded *"yes" (participant, Okwo-Ngbo)* to the question of knowledge of asymptomatic characteristics of HBV infection but did not substantiate his response, including the natural history of HBV infection.

Knowledge of modes of transmission: Very few of them knew some of the modes of transmission of hepatitis B virus infection. Many of them mentioned universal measures such as personal and environmental hygiene. However, one of the participants mentioned *"through sexual intercourse" (male participant, Nkwo-Izhia donkey herders market)* in response. Most of the participants responded "*Don't know"* to the question. Risk of contracting HBV while marketing donkeys

Most of the respondents were of the opinion that they were not at risk of contracting hepatitis B virus infection through their trading with the animal, but one of the respondents who agreed that they can be at risk put it this way;

"Yes I think so, depending on how you handle it (the donkeys) because if the donkey has wound and you are not careful, you can contract it" (male dicussant, Nkwo-Izhia donkey lairage)
Another answered also in the affirmative and said;

"Yes, through dirty environment and the animal can have the disease transmissible to man" (female participant, Eke-Oshiri donkey butchers market)

Majority of the discussants affirmed that they were not at risk all as earlier mentioned. One of them said thus;

"They were not at risk because she was confident that none of them (butchers) has suffered it. I have been in this market for more than 20 years, had my children also, raised them from this market and none has suffered any sickness with yellowness of eyes. Many of them are grown-ups, some have finished secondary school" (female discussant, Nkwo-Izhia butchers market).

Another respondent opined that they were not at risk of contracting the infection because they have been long in the trade without such illness. In his words;

"I have been in this trade (donkey butchering) for more than 30 years, in fact I joined my father in the trade when I was 6 years old and since then I have been healthy; my father even though old now has no sickness suggestive of coming from donkey business" (male discussant, Afor-Ezillo donkey butcher market). He thereafter became sober and retorted *"I never know, except if you tell me so".*

Apart from the respondent who earlier mentioned *"through sexual intercourse"* none of the discussants knew any other way hepatitis B virus infection.

Health Management Committee and their roles: All the respondents from the abattoirs said that they had management committee but not specific for health. According to many of the respondents, what was obtainable were rather welfare committees. One of them responded this way;

"We have committee that take care of the market" (male discussant, Okwo-Ngbo donkey butchers market).

Participants from the other markets also reported having management committees. These committees were not specific for health matters, let alone HBV control but include security, settlement of misunderstanding and other welfare matters. According to one of the participants;

"Yes we have a management committee that take care of security, environmental sanitation, and the traders" (male discussant, donkey herders market, Nkwo-Izhia)

At the butchers section in Nkwo-Izhia, a participant had this to say; *"Yes we have and their roles are to keep the environment in a good shape and settle quarrels" (female discussant).*

Another participant from Okwo-Ngbo donkey butchers market just summarized their management committee as *"They control the members" (female discussant).*

All the participants at Afor-Ezillo agreed that they do not have management committee, which implies that any interested donkey butcher(s) can start the business regardless of his/her health status. That was not good for their customers and themselves. One of them responded thus;

"There is no health-related plans before now except if it becomes very important now (male discussant, AforEzillo donkey market)".

On what happens if a new member wants to join their associations, all the discussants reported that there was no laid down health screening exercise such intending person undergoes, and none of the old members did any periodic health assessment.

Preventive and treatment opportunities for hepatitis B virus infection: Most of the respondents reported that the donkey handlers in the donkey markets were not privy to and have not had vaccination against hepatitis B virus infection. This could have been due to ignorance or inadequate knowledge of where to obtain the services, hence no hospital sited within or close to the abattoirs; most probably one of the short-comings of the management committees.

About knowledge of vaccination against HBV infection, one of the participants had this to say;

"Yes, but God protects us" (a male discussant, Eke-Oshiri donkey butchers market).

Still at Eke-Oshiri market, a female discussant opined that she has received vaccination against HBV infection. When probed further where she received the vaccination, she affirmed *"at Oshiri Primary Health centre".*

One of the participants in a bid to answer a question on knowledge of where to receive vaccination for the virus said; *"No, but if there is anywhere, then I don't know" (a female discussant, Nkwo-Izhia donkey butchers market).* One of the participants in the same group reported that every Mondays, they organize clean up exercise in the market. He continued that *"we have sanitizers that everyone coming into the market uses to prevent infection" (male discussant).* The researcher could not see the sanitizer when he sought to see it.

Another participant had this to say; *"we have no plan for immunization; we only depend on God'sgracebut as for now, there is no place or center of immunization within our locality" (male discussant, Afor-Ezillo butchers market).*

On other measures of HBV infection control, one of the participant had this to say; *"We keep the environment clean daily and fumigate the place" (male discussant, Nkwo-Izhia donkey herders market).* Other respondents in other groups simply responded *"No".* This meant that majority of the traders were not protected from HBV infection and can be easily infected.

If any of the traders had injury from any source, the participants reported varied options; evaluation of the injury extent first before deciding where to take the victim to, some said straight to chemist and another to hospital right away. A participant had this to say;

"We look at the injury to know whether to take the person to hospital or pharmacy" (a male discussant, Nkwo-Izhia donkey herders market).

Other respondents said;

"We give the person first aids medication and we sometimes go to chemist" (a male discussant, Afor-Ezillo donkey herders market). Another discussant said;

"If any of our member gets wound while in this market, we take such one to chemist for treatment" (a male discussant, Okwo-Ngbo donkey butchers market). At Eke Oshiri donkey market, a discussant had this to say;

"Our members in this market who get injuries are taken to hospital" (a female respondent, Eke Oshiri donkey butchers market).

All the above statements authenticated the fact that there was no effective medical response against the transmission of HBV within the donkey markets.

Knowledge of natural history of HBV positive cases: Essentially, all the participants were not aware of the asymptomatic nature of HBV infection. Equally they were ignorant of the complications. All but one who mentioned death as the consequences of untreated case of HBV infection responded '*no'* to questions on knowledge of HBV asymptomatic nature and complications. These were in consonance with majority of the participants' earlier show of poor knowledge of the HBV infection during the questionnaires interview administration.

Result of Key Informants Interviews

Meaning and causes of hepatitis B virus infection: None of the stakeholders demonstrated knowledge of the meaning of HBV infection considering their educational qualifications. Only the key informant at Okwo-Ngbo donkey markets, when asked the cause of HBV, managed to say something, though not directly on the subject;

"It is something that is not good".
All the other participants had this to say;
"I don't really know anything about it".

Knowledge of HBV signs and symptoms: On account of 'don't know' posture of the respondents, the researcher zeroed the question to more familiar term, 'disease that makes the eyes turn yellow', one of the key informant had this to say;

"I always thought it is malaria" (an informant, Nkwo-Izhia donkey market).

The informant at Okwo-Ngbo was able to authenticate that he had an idea of HBV when he said that *"the symptoms include yellowing of eyes and generally body weakness".*

Admission of new members, pre- and ongoing health assessment of members, HBV vaccination and other preventive measures

Equally, though they believed in efficacy of the vaccine, there was no implementation of the vaccination programme in the markets. Lack of awareness of where to obtain the services was their main constraint. On question about knowledge of prevention of HBV infection through vaccination, one of the informants said;

"Yes, just like any other immunizable diseases" (key informant, Afor-Ezillo donkey butchers market)

.On where to get the services or nearby places, a key informant had this to say; *"No and we don't know where to get vaccinated" (key informant, Nkwo-Izhia donkey butchers).* The responses were the same for other respondents.

For other preventive measures, the key informants were unanimous in their response for environmental cleaning. One said; *"we use pesticide also" (key informant, Afor-Ezillo donkey butchers market).* Another key informant, when asked whether they have other preventive measures said;

"Not really, but from time to time doctors come around to checkmate the donkeys and treat infected ones" (key informant, Nkwo-Izhia donkey butchers market).

Availability of Health Management Committee and the committee roles

All the markets have management committees, but none was specific for health let alone HBV infection control. In other words, the roles of the committees in the markets were non-specific. According to one of them;

"They make sure that all things are done properly" (Key informant, Nkwo-Izhia donkey butchers).

The statements from the other key informants were clearer with respect to their roles which were closer to health issues and indirectly to issues of HBV infection. One of them said;

"Yes, for cleaning and sweeping everyday" (Key informant, Eke-Oshiri donkey butchers market).

Management of injuries and knowledge of natural history of HBV infection: All the key informants were not aware that the infection may be present in somebody without causing symptoms. When the researcher asked one of the key informant what he felt could be done if someone apparently

healthy among his association was found to have the infection after screening, he said;

"No plans, the person would be left in the hands of God" (key informant, Ezillo Donkey butchers market).

Concerning management of injuries, one of them had this to say;

"It depends if it is severe in which he/she would be taken to the chemist/hospital, if not the injury would go on its own (that is, nothing was done)" (key informant, Afor-Ezillo donkey butchers market).

In the same vein, other informants were of the view that once an injured member received care at a chemist, he/she would not have any problem especially when the wound is healed when he said;

"If someone gets wound, we take him to Chemist for treatment" (key informant, Okwo-Ngbo donkey butchers market).

One of the key informant interviewees knew that untreated cases of HBV infection could lead to patient's death as a consequence. On the contrary, one of them said;

"We don't really know and that's why you are here to educate us" (key informant, Nkwo-Izhia donkey butchers market).

DISCUSSION

The low proportion of respondents' knowledge about HBV infection perhaps was due to lack of awareness creation, whereas the low risk perception in getting HBV transmission through the various variables assessed could be due to ignorance. The fact that only 12.8% of the respondents had good knowledge of HBV infection may perhaps be due to lack of awareness and ignorance too. Among the respondents' during the focus group discussions and key informant interviews, the same high level of poor knowledge was displayed. However, this finding contrasted from another related study conducted on occupational hazards of butchers in Kano metropolis, Kano State, North Western region, Nigeria[24], which found that more than three-quarters 241 (75%) of the respondents had good knowledge of occupational hazards (HBV may be included); cut/injuries was known by most of the respondents 309 (96.3%).

There was no statistically significant difference in the proportion with HBV reactive sample when comparing those with good and poor knowledge. This was probably because they operated within the same environment with same HBV background knowledge and inability of the good knowledge proportions to differentiate itself from the proportion of poor knowledge respondents. On the respondents' (butchers) assessment of the donkey markets' environment, the mean duration of stay (SD) in years of the respondents was 10.8(8.6) which could mean that majority of the respondents have been in the donkey business long enough to improve on their healthcare. The discordant reports among the respondents on the variables: days of week the markets open for business, employment of workers who sweep the markets and frequency of washing or cleaning effluent drainage system could be that some proportions of the respondents tried to be mischievous and unhealthy for HBV control in the markets. Further, the incongruous reports of the respondents that health officials inspect their donkeys before slaughter compared with proportion of those who responded negatively and other variables assessed in this section casted doubt on the veracity of their reports since there were higher reactive samples among the proportion of those who reported than proportion of those who did not. In addition, high proportions of butchers reported don't know to variables on practices within the donkey markets which could be attempts to hide sharp practices observed in the abattoirs on background check. Corroborating this study findings, a study in Sokoto, North West Region, Nigeria[28] assessed abattoir operations and waste management in Nigeria found and highlighted the unsanitary nature of abattoirs in Nigeria. The investigators also reviewed the challenges and prospects in respect of environmental quality and public health.

The differences in proportions of butchers exposed to physical hazards in the abattoirs which posed threats to their contracting HBV infection most probably could be due to differences in conditions existing between the butchers' operations in the different markets while the comparability of findings in the other variables may be due to lack of health institutions within any of the donkey markets and the fact that donkey business commenced in Ebonyi State at the same period. These results were corroborated by a study conducted in Ibadan, South West Nigeria[23] which found the existence of the following occupational hazards in abattoir; knives, live cows injuries and bones all of which cause injury. Other hazards reported were dirty environment, wet/slippery floors and hot water. According to the researchers, current health problems were low back pain, muscular and joint pain, eye irritation and knife injuries; apprentices reported more knife injuries than old butchers; hand dermatitis was seen in of butchers and was more prevalent among females than males respectively. In addition, an assessment study conducted in Gueteng abattoir, South Africa[29], found low advancement of the hygiene and assessment management systems.

On comparison of proportions of butchers' HBV status with age as at last birthday, the difference in findings among reactive and non-reactive respondents was not statistically significant, probably because HBV virus can affect persons of any age group whether young or old. Among the proportion of respondents age groups, greater than 48 years age group which was higher in proportion 42(100%) also yielded more reactive assay results 4(9.5%) compared with 38(90.5%) non-reactive samples. This difference in proportions was not statistically significant, which could be due to equal exposure of HBV risk factors among the age groups within the abattoirs. The difference in proportions of duration of stay of butchers in the abattoirs was however statistically significant which probably implies that the longer the butchers stayed in the abattoirs, the more likely they contracted HBV infection, (though not statistically significant when categorized). This result was corroborated by related studies done at Osun, Abeokuta and Ibadan, South West Region, Nigeria[7,23] and Kano State, North West Region, Nigeria[16,24]. Consideration of the butchers' proportions of HBV status and other socio-demographic characteristics revealed that none of the differences in proportions was statistically significant. This finding may be because the proportion of the variables were not associated with the possible risks of HBV transmission among the

respondents. This finding corroborated previous study conducted in a rural community on asymptomatic sexually active youths in Ishiagu, Ebonyi State, South East Region, Nigeria[30] which found overall HBV prevalence of 8.9%. Age group (20-29) years had the highest prevalence of HBsAg (4%) compared with (3.1%) of age group (10-19) years and (1.8%) of age group (30-39) years. The proportions of butchers who completed tertiary education showed zero reactive samples which also was in tandem with previous studies reports.[16,25]A striking finding was among the proportions of paid employment respondents who despite their few proportions showed high HBV reactive samples which could have been possible because their pays were high and may have led them to exhibiting high HBV risky behaviours which had exposed them to HBV infection; same reason of possible living ostentatious lives due to improved socio-economic status applied tocivil servants among respondents' main occupation whose samples also showed high HBV reactive samples. Conversely, the low proportion found among the farmers' could be explained by low socioeconomic status and the fact that farmers were largely in rural areas where the norms of the society were more respected especially with respect to sexual abstinence (sexual intercourse being the most HBV transmission driving factor among the risks factors implicated among biological factors). This finding was corroborated by a study in Mozambique, South African Region[26] which found 67% HBV reactive samples among respondents who had multiple sexual partners, males higher than females (p=0.004). However, it has been reported that HBV can exist in occult basis[33,36,37] and capable of reactivation in an improperly screened blood during blood transfusion which makes it expedient that such exposed persons should be monitored for more few months sufficient above the average incubation period of HBV.

Respondents' proportions of those who reported to have had any other wounds or accidents while working in the abattoirs and those who did not report such have different HBV assay results but non-statistical significant different. This may be due to similarity in work environment and operational time which provided them same exposure doses. The prevalence among butchers 10(8.0%) was considered high and could perhaps be due to the respondents' reported ignorance about HBV infection, low vaccination status and inherent practices in the donkey markets which rendered the butchers susceptible to HBV infection transmission. It could also be adduced that long distance travelers, like the donkey butchers who stayed outside their formal residence procuring the donkeys from the herders were also prone to risky behaviours which transmit the virus. This finding was corroborated by a review update of HBV in Nigeria[8]which found HBV prevalence 4.3% to 23.3% across the country and a pooled prevalence of 13.5% among the population. However, there was an increased prevalence 11.6% among butchers and 10.9% among slaughtered cows in a related study carried out in Kano metropolis, Kano State, North Western region, Nigeria[16].

Among the respondents' during the focus group discussions and key informant interviews, the same high level of poor knowledge was displayed, in addition to low risk perception, lack of health institution, poor vaccination status of the respondents, poor regulation standards of practices within the donkey markets, lack of occupational risk reduction strategies for the donkey butchers and poor health supervision of activities of the butchers.

These findings combine to make the butchers prone to HBV transmission. These findings contrasted from another related study conducted on occupational hazards of butchers in Kano metropolis, Kano State, North Western region, Nigeria[24], which found that more than three-quarters 241 (75%) of the respondents had good knowledge of occupational hazards (HBV may be included); cut/injuries was known by most of the respondents 309 (96.3%) which showed statistically significant association (p=0.003); being in meat business for between 6 to 10 years (p=0.048) and self-learning of meat business (p=0.005).

CONCLUSION

The results from this study showed that there was poor knowledge among the donkey butchers. There were some risk factors found to be associated with HBV transmission among the donkey butchers. Prevalence of HBV results showed that the donkey handlers were high risk groups for HBV transmission. The study could be adjudged to have met its general and specific objectives. These results have obvious public health implications for the donkey butchers to reduce HBV transmission in Ebonyi State.

Recommendations

The need to conduct awareness campaign and vaccination exercise for the butchers cannot be overemphasized. Development and dissemination of abattoirs policy guidelines to Ebonyi State, especially to the donkey butchers including quarterly supportive supervision. Members of the donkey butchers should receive re-orientation to improve on environmental sanitation of the abattoirs.

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