APPENDICES

APPENDIX I

**SUMMARY TABLE FOR HBV BACKGROUND INFORMATION**

| **Microorganisms** | **Reservoirs of infection** | **Routes of transmission** | **Lab. Diagnosis** | **Common clinical features** | **Treatment 0ptions** | **Preventive strategies** |
| --- | --- | --- | --- | --- | --- | --- |
| HBV | (1) Gorillas; (2) Chimpanzees; and (3) Cows | (1) Parenterally; (2) Perinatally; (3) Sexually; and (4) Horizontally | Serology: (1) HBsAg; (2) HBeAg; (3) Anti-HBc IgM; (4) Anti-HBc IgG; (5) Anti-HBe; and (6) HBV DNA | (1) Constitutional symptoms; (2) Anorexia; (3) Nausea; (4) Vomiting; (5) Low-grade fever; (6) Myalgia; (7) Disordered gustatory acuity and smell; (8) RUQ pain; (9) Hepatic encephalopathy; (10) Ascites; | (1) NtRTIs: (a) Tenofovir; and (b) Adefovir; (2) NRTIs: (a) Entecavir; (b) Elbivudine; (c) Lamivudine; and (3) PEG- interferon -a 2a, interferon alfa-2b | (1) Pre-exposure vaccination; and (2) Post-exposure prophylaxis with vaccination and immunoglobulin, depending on clinical status |

APPENDIX II

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**APPENDIX III**

**HBV TESTING ALGORITHM**

Screen subject for Hepatitis B

 HBsAg negative HBsAg positive

Do complete HB viral screening: Test for anti-HBs

(Anti-HBc (IgM & Total) HBeAg, Anti-HBe, Anti-HBs)

Chronic HB Acute HB Anti HBV Negative Anti HBV Positive

Evaluate for treatment. Observe vaccine with HB vaccine discharge.

APPENDIX IV

**Interpretation of Hepatitis B Serologic Tests /Markers**

|  |  |  |
| --- | --- | --- |
| **Tests** | **Results** | **Interpretation** |
| HBsAg | Negative | Susceptible |
| Anti-HBc | Negative |
| Anti-HBs | Negative |
| HBsAg | Negative | Immune due to vaccination |
| Anti-HBc | Negative |
| Anti-HBs | Positive with>10mlU/ml\* |
| HBsAg | Negative | Immune due to vaccination |
| Anti-HBc | Positive |
| Anti-HBs | Positive |
| HBsAg | Positive | Acutely infected |
| Anti-HBc | Positive |
| IgM, Anti-HBc | Positive |
| Anti-HBs | Negative |
| HBsAg | Positive | Chronically infected |
| Anti-HBc | Positive |
| IgM, Anti-HBc | Negative |
| Anti-HBs | Negative |
| HBsAg | Negative | Four interpretations possible |
| Anti-HBc | Positive |
| Anti-HBs | Negative |

**Table 4. Between groups, a comparison of the respondent's assessment of the donkey markets’ environment.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variables** | **Butchers (n=125)** **N(%)**  | **Herders (n=125) N(%)** | **(χ2)** | **p-value** | **95% Confidence interval (C.I.)** |
| **Duration of stay** Mean (SD) in years.  | 10.8 (8.6) | 10.1 (8.0) | t=0.600 | 0.549 | Lower-1.441Upper 2.703 |
| **Days of the week, these markets open.** |  |  |  |  |  |
| Daily | 47 (37.6) | 125 (100) | 113.372 | <0.001\* |  |
| Once a week | 78 (62.4) | 0 (0.0) |  |  |  |
| **Have workers who sweep the markets** |  |  |  |  |  |
| Yes | 104 (83.2) | 120 (96.0) | 10.989 | <0.001\* |  |
| No | 21 (16.8) | 5 (4.0) |  |  |  |
| **Frequency of washing or cleaning effluent drainage system** |  |  |  |  |  |
| Daily | 23 (18.4) | 97 (77.6) | 109.916 | <0.001\* |  |
| Weekly | 76 (60.8) | 9 (7.2) |  |  |  |
| Monthly | 11 (8.8) | 0 (0.0) |  |  |  |
| No drainage | 15 (12.0) | 19 (15.2) |  |  |  |
| **Frequency of health officials' inspection of the donkeys** |  |  |  |  |  |
| Daily | 17 (13.6) | 17 (13.6) | 18.750 | <0.001\* |  |
| Weekly | 18 (14.4) | 26 (20.8) |  |  |  |
| Monthly | 17 (13.8) | 16 (12.8) |  |  |  |
| No inspection | 18 (14.4) | 0 (0.0) |  |  |  |
| Occasionally | 7 (5.6) | 7 (5.6) |  |  |  |
| Don’t know | 48 (38.4) | 59 (47.2) |  |  |  |
| **Handling of sick donkeys** |  |  |  |  |  |
| Isolated from others | 45 (36.0) | 28 (22.4) | 47.604 | <0.001\* |  |
| Treated | 16 (12.8) | 67 (53.6) |  |  |  |
| Not treated | 37 (29.6) | 17 (13.6) |  |  |  |
| Don’t know | 27 (21.6) | 13 (10.4) |  |  |  |
| **Handling of carcass of dead donkeys** |  |  |  |  |  |
| Dismembered and sold to the public | 24 (19.2) | 29 (23.2) | 19.052 | <0.001\* |  |
| Cremated | 1 (0.8) | 9 (7.2) |  |  |  |
| Buried | 75 (60.0) | 69 (55.2) |  |  |  |
| Thrown to the bush to rot away | 8 (6.4) | 15 (12.0) |  |  |  |
| Don’t know | 17 (13.6) | 3 (2.4) |  |  |  |
| **Pattern of disposal of animal dung and related stuff** |  |  |  |  |  |
| Open dumping on land surface | 93 (74.4) | 90 (72.0) | FT(5.079) | 0.411 |  |
| Dump into nearby streams/rivers | 2 (1.6) | 1 (0.8) |  |  |  |
| Drying and burning to ashes | 5 (4.0) | 7 (5.6) |  |  |  |
| Burying inside soil | 23 (18.4) | 24 (19.2) |  |  |  |
| Used for manure | 2 (1.6) | 3 (2.4) |  |  |  |

**t = independent sample test χ2 = Chi Square**

**Tab 5. Between groups, a comparison of respondents’ acquiring physical hazards.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variables** | **Butchers N(125) N (%)** | **Herders N(125) N(%)** | **(**χ2**)** | **p-value** |
| **Duration of stay as donkey handler** |  |  |  |  |
| 1 – 12 months | 8 (6.4) | 10 (8.0) | 0.541 | 0.769 |
| 2 – 4 years | 29 (23.2) | 25 (20.0) |  |  |
| More than four years | 88 (70.4) | 90 (72.0) |  |  |
| **Had any injury as a donkey butcher or herder** |  |  |  |  |
| Yes  | 63 (50.4) | 15 (12.0) | 42.934 | <0.001\* |
| No | 62 (49.6) | 110 (88.0) |  |  |
| **If yes to the above, how are you treated?** |  |  |  |  |
| Nothing | 19 (15.2) | 46 (36.8) | 0.542 | 0.864 |
| Seek for doctor or medical help | 28 (22.4) | 17 (13.6) |  |  |
| Buy drugs from a chemist's shop | 78 (62.4) | 62 (49.6) |  |  |
| **Had donkey blood splash into your orifices: eyes, nostrils, ears, mouth** |  |  |  |  |
| Yes | 31 (24.8) | 2 (1.6) | 29.360 | <0.001\* |
| No | 94 (75.2) | 123 (98.4) |  |  |
| **Had other wounds or accidents while working in donkey markets** |  |  |  |  |
| Yes | 25 (20.0) | 7 (5.6) | 11.611 | <0.001\* |
| No | 100 (80) | 118 (94.4) |  |  |
| **Had other wounds or accidents while working in donkey markets, specify** |  |  |  |  |
| Donkey kick | 1 (0.8) | 3 (2.4) | FT(0.346) | 0.124 |
| Fall with bruises | 9 (7.2) | 3 (2.4) |  |  |
| Head injury | 1 (0.8) | 1 (0.8) |  |  |
| Knife cut | 14 (11.2) | 7 (5.6) |  |  |
| None | 100 (80.0) | 118 (94.4) |  |  |

**\*=****Statistical significance. FT=Fishers exact test.**

**Table 6. Relationship between butchers’ HBV assay results with butchers’ socio-demographic characteristics.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **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 0.069Upper 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) |  |  |  |
| **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) |  |  |  |
| **Respondent's 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) |  |  |  |
| **Sex of respondents** |  |  |  |  |  |  |

**FT=Fishers exact test \*=Sample t-test.**

**Tab7. Relationship of butchers’ risk factors and practices in the abattoirs and HBV assay result (N=125).**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **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) |  |  |
| **Health officials inspect donkeys 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**

Tab 8. Relationship of butchers' HBV knowledge and HBV assay result (N=125).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Grades of knowledge** | **Total** | **Reactive, R** | **Non-Reactive, NR N (%)** | **Chi-Square (χ2)** | **p-value** |
|  | **N (%)** | **N (%)** |  |
| Good knowledge | 16 (100) | 3 (18.8) | 13 (81.2) | 2.881 | p=0.118 |
| Poor knowledge | 109 (100) | 7 (6.4) | 102 (93.6) |   |  |

Tab 9. Relationship of herders HBV assay result with socio-demographic characteristics (N=125).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Variables** | **Total N (%)** | **Reactive, R** | **Non-reactive, NR** | **t-test** | **p-value** | **Confidence interval (C.I)** |
| **Age in years Mean ((SD)** | 125(100)  | 29.27 (9.27) | 31.87 (12.3) | 0.850 | 0.387 | Lower -8.40Upper+4.04 |
| **Age groups in years** |  |  |  |  |  |  |
| 18-27 | 57(100) | 9(15.8) | 48(84.2) | FT=4.464 | 0.217 |  |
| 28-37 | 37(100) | 9(24.3) | 28(75.7) |  |  |  |
| 38-47 | 14(100) | 0(0.0) | 14(100) |  |  |  |
| >47 | 17(100) | 1(5.9) | 16(94.1) |  |  |  |
| **Duration of stay in years**  |  |  |  |  |  |  |
| **Mean (SD)** | 125(100) | 10.21 (8.12) | 10.10 (7.96) | 0.053 | 0.958 | Lower -3.83 |
|  |  |  |  |  |  | Upper +4.04 |
| **Sex of respondents** |  |  |  |  |  |  |
| Male | 116 (100) | 19 (16.4) | 97 (83.6) | 1.738 | 0.353 |  |
| Female | 9(100) | 0 (0.0) | 9 (100) |  |  |  |
| **Marital status of respondents** |  |  |  |  |  |  |
| Married | 72(100) | 11 (15.3) | 61 (84.7) | FT=0.584 | 1.000 |  |
| Single | 52(100) | 8 (15.4) | 44 (84.6) |  |  |  |
| Widowed/Divorced | 1(100) | 0 (0.0) | 1 (100) |  |  |  |
| **Religion of respondents** |  |  |  |  |  |  |
| Islam | 100(100) | 17 (17.0) | 83 (83.0) | FT=0.752 | 0.755 |  |
| Christianity | 21(100) | 2 (9.5) | 19 (90.5) |  |  |  |
| Traditionalist | 4(100) | 0 (0.0) | 4 (100) |  |  |  |
| **Level of education completed.** |  |  |  |  |  |  |
| No formal education | 36(100) | 6 (16.7) | 30 (83.3) | FT=3.150 | 0.654 |  |
| Primary | 37(100)  | 5 (13.5) | 32 (86.5) |  |  |  |
| Junior Secondary | 17(100) | 1 (5.9)  | 16 (94.1) |  |  |  |
| Senior Secondary | 27(100) | 5 (18.5) | 22 (81.5) |  |  |  |
| Tertiary | 3(100) | 1 (33.3) | 2 (66.7) |  |  |  |
| Arabic | 5(100) | 1 (20.0) | 4 (80.0) |  |  |  |
| **Respondent's employment status** |  |  |  |  |  |  |
| Self-employed | 105(100) | 15 (14.3) | 90 (85.7) | FT=1.616 | 0.384 |  |
| Paid employment | 17(100) | 3 (17.6) | 14 (82.4) |  |  |  |
| Unemployed | 3(100) | 1 (33.3) | 2 (66.7) |  |  |  |
| **Number of rooms in respondents' residence** |  |  |  |  |  |  |
| Single room apartment | 61(100) | 10 (16.4) | 51 (83.6) | 0.136 | 0.947 |  |
| Multiple rooms apartment | 42(100) | 36 (34.0) | 6 (31.6) |  |  |  |
| Self-contained apartment | 22()100 | 3 (13.6) | 19 (86.4) |  |  |  |

**FT=Fishers exact test χ2=Chi square test**

Tab 10. Relationship of herders’ risk factors and practices in the lairage with HBV assay result (N=125)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variables** | **Total****N (%)** | **Reactive, R****N (%)** | **Non-Reactive, NR (%)** | **χ2** | **p-value** |
| **Ever been vaccinated** |  |  |  |  |  |
| Yes | 3 (100) | 1 (33.3) | 2 (66.7) | 0.784 | 0.393 |
| No | 122(100) | 18 (14.8) | 104 (85.2) |  |  |
| **Complete anti-hepatitis B virus vaccination.** |  |  |  |  |  |
| Yes | 3 (100) | 1 (33.3) | 2 (66.7) | 0.784 | 0.393 |
| No | 122(100 | 18 (14.8) | 104 (85.2) |  |  |
| **Health officials inspect donkeys before the sale.** |  |  |  |  |  |
| Yes | 65 (100) | 11 (16.9) | 54 (83.1) | 0.312 | 0.625 |
| No | 60 (100) | 8 (13.3) | 52 (86.7) |  |  |
| **Had piercing or cut or head injury as herder** |  |  |  |  |  |
| Yes | 15 (100) | 1 (6.7) | 14 (93.3) | 0.963 | 0.465 |
| No | 110(100) | 18 (16.4) | 92 (83.6) |  |  |
| **I had donkey blood splash into your orifices: mouth, eyes, nostrils, and ears.** |  |  |  |  |
| Yes | 2 (100) | 0 (0.0) | 2 (100) | 0.364 | 1.000 |
| No | 123(100) | 19 (15.4) | 104 (84.6) |  |  |
| **Had other wounds or accidents while working in donkey garage/lairage** |  |  |  |  |  |
| Yes | 7 (100) | 2 (28.6) | 5 (71.4) | 1.029 | 0.594 |
| No | 118(100) | 17 (14.4) | 101 (85.6) |  |  |

Tab 11. Predictors of reactive HBV assay result among herders' socio-demographic characteristics

|  |  |  |  |
| --- | --- | --- | --- |
| **Independent variable** | **AOR** | **95% C.I. for AOR** | **P-value** |
|  |  | **Lower** | **Upper** |  |
| **Smoke cigarette** |  |  |  |  |
| Yes | 1 |  |  |  |
| No | 1.280 | 0.379 | 4.323 | 0.691 |
| **On any drug(s) that make you feel high** |  |  |  |  |
| Yes | 1 |  |  |  |
| No | 4.607 | 1.232 | 17.226 | 0.023 |
| **Had any casual sexual intercourse** |  |  |  |  |
| Yes | 1 |  |  |  |
| No | 2.436 | 0.783 | 7.577 | 0.124 |

**AOR=Adjusted Odds Ratio, C.I=Confidence Interval.**