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Original Article

Situation Analysis of HIV, Hepatitis B, and Syphilis among Pregnant Women: A Case of Burco General Hospital, Somaliland

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HIV, Hepatitis B, Syphilis, Pregnant Women, Burao, Somaliland.

ABSTRACT

Background: Sexually transmitted diseases like HIV, Hepatitis B and Sexually Transmitted Diseases like syphilis remain a public health concern, with 2.3 million deaths per year and 1 million people newly infected per day. This accounts for about 14% of deaths from infectious and parasitic diseases globally. These diseases can be vertically transmitted and have a particular burden on pregnant and newborns, especially in low-income countries. **Objectives**: This study aims to determine the seroprevalence and determinants of HIV, Hepatitis B and Syphilis among pregnant women attending the obstetric department of Burco General Hospital, Somaliland. **Methodology**: quantitative research with a cross-sectional study design using semi-structured questionnaires and rapid test kits were used to screen 271 pregnant women attending the hospital. Both descriptive and analytic statistics were calculated using SPSS v20. Adjusted odds ratios (AOR) and their 95% confidence interval (CI) were calculated with a level of significance set at 5%. **Results**: the prevalence of HIV, Hepatitis B, and Syphilis among pregnant women attending Burco General Hospital was 0.4%, 4.1%, and 3% respectively. The cross-reactivity of HIV/HBV was 9.1%. There was no significant risk factor outcome regarding sociodemographic and obstetric characteristics. **Conclusion and recommendations**: Infectious diseases are a public health burden among pregnant women in Burao. However, antenatal care provides an excellent opportunity to screen women for infections that are common and treatable and can be transmitted vertically. Ministry of Health should adopt proper prevention and control intervention guidelines to reduce the risk of these three infections in line with WHO triple elimination guidelines.

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INTRODUCTION

Human Immunodeficiency Virus (HIV), hepatitis and sexually transmitted diseases account for 2.3 million deaths per year, with 1 million people newly infected per day. These account for 14% of deaths from infectious and parasitic diseases. 1.7 million People acquired HIV and 3 million new Hepatitis B and C infections, with 1.1 million deaths and 374 million new cases of STIs in 2019, these three infections have a huge public health burden. These communicable diseases share common modes of transmission and determinants and call for a common public health approach along the continuum of prevention, diagnosis, treatment, and care (AIDs Commission, 2021).

HIV is a major global public health crisis with 38.4 million adults living with it in 2021, of which 1.5 million people were infected in that same year and 650.000 deaths were recorded. The World Health Organization (WHO) estimates that a total of 19.7 million women were living with HIV infection globally in 2021, with 640,000 of them being newly infected (WHO, 2021).

These women can transmit the HIV infection to their fetus during labour, delivery, or breastfeeding. More than 1.3 million women living with HIV globally become pregnant every year. Without treatment, these women can transmit the infection to their newborns. Approximately 15-30% of these infants acquire HIV during gestation or at delivery, with a further 5 -15 % acquiring it during breastfeeding. Thus, mother-to-child transmission (MTCT) or vertical transmission is a substantial factor in the HIV pandemic. In 2017, MTCT accounted for 9% of new HIV infections globally (Bancha *et al.*, 2021).

In 2020, the Joint United Nations Programme on HIV/AIDS (UNAIDS) reported that an estimated 1.8 million children were living with HIV globally, of which 150.000 were newly acquired HIV infections compared to 1.7 million in 2021. Out of these children, only 40% (29-51%) have achieved a viral suppression (UNAIDS, 2014). Lack of treatment in these young children leads to early mortality and increased morbidity. As such, they have a shortened life expectancy and a huge burden on the child and his family, both economically and socially (UNAIDS DATA, 2021).

The African continent registered 970,000 newly acquired HIV infections in 2019 and 440,000 HIV deaths in the same year (AIDs Commission, 2021). North Africa and the Middle East are among the three regions where new HIV infections are on the rise, with a 33% increase between 2010 and 2021. On the other hand, only 67% of the people living with HIV were aware of their HIV status, and 50% (the lowest in the world) were on treatment, of which only 44% were virally suppressed. These regions are also off track in terms of coverage of services to prevent vertical transmission and in fully integrating HIV counselling and testing with sexual and reproductive health services. Therefore, only 40% of children aged 0 to 14 years with HIV were on treatment in 2021 (Bafa & Egata, 2020).

In 2018, a survey conducted on average antenatal HIV prevalence across Somalia showed a prevalence of 0.1%, with the Somaliland region at 0.15% (Masika, 2017). In 2020, the number of

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people living with HIV in Somalia was 8,700, with 500 new infections and 500 deaths in the same year. Of those living with HIV, 3900 were women above the age of 15 years, while children aged 0-14 years accounted for 1000. New infections among women above the age of 15 years and children of 0-14 years were < 100 in each group. Similarly, death related to HIV in each group was estimated to be <200 and <100, respectively (Bafa & Egata, 2020).

Women who were living with HIV in Somalia and on treatment in 2020 were 53%, of which 43% were virally suppressed. The percentage of pregnant women living with HIV and accessing antiretroviral drugs was 0% in 2010 compared to 33% in 2020. Due to this low coverage, the mother-to-child transmission rate of HIV during pregnancy, labour, and breastfeeding in Somalia was estimated to be 37.5% in 2010 compared to 31% in 2020 (Bafa & Egata, 2020; Central Statistics Department, 2020).

Somalia was among the countries that adopted the UNAIDS' ambitious 90-90-90 targets for HIV treatment. These were by 2020, 90% of all people living with HIV should know their status, 90% of all people who are diagnosed with HIV should receive sustained antiretroviral therapy, and 90% of those receiving therapy should have viral suppression. By 2019, however, the country was far off track in approaching those targets. Only 32% of those people who were living with HIV knew their status, with 79.4% receiving antiretroviral therapy and 73.7% on viral suppression (UNAIDS global aids update, 2022; UNAIDS DATA, 2021).

Syphilis is among the sexually transmitted diseases which can also be vertically transmitted from mother to child during pregnancy. It's caused by Treponema Pallidum bacteria. Over half of pregnant women with untreated active syphilis can end up having adverse pregnancy outcomes (ABOs) including stillbirth, early neonatal death, preterm, low birth weight, or serious neonatal infections. WHO estimates that over 900,000 pregnant women were infected with syphilis in 2019. The total number of congenital syphilis cases was estimated at 661.000, including 355, 000 adverse birth outcomes and 306, 000 non-clinical congenital syphilis cases (infants without clinical signs born to untreated mothers) in 2019. These ABOs can be prevented with high ANC coverage and intramuscular benzathine penicillin G, a long-acting penicillin, administered to pregnant women at least four weeks before delivery. However, WHO estimates that 57% of those ABOs occurred in pregnant women who had attended ANC but were not screened for syphilis while 21% were mothers who were not enrolled in any ANC, and 16% were screened pregnant women but not treated cases (Dionne-Odom *et al.,* 2016; Stoltey & Cohen, 2015).

In 2014, out of 8179 antenatal care attendees who were tested for syphilis in Somalia, 122 (1.5%) tested positive. Only 46.7% of those who tested positive received at least one dose of intramuscular Benzathine Penicillin 2.4 mU (Genetu *et al.,* 2020).

Viral hepatitis is another sexually transmitted disease. It can also be transmitted through infected blood products, feco-orally, or vertically transmitted from the infected mother to the fetus. It's caused by five hepatotrophic viruses (A through E), although hepatitis B and C are the most common types (Ismail *et al.,* 2017).

It is estimated by WHO that 1.5 million people were newly infected with chronic hepatitis B infection in 2019, with 820.000 related deaths. 83% of these new hepatitis B infections were in Africa and Southeast Asia regions. The African continent witnessed 990.000 new infections in 2019, with 80.000 hepatitis B-related deaths (WHO, 2021).

It is estimated that 10-20% of pregnant women with positive HBsAg can transmit the infection to their newborn baby during pregnancy or at delivery. 70-90% of those neonates will progress to the chronic phase of the hepatitis B infection (Ismail *et al.,* 2017). Thus, mother-to-child and early childhood transmissions are globally the main routes of HBV transmission, with childhood

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infections accounting for most of the chronic infections, which lead to liver cirrhosis and cancer (Dionne-Odom *et al.,* 2016).

These infections carry significant morbidity and mortality for both the mother and newborn. Treating and case management for HIV, hepatitis B, and syphilis can be a heavy burden in low- and middle-income countries. However, screening through antenatal visits can reduce vertical transmission to 5% instead of 15-45% (Kurtay & Hussein, 2022).

WHO has put guidelines on the triple elimination of vertical transmission of HIV, hepatitis B virus and syphilis through antenatal care provision to reduce the burden of these infections (WHO, 2021).

The global community has committed to the elimination of vertical transmission of mother to child to reduce the burden of HIV, hepatitis B, and syphilis. This can be achieved through the availability of quality reproductive and maternal, and child health (MCH) services. The 2016-2021 WHO, three global health sector strategies (GHSS) on these three diseases call for member states and WHO to work towards attaining zero new HIV infections in infants and young children by 2030. It also calls for screening for maternal syphilis early in pregnancy and prompt treatment of seropositive women to eliminate congenital syphilis by 2030 and ≤0.1% prevalence of hepatitis B surface antigen (HBsAg) among children ≤5 years of age by 2030 (Dionne-Odom *et al.,* 2016).

The federal government of Somalia, through its National Strategic Plan 2015-2019, has included a strategic action to implement provider-initiated testing and counseling (PITC) services with an emphasis on STI patients and maternal and child health attendees (Macêdo *et al.,* 2017). The goal of this action was to attain the WHO targets in fighting HIV, hepatitis B and syphilis.

However, a 2020 health and demographic survey conducted in Somaliland showed that 52% of women who had a live birth in the five years preceding the survey did not attend ANC, compared to the 4 visits recommended by the WHO. Only 47% of women aged 15-49 who had a live birth in the preceding 5 years received antenatal care from a skilled health provider. Of which only 9% had comprehensive knowledge about HIV. The percentage of women who knew that HIV can be transmitted during labour or breastfeeding was 60% and 64%, respectively. Furthermore, only 4% of married women in the same age group reported that they had sexually transmitted infections in the year preceding the survey (Sebastião *et al.,* 2020).

Low ANC coverage to screen and treat these infections and a lack of government follow-up on the WHO guidelines and targets can lead to a wider spread of these infections in society. This is made worse by the lack of literature on the prevalence of these infections and risk factors among the society in Burco and the wider population in Somaliland and Somalia. Therefore, this study aims to determine the seroprevalence and determinants of HIV, Hepatitis B and Syphilis among pregnant women attending the obstetric department of Burco General Hospital, Somaliland.

This paper highlights the burden of HIV, hepatitis B, and Syphilis among pregnant women living in Burao, Somaliland. Due to the lack of previous literature and weak health system surveillance, there is little progress on eliminating these three STDs through ANC to protect mothers and their newborns. The study highlights the need for a maternal healthcare approach that is equal in its global application to be established to provide relevant diagnosis, information, and care to pregnant women to eliminate these three diseases.

Objectives

To determine the seroprevalence and determinants of HIV, Hepatitis B and Syphilis among pregnant women attending the obstetric department of Burco General Hospital, Somaliland.

METHODOLOGY

Research Design, Target Population, and Study Area

Article DOI: https://doi.org/10.37284/eajhs.8.1.3094

This was a quantitative descriptive cross-sectional study aimed at determining the seroprevalence and determinants of HIV, hepatitis B, and syphilis among pregnant women aged 15-49 attending the ANC and obstetric department of Burco General Hospital between April to June 2023. The hospital serves as a referral centre for both government and private healthcare facilities in the Togdheer region, which is inhabited by a population of 721,363 according to the UNFPA 2014 population survey.

Sample Size Determination

To calculate the minimum sample size, the prevalence rate of HIV in pregnant women of 0.2% was used from a study done in Muqdisho in 2022 (5). This prevalence was used because it's the latest study done in Somalia and on pregnant women with similar socio-cultural and demographic characteristics. The minimum sample size for this study was calculated using the equation $n= ((Z\alpha/2)^2 \times pq) / d^2$. With 95% CI. and 10% of non-respondents, the final sample size was 271. Using the data from the obstetric department for patients seen in the first three months of the year, it was estimated that an average of 900 pregnant women attended the ANC and obstetric ward monthly. Thus, the expected number of pregnant women throughout the study was calculated to be 1800, and using a systematic random sampling method, every 7^{th} pregnant mother was enrolled for the study starting from 15 April to 20 June 2023 until the expected number was reached.

Inclusion and Exclusion Criteria

Pregnant women aged 15-49 who received care at Burco General Hospital and who had given consent were recruited for the study. Those who refused to consent were excluded. Pregnant women aged 15-17 years were required to have a guardian's consent for them.

Dependent and Independent Variables

The dependent variables in the study were HIV, hepatitis B, and Syphilis, and the independent variables were demographic, obstetric, and social factors.

Demographic, Obstetric, and Social Factors Data Collection

The pre-test counselling was done by trained counsellors for those who consented to participate in the study. Data for demographic, obstetric, and social factors were captured using a questionnaire by qualified midwives who were trained for two days. The researcher supervised these midwives.

Sample Collection

Four millilitres of venous blood samples were collected from consented patients into vacutainer tubes by trained midwives. The tests were taken to the laboratory and blood was allowed to clot and the sera was used for the tests. The tests were carried out on the same day as blood collection. The blood tests were performed at Burco General Hospital by two certified working laboratory technicians. To avoid bias, the blood tests were marked with coding numbers that corresponded to the same questionnaire, thus blinding the laboratory technicians.

Sera-profile Determination (Rapid)

HIV/Syphilis

The SD BIOLINE HIV/syphilis Duo test kit is a solid phase immunochromatographic assay for qualitative detection of antibodies to all isotopes (IgG, IgM, IgA) specific to HIV-1/2 and/or Treponema palladium in human serum, plasma, and whole blood. The test procedure is to add 10 µL of serum to a sample well, and then to add three drops of assay diluent to the same well. The result is read at 15–20 min. A positive test result is indicated when the control line (C) and test line ('SYP' or 'HIV' or both) are visible, and a negative result is indicated when only the control line (C) is visible. The test is invalid when the control line is invisible. SD BIOLINE HIV/syphilis Duo test kit is reported to have sensitivity, specificity, positive predictive value, and negative predictive value of 100, 99.5, 99.5, and 100% for HIV and 97.6, 96, 95.4 and 98% for syphilis testing, respectively (Shimelis & Tadesse, 2015).

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Hepatitis B Virus (Coretest One-step HBsAg Test)

Coretest One Step HBsAg Test is used for the qualitative determination of Hepatitis B surface antigen (HBsAg) in the serum. The test procedure is to let the pouched test come to room temperature (15-30℃). Use the pipette to draw and slowly add 1 drop of whole blood/serum/plasma to the sample well. Hold the buffer bottle vertically and add 1 drop of buffer to the sample well. Draw and transfer 2-3 drops of buffer to the sample well. Wait for coloured bands to appear. Read the result within 20 minutes. However, to confirm negative results, a complete reaction time, of 30 minutes is required. Do not interpret the result after 30 minutes.

A positive result is when two coloured lines appear. One in the test region (T) and another one in the control region (C). The colour intensity of the test line may be weaker or stronger than that of the control line. A negative result is reported if only one coloured line appears in the control region (C) and no line is visible in the test region (T). Invalid results will be considered if the control Line fails to appear.

Data: Instruments, Procedures, Entry, Cleaning, Analysis, Presentation

The data was coded and entered into SPSS version 20. The descriptive statistics (means, percentages, or frequencies) were calculated, and the binary logistic regression analysis was used to see the relationship between dependent and independent variables. Variables having a *p-value* of <0.25 in bivariate analysis were considered to have an association with the dependent variable and fitted into the multivariate analysis model. The strength of the association was measured using an odds ratio and interpreted by considering the 95% confidence interval, and $p < 0.05$ was a statistically significant risk factor in multivariate analysis. Hosmer and Lemeshow Test was used to assess the fitness of the model.

Reliability and Validity

To maintain the reliability of the research, the procedures were conducted under the same conditions following the prescribed guidelines for each test. To ensure the validity of tests, we pre-assessed the specificity and sensitivity of each test type to ensure that the tests would provide accurate information about the condition.

Ethics and Consent

The study was done according to the Helsinki Declaration. Ethical approval was obtained from the University of Burao ethical review committee (REF: UOB/ERC/APPROVAL/23). A letter of permission was obtained from the medical director's office of Burao General Hospital (REF: BCH/127/2023) to communicate with head nurses/midwives of the selected wards and the laboratory department. The mothers were informed about the purpose, the right to participate, the confidentiality of information, and the intent to publish the results without using their names or initials to conceal identity, but anonymity cannot be guaranteed. Written consent was obtained from the mothers.

RESULTS

Demographic Characteristics of the Studied Population

The majority of the respondents (42.1%) were in the age group of 25-34 years old, however, the only positive case for HIV was in the age group 15-24, which also accounted for 36.4% of hepatitis B patients.

The majority of the respondents live in urban areas (85.2%), with most of them being married (96.7%) and in monogamous marriage (80.1%). Urban residence and marital status of being married accounted for 90.9%, and 100% in both hepatitis B and syphilis cases, respectively. While being in a monogamous marriage accounted for 72.7% and 75% of hepatitis B and syphilis-positive cases.

The majority of the pregnant women were illiterate (62.7%), followed by those who attended primary education (18.1%). Thus, 88.6% of the respondents reported being housewives with no formal job. For their partners, the majority 39.9%, were reported to have no formal education, and

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20.3% had attended primary, while only 24.4% and 15.5% progressed to secondary and tertiary education, respectively. Therefore, almost half of their partners (42.8%) work on daily temporary manual labour. Only 18.2% reported to be in trading and 34.3% were unemployed. As a result, 81.8% of hepatitis B-positive cases and 50% of syphilis-positive cases were among non-educated pregnant women, while being a housewife accounted for 90.9% and 100% of hepatitis B and syphilis cases, respectively. Similarly, the husband's occupation, being unemployed or others (temporary manual jobs), accounted for 90.9% of hepatitis B-positive cases and 75% of syphilis cases.

Table 1: Demographic Factors of the Respondents against Hepatitis B, Syphilis, and HIV among Pregnant Women Attending Burco General Hospital, 2023

	Frequency	HBV B		SYPHILIS		HIV	
Characteristics	**(N=271) (%)**	**+VE N=11**	**-VE N=260**	**+VE N= 8**	**-VE N=263**	**+VE N=1**	**-VE N=270**
Age in category							
15-24	104 (38.5%)	4	100	2	102	1	103
25-34	114 (42.1%)	3	111	3	111	0	114
35-44	46 (17%)	4	42	3	43	0	46
45-47	7 (2.6%)	0	7	0	7	0	7
Residence							
Urban	231 (85.2%)	10	221	8	223	1	230
Rural	40 (14.8%)	1	39	0	40	0	40
Marital status							
single	0 (0%)	0	0	0	0	0	0
Married	262 (96.7%)	10	252	8	254	0	262
Divorced/separated	8 (3%)	1	7	0	8	1	7
Widow	1 (0.4%)	0	1	0	1	0	1
Type of marriage							
Monogamous	217 (80.1%)	8	209	6	211	0	217
Polygamous	54 (19.9%)	3	51	2	52	1	53
Education							
None	170 (62.7%)	9	161	4	166	1	169
Primary	49 (18.1%)	1	48	1	48	0	49
Secondary	27 (10%)	1	26	3	24	0	27
Tertiary	25 (9.2%)	0	25	0	25	0	25
Husband education							
None	108 (39.9%)	7	101	4	104	1	107
Primary	55 (20.3%)	3	52	1	54	0	55
Secondary	66 (24.4%)	1	65	2	64	0	66
Tertiary	42 (15.5%)	0	42	1	41	0	42
Occupation							
Housewife	240 (88.6%)	10	230	8	232	1	239
Student	6 (2.2%)	0	6	0	6	0	6
Trading	11(4.1%)	0	11	0	11	0	11
Civil servant	13 (4.8%)	1	12	0	13	0	13
Others	1 (0.4%)	0	1	0	1	0	1
Occupation of husband							
Unemployed	93 (34.3%)	6	87	3	90	1	92
Student	3 (1.1%)	0	3	0	3	0	3
Trading	59 (18.1%)	1	48	2	47	0	49
Civil servant	10 (3.7%)	0	10	0	10	0	10
Others	116(42.8%)	4	112	3	113	0	116

HBV: hepatitis B virus, HIV: human immunodeficiency virus

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Obstetric Factors of the Population

The study showed that the majority of the pregnant women had parity and gravidity of 3 or more children (43.9% and 62%, respectively). More than half (57.2%) of these pregnant women were in their third trimester, with 54.5% hepatitis B positive cases and 100% syphilis cases, while 33.6% were in the second trimester and only 9.2% were in their first trimester of pregnancy. Mothers who reported having 4 or more children (gravidity) had the highest rate of hepatitis B (63.6%) and syphilis (62.5%) prevalence. Half of the cases with positive syphilis results reported a history of abortion.

Table 2: Obstetric Characteristics of the Respondents against Hepatitis B, Syphilis, and HIV among Pregnant Women Attending Burco General Hospital, 2023

	Frequency	HBV B		SYPHILIS		HIV	
Characteristics	**(N= 271)%**	**+VE N=11**	**-VE N=260**	**+VE N=8**	**-VE N=263**	**+VE N=1**	**-VE N =270**
Parity							
0	59 (21.8%)	0	59	1	58	0	59
1	47 (17.3%)	3	44	1	46	0	47
2	46 (17%)	1	45	2	44	1	45
3	30 (11.1%)	2	28	0	30	0	30
Equal or > 4	89 (32.8%)	5	84	4	85	0	89
Gravidity							
1	59 (21.8%)	0	59	1	58	0	59
2	44 (16.2%)	3	41	1	43	0	44
3	43 (15.9%)	1	42	1	42	1	42
Equal or >4	125 (46.1%)	7	118	5	120	0	125
Gestational period							
1-3 months	25 (9.2%)	2	23	0	25	0	25
46 months	91 (33.6%)	3	88	0	91	0	91
7-9 months	155 (57.2%)	6	149	8	147	1	154
History of home delivery							
Yes	108 (39.9%)	9	99	5	103	1	107
No	163 (60.1%)	2	161	3	160	0	163
History of Cesarean section							
Yes	33 (12.2%)	2	31	1	32	0	33
No	238 (87.8%)	9	229	7	231	1	237
History of abortion							
Yes	71(26.2%)	3	68	4	67	0	71
No	200 (73.8%)	8	192	4	196	1	199
History of blood transfusion							
Yes	41 (15.1%)	2	39	3	38	1	40
No	230 (84.9%)	9	221	5	225	0	230

HBV: hepatitis B virus, HIV: human immunodeficiency virus

Social Factors of the Respondents

Among the respondents, 14.8% reported having contact with liver disease patients, while nose piercing and ear piercing were 4.8% and 98.9%, respectively. 36.5% of pregnant women had tooth extraction. The history of STDs or a husband with a history of STDs was 21.4% and 15.9% respectively. Traditionally, it is customary for Somali girls to have ear piercings in childhood. Those who had contact with liver disease accounted for 45.5% and 12.5% of hepatitis B and syphilis-positive cases. All positive cases of hepatitis and 87.7% of syphilis cases reported a history of ear piercing, and no history of nose

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piercing. 6 out of the 8 cases of positive syphilis reported had tooth extraction (75%), while only 3 (27.3%) of those who had tooth extraction had a positive hepatitis B test. The majority of those who had hepatitis or syphilis reported a history of STDs, with a positive hepatitis test (72.7%) or syphilis (62.5%) test. Likewise, 63.6% of hepatitis B-positive cases and 75% of syphilis cases reported a history of a husband with STDs.

Table 3: Social Factors of the Respondents against Hepatitis B, Syphilis, and HIV among Pregnant Women Attending Burco General Hospital, 2023

	Frequency	HBV B		SYPHILIS		HIV	
Characteristics	**(N= 271)%**	**+VE N=11**	**-VE N=260**	**+VE N=8**	**-VE N=263**	**+VE N=1**	**-VE N =270**
Contact with a liver disease person							
Yes	40 (14.8%)	5	35	1	39	0	40
No	231 (85.2%)	6	225	7	224	1	230
Nose piercing							
Yes	13 (4.8%)	0	13	0	13	0	13
No	258 (95.2%)	11	247	8	250	1	257
Ear piercing							
Yes	268 (98.9%)	11	257	7	261	1	267
No	3(1.1%)	0	3	1	2	0	3
Tooth extraction							
Yes	99 (36.5%)	3	96	6	93	0	99
No	172 (63.5%)	8	164	2	170	1	171
History of STDs							
Yes	58 (21.4%)	8	50	5	53	1	57
No	213 (78.6%)	3	210	3	210	0	213
History of husband with STDs							
Yes	43 (15.9%)	7	36	6	37	0	43
No	228 (84.1%)	4	224	2	226	1	227

HBV: hepatitis B virus, HIV: human immunodeficiency virus. STDs: sexually transmitted disease

Laboratory Results of the Respondents

Prevalence of HIV, HBV, and Syphilis among Respondents

The prevalence of hepatitis B among the respondents was 4.1%, with 11 pregnant mothers testing positive for the virus. HIV, on the other hand, was 0.4% as only a single mother tested for the disease. The prevalence of Syphilis was 3%, with 8 pregnant mothers having positive results. Among the patients who tested positive for Hepatitis B, only one patient tested positive for HIV. This gives HIV/HBV a cross-reactivity of 9.1%.

Assessing the Association between Independent Factors and the Presence of HBV

Independent variables under demographic, obstetric, and social factors were assessed against hepatitis B status using binary regression. Among the variables, four had a P -value <0.25 (Table 4). This was the history of home delivery, contact with a liver disease patient, history of STDs, and husband's history of STDs.

Those four independent variables were fitted into the multivariate analysis model. Only home delivery and history of contact with liver disease patients showed a p-value <0.05 (Table 5) and were considered to be statistically significant.

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Table 4: Socio-demographic and Associated Factors with HBV Infection among Pregnant Mothers Attending Burao General Hospital, Somaliland, 2023 (N = 271).

		HBsAg status		Univariate analysis		Multivariate analysis	
Variables		Positive n (%)	Negative n (%)	COR (95%CI)	P-value	AOR* (95%CI)	P - value
Home delivery	yes	9 (3.3%)	99 (36.5%)	0.137 (0.029-0.645)	0.012	0.151 (0.029 -0.775)	0.023
	No	2 (0.74)	161 (59.4%)	1			
Contact with live disease patient	Yes	5 (1.8%)	35 (12.9%)	0.187 (0.054-0.644)	0.008	0.213 (0.053 – 0.775)	0.030
	No	6 (2.2%)	225 (83%)	1			
STDs history	Yes	8 (3%)	50 (18.5%)	0.089 (0.023-0.349)	0.001		
	No	3 (1.1%)	210 (77.5%)	1			
Husband with STDs	Yes	7 (2.6%)	36 (13.3%)	0.092 (0.026 – 0.33)	0.000		
	No	4 (1.5%)	224 (82.7%)	1			

Abbreviations: AOR, adjusted odds ratio; CI, confidence interval; HBV, hepatitis B virus; COR, crude odds ratio. a: Adjusted for all the independent variables listed.

Assessing the Association between Independent Factors and the Presence of Syphilis

Independent variables under demographic, obstetric, and social factors were assessed against Syphilis status using binary regression. Among the variables, seven had a P -value <0.25 (Table 5). This was the history of home delivery, abortion, blood transfusion, ear piercing, tooth extraction, history of STDs, and husband's history of STDs.

Those seven independent variables were fitted into the multivariate analysis model. Only tooth extraction showed a p-value <0.05 (Table 6) and was considered to be statistically significant.

Table 5: Socio-demographic and Associated Factors with Syphilis Infection among Pregnant Mothers Attending Burao General Hospital, Somaliland, 2023 (N = 271).

		Syphilis status					
				Univariate analysis		Multivariate analysis	
Variables		Positive n (%)	Negative n (%)	**COR* (95%CI)**	**P-value**	**AOR* (95%CI)**	**P - value**
Home delivery	yes	5 (1.8%)	103 (38%)	0.386 (0.09-1.65	0.199		
	No	3 (1.1%)	160 (59%)	1			
Abortion history	Yes	4 (1.5%)	67 (24.7%)	0.342 (0.08 – 1.4)	0.137		
	No	4 (1.5%)	196 (72.3%)	1			
Blood transfusion history	yes	3 (1.1%)	38 (14%)	0.281 (0.06-1.22)	0.023		
	No	5 (1.8%)	225 (83%)	1			
Ear piercing	Yes	7 (2.6%)	261 (96.3%)	18. 6 (1.5 - 230)	0.023		
	No	1 (0.3%)	2 (0.7%)	1			
Tooth extraction	Yes	6 (2.2%)	93 (34.3%)	0.182 (0.04- 0.92)	0.04	0.044(0.004-0.501)	0.012
	No	2 (0.7%)	170 (62.7%)	1			
STDs history	Yes	5 (1.8%)	53 (19.6%)	0.151(0.04- 0.65)	0.11		
	No	3 (1.1%)	210 (77.5%)	1			
Husband with STDs	Yes	6 (2.2%)	37 (13.7%)	0.55(0.01- 0.28)	0.001		
	No	2 (0.7%)	226 (83.4%)	1			

Abbreviations: AOR, adjusted odds ratio; CI, confidence interval; HBV, hepatitis B virus; COR, crude odds ratio.

a: Adjusted for all the independent variables listed.

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Assessing the Association between Independent Factors and the Presence of HIV

Descriptive Analysis of Independent Factors against the Presence of HIV

Only one of the respondents tested positive. The patient was in the age group of 15-24 years old. She had risk factors of urban residence, polygamous family, no education, history of blood transfusion, ear piercing, and sexually transmitted diseases like hepatitis B. No inferential statistics were carried out as the prevalence was too small to have any significance.

DISCUSSION

Baseline Characteristics

The majority of the respondents (42.1%) were in the age group of 25-34 years old and lived in urban areas (85.2%), with the majority of them being married (96.7%) and in monogamous marriage (80.1%). The majority of the pregnant women were not educated (62.7%). This is in line with results from the Somaliland Health and Demographic Survey 2020, which showed that 66% of women aged 15-49 are illiterate (Sebastião *et al.*, 2020). Thus, 88.7% of the respondents reported being housewives with no formal job.

The study showed that the majority of the pregnant women had parity and gravidity of 3 or more children (43.9% and 62%, respectively). Among the respondents, 39.9% reported having a home delivery, while only 12.2% had a caesarian section, 26.2% had a history of abortion and 15.1% reported having a history of blood transfusion. This is similar to results from the national statistics, which showed that the total fertility rate in Somaliland is 5.7 children per woman and 48% of deliveries are assisted by traditional birth attendants, with 4% of deliveries performed using cesarean section (Sebastião *et al.*, 2020).

Prevalence of HIV, Hepatitis B, and Syphilis and Their Co-infection among Respondents

Among the respondents of this study, only one pregnant woman tested positive for HIV, giving a prevalence of 0.4% among the pregnant women attending Burco General Hospital. This is twice the prevalence found in Muqdisho, with a prevalence of 0.2% (Kurtay & Hussein, 2022). This could be due to the study population size, which was far smaller than the study done in Muqdisho thus raising the percentage of positive cases. However, this prevalence is much smaller than the results found in Uganda 2.9%, Angola 2.6% or Ethiopia 5.3% (14-16). This can be due to socio-religious differences among these societies (Schumann *et al.*, 2020).

The prevalence of hepatitis B among the respondents was 4.1%, with 11 pregnant mothers testing positive for the virus. This result was similar to the study done in Muqdisho in 2020 by (Bancha *et al.*, 2020; Dahie & Heyle, 2017), which found a prevalence of 4.12%. It was also similar to the results of Bafa and Egata (2020) who had a prevalence of 4.5% in Ethiopia in 2020 (Tadiwos, 2021). Lastly, Dionne *et al.* (2016) showed a prevalence of 4.4% in Cameroon for hepatitis B among pregnant women in 2016.

Syphilis, on the other hand, stood at a prevalence of 3%, with 8 pregnant mothers having positive results. This prevalence was within the range of another study done in Cameroon by Dionne *et al.*, 2016, which had a prevalence of 1.7% (1.3%-3.8%). However, this is lower than the prevalence of 6.3% (ever infected) and 1.8% (active infection) found in the 2017 integrated biological and behavioural surveillance (IBBS) survey conducted in Muqdisho by Genetu, (2020). This higher prevalence can be explained by the sample subjects in that survey who were female sex workers. These are among the risk groups who are expected to have higher rates of sexually transmitted diseases.

Among these three infections, only HIV and Hepatitis B had co-infection of 9.1%. This is slightly higher than the prevalence reported in Angola by Valente *et al*. (2020), which was 7.5%. However, a study done in Atat Hospital, Southern Ethiopia, showed that HIV co-infection was present in 40% of hepatitis B virus-positive

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pregnant women attending the antenatal care clinic (UNAIDS, 2014).

Risk Factors for Hepatitis B and Syphilis

Only one of the respondents tested positive for HIV. The patient was in the age group of 15-24 years old. She had risk factors of urban residence, polygamous family, no education, history of blood transfusion, ear piercing, and STDs, while also being co-infected with hepatitis B.

There was no significant risk factor regarding socio-demographic and obstetric factors in association with hepatitis B or syphilis infection. Home delivery (AOR: 0.151, 95% CI: 0.029-0.775) and contact with liver disease patients (AOR: 0.213, 95% CI:0.053-0.775) showed slight protection against hepatitis B infection. This was not in line with a study done in Ethiopia by Bafa & Egata (2020), who reported that home delivery by traditional birth attendants (adjusted odds ratio = 9.06; 95% confidence interval = 2.01–13.36, $p<0.005$) was an independent factor for hepatitis B infection. On the other hand, tooth extraction showed slight protection against Syphilis infection (AOR:0.044 95%CI:0.004-0.501). These results can be attributed to the small sample size with the low prevalence of these infections among the study population.

Although there was no evidence to suggest a significant association, it is worth noting that 6 out of 8 positive syphilis cases reported a history of sexually transmitted diseases. This is in line with results from a study done by Macêdo *et al*., (2017), which showed a previous history of sexually transmitted infection (OR = 9.7) was identified as a determinant factor for syphilis-positive cases. On the other hand, urban residence and marital status of being married accounted for 90.9% and 100% in both hepatitis B and syphilis cases, respectively. While being in a monogamous marriage accounted for 72.7% and 75% of hepatitis B and syphilis-positive cases.

CONCLUSION

Antenatal care provides an excellent opportunity to screen women for infections that are common and treatable and can be transmitted vertically. Somaliland has a high fertility rate (5.7 children per woman), however, the number of deliveries attended by traditional birth attendants is also very high (48%), which can lead to increased transmission of these three infections.

There was no statistically significant outcome regarding the sociodemographic and obstetric factors in association with these three infections.

This study found that the seroprevalence of HIV, HBsAg, and Syphilis among pregnant women attending ANC at Burco General Hospital was 0.4%, 4%, and 2.9%, respectively, with HIV/HBV co-infection of 9.1%.

Recommendation

Ministry of Health in Somaliland, management of Hospitals, Health centers, and MCHs should adopt proper prevention and control intervention guidelines which consider the following points:

- Adaptation of WHO guidelines on triple elimination of HIV, Hepatitis B, and Syphilis to eliminate both vertical and horizontal transmission.
- Training and awareness sessions on HIV, Hepatitis B, and Syphilis risk behaviours and transmission for workers and the community should be maintained.
- Health workers at hospitals should be offered Hepatitis B vaccinations.
- Universal screening of all pregnant women for HIV, HBsAg, and Syphilis during each pregnancy
- Case management of HIV, HBsAg, and Syphilis positive mothers and their infants
- Provision of immunoprophylaxis for infants born to infected mothers, including hepatitis B vaccine and hepatitis B immune globulin
- Routine vaccination of all infants with the hepatitis B vaccine series, with the first dose administered at birth

Further Research

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There is a need to conduct a larger study with a large sample size collected from the different regions in Somaliland to get a national, and regional prevalence of these three infections.

Longitudinal studies need to be done to establish changes in the prevalence of HIV, Hepatitis B, and Syphilis and the effect of any interventions done over time.

Further study needs to be conducted to examine the possibility and extent of prevalence and co-infection on a large scale throughout the nation.

There is also a need for research to assess some cultural norms, like female genital mutilation, concerning these three infections.

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Authors' Contributions

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Disclosure

The authors declare no competing interests in this work

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