

## Sexually Transmitted Infections and HIV: Knowledge, Attitudes and Practices as Transmission Risk Factors in Pregnant Women at Maxixe Health Centre, Mozambique

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### Abstract

Sexually transmitted infections are among the most common public health problems worldwide. Female and male infertility, mother to child transmission, causing miscarriages or congenital disease, and increased risk for Human Immunodeficiency Virus infection (HIV) are some of their consequences. In Sub-Saharan Africa countries, such as Mozambique, the prevalence of these infections is high, women being those who carry the higher burden.

Thus we developed this cross-sectional study with objective of characterizing some sexually transmitted infections, HIV infection, syphilis and trichomoniasis in pregnant women, verifying if their management was in accordance with guidelines and recommendations in the country and identifying practice, Knowledge and associated risk factors.

Samples were collected from 253 pregnant women attending Centro de Saúde de Maxixe. Vaginal samples were obtained and observed microscopically by wet mount and direct microscopic examination (*Trichomonas vaginalis*). HIV antibody testing was performed with the tests Determine HIV-1/2 and Uni-Gold™ and against, *T. pallidum* by RPR, SD BIOLINE Syphilis 3.0 and Determine TP tests in plasma samples. In this study, 11.1% of the pregnant women were infected with HIV, 2.8% with active syphilis, 5.1% with *Trichomonas vaginalis* and 9.1% with yeast. Antibodies against *T. pallidum* were identified in 8,3% of these women. In relation to HIV, 7, 5% of them were new cases.

Samples were taken from 253 pregnant women attending ante-natal outpatient consultation at the health centre, which were informed about the nature of the study and submitted to a semi-structured interview after signing the free informed consent. In this study, the inconsistency on condoms use and the existence of multiple partners by the participants contributing for these infections transmission. Participants have shown that they had information about these infections modes of transmission, as also which measures to use to prevent them.

A significant number of women present with any symptom related to infections that were diagnosed to them, proving that the use of syndrome approach in vaginal discharge must be given some thought in relation to its value in this situation.

The data obtained in this study shows that some gaps also exist in the prenatal care clinics of this Centre, from routine procedures that are not performed in accordance with MISAU recommendations.

The high prevalence of some STI found in this population, their risk behavior, together with the non-observance of some guidelines in the management of those infections by the health personal very worrying. The implementation of a teaching program on quality control, prevention and management of these infections by the health professional seems to us to be of utmost importance, so these can act in accordance with the present guidelines and transmit correct information to the pregnant women who attend prenatal care.

**Keywords:** HIV, Pregnant Women, Sexually Transmitted Infections

## Introduction

Sexually transmitted infections (STIs) have increased significantly, becoming a serious public health problem with a high socio-economic weight, it is due to the significant morbidity and mortality they cause in young individuals as well as the adverse effects they may have at maternal and child health level [1-4].

The control of these infections has become the target of several public health actions; however, although there are basic STIs measures of prevention, they continue to spread to the population worldwide between the ages of 15 and 49 for both sexes [5, 6].

The behavior of greater exposure to STIs and the absence of symptoms hinder the early clinical diagnosis and make the population of young women more susceptible to the consequences of these infections [7-9].

A correct diagnosis of a STI is essential for proper and effective treatment. The concern in the diagnosis and treatment of STIs is not due to the fact that they are infections caused by pathological agents, but also in their possible correlation with increased transition and acquisition of Human Immunodeficiency Virus (HIV) infection [10-12].

In sub-Saharan Africa, HIV is a major concern in the context of human health, constantly threatening the development and the well-being of human beings [6, 13, 14].

This African region, that Mozambique belongs to, the cases of this epidemic are reportedly more than 75%. Mozambique is one of the countries of the Southern region most severely affected by the epidemic, with the eight highest prevalence rate of HIV infection in the world. In this country there are 2 million and 650 thousand people infected by HIV, which affects 15,8 % of women observed in antenatal visits and 11,5 % of people aged 15-49 [15-18].

Women are the largest group of people infected by HIV in Mozambique due to their vulnerability related to biological, social and cultural characteristics and, on the other hand, it is due to issues of power, dominance and violence [19-21].

In Mozambique, nearly one million women attend annually the antenatal visits, in this visit, the *Treponema pallidum* and HIV screening is carried out in all women at the first antenatal visit using rapid tests, according to the norms of the Ministry of Health of Mozambique [22]. The prevalence of HIV and *Treponema pallidum* infections in pregnant women across the country is 15, 8% and 2, 2%, respectively [23-25].

The National Health Service does not reach 42% of the national territory, which makes the population mostly poor with no answer for their basic health needs [23].

In 2003 was carried out a study aimed at determining the prevalence of STIs in women attended at family planning clinics in Mozambique, it was shown among those women, the prevalence's of: 4% for gonorrhea, 8% for Chlamydia, 31% for trichomoniasis, 6% of Mgenitalium infections and 7% of syphilis seropositivity with RPR (Rapid Plam Reagin) [26]. On the other hand, due to the increase in

the number of cases of HIV infections in Mozambique, it is relevant the study of other sexually transmitted infections to understand their association with HIV since they share the same ways of transmission, and are co-factors in the acquisition of the infection through the same way [27-29].

The Ministry of Health has been conducting periodic epidemiological surveillance in all pregnant women in all the country's health centres considered sentinel posts but these surveillance usually cover HIV and *Treponema pallidum* infections, hence there is a lot of information on these two type of infections whereas information on other infections is very scarce [20, 30].

In a study conducted by Daune (2010), this author found a prevalence of HIV infection of 8, 6% in pregnant women in Inhambane province. In this province, the prevalence of HIV infection in men is 5, 8% and 10% in women and, 4% of all people infected with HIV in Mozambique is in this province.

According to the periodic epidemiological surveillance report, the prevalence rates of HIV infection among pregnant women attending the Maxixe Health Centre were: 8%, 6%, 10%, 13% and 10% in 2000, 2001, 2002, 2004 and 2007, respectively. Syphilis prevalence rates were: 4% and 2% in 2007 and 2009, respectively [31].

Although highly reliable, molecular biological methods carry high costs, which is why, in countries with scarce resources, the diagnosis is carried out in accordance with clinical diagnosis and possibly confirmed by anti-HIV and anti-treponemal antibody screening [32].

Information on the prevalence of other sexually transmitted infections in pregnant women in Mozambique is scarce and it is known that these infections during pregnancy can have drastic consequences for pregnancy and for the newborn; they are associated with considerable discomfort and may result in termination of pregnancy, low birth weight and increased infant mortality [33]. Although these infections affect men and women, in developing countries such as Mozambique the situation is very complicated for women for several reasons: women are less able to seek treatment in relation to men, in certain population groups there are social consequences such as stigmatization when women are infertile, including the partner's right to divorce [11, 34]. On the other hand, in these countries complications related to STIs are the major causes of mortality and morbidity of the mother and child during pregnancy [11].

In antenatal visit at Maxixe Health Centre, the diagnosis of other sexually transmitted infections is based on the syndromatic approach, and therapy is performed when there are symptoms, according to MISAU recommendations [26].

Correct and early diagnosis of STIs is one of the cornerstones of its control, as it prevents complications and consequences from developing, and provides a unique opportunity for educational activities on the prevention of HIV infection [35].

The control of these infections does not only prevent the complications of STIs, such as pelvic inflammatory disease and obstruction of tubes in women, but also prevents their transmission to the newborn. This prevention will help to eliminate/reduce the number of cases of congenital syphilis, but also reduces the transmission of HIV infection.

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Epidemiological studies that enable to know different aspects related to the distribution and spread of HIV infection are of vital importance in order to subsidize and know how to act in the prevention and control programmed of HIV/STIs.

The study aimed to characterize the prevalence of HIV, *T. pallidum* and *Trichomonas vaginalis* infections and see if the practices and lack of knowledge contribute to the failure of the programmed to control these infections in pregnant women attended at Maxixe Health Centre in Mozambique.

### Materials and Methods

The present study was cross-sectional. The population included in this study was pregnant women attending antenatal outpatient visits at Maxixe Health Centre, located in Maxixe City, Inhuhane Province, southern region of Mozambique, from January to April, 2016.

The protocol of the survey was approved by the National Bioethics Committee for Health of the Ministry of Health of Mozambique (CNBS) on November 26, 2015.

At the study site, in accordance with the approved protocol, and prior to the application of the questionnaire, the interviewer explained to each of the participants the objectives of the study, mentioning the principles of confidentiality and reassuring them of any apprehensions regarding the release of their responses. Each participant was informed that her identity would not be related to the information provided and that it would only be used for the purposes of the study, and it was reminded that they could withdraw from the questionnaire or request to be withdrawn from the study at any time with no reprisals for their stand.

In order to preserve the privacy of the participants, the questionnaire and the samples collected were coded and the code correspondence key given to the nurse responsible for the maternal and child health sector of the Centre.

Participants who did not speak Portuguese were also informed about the objectives of the study and explained the whole process and about the informed consent in their language by the principal investigator, since the investigator speaks their local languages.

The inclusion criteria for the study were as follows: pregnant women attending antenatal visits at Maxixe Health Centre, who, after being clarified on the objectives of the study, voluntarily adhered to it, i.e. they agreed to participate in the study and signed freely informed consent.

The exclusion criteria were met by participants who did not meet the inclusion criteria, participants who suffer from psychiatric disorders that implied the impossibility of responding the interview and who did not have a legal representative for cases of participants under the age of 18.

It was carried out a semi-structured interview to women who took part in the study to obtain sociodemographic data about the knowledge of sexually transmitted infections and risk behaviors in relation to these infections.

To all pregnant women included in the study were collected blood samples by vein puncture by healthcare professionals from the

Centre and placed in a tube with the anticoagulant, vaginal exudates was done by the pregnant women themselves (pick-your-own), using a Swab with AMIES charcoal as transport mode after the explanation of the principal investigator.

The exudates sample with transport medium was used for wet mount analysis. The collection of vaginal exudates was aimed to diagnose *Trichomonas vaginalis* in the laboratory of Maxixe Health Centre.

### HIV Infection Research

The HIV antibodies test was performed by two rapid immunochromatographic tests: Determine™ HIV-1/2 and Uni-Gold™. These tests are part of the normal routine of the Centre's antenatal visits, the first one being used for screening and the second for confirming the reactivity of the First one. However, in this study all samples were analyzed by the two tests.

The laboratory diagnosis of HIV infection was made to all pregnant women who attend antenatal visits, with pre-test and post-test counseling.

To run the Determine™ HIV-1/2 test a drop of plasma was introduced into the test, and a drop of the respective reagent was then added.

After 15 minutes the result is read. When you see only the control bar, it is considered unreactive result, if two bars (control and test) are seen, it is considered reactive.

The Uni-gold™ test was also performed on all samples obtained from pregnant women by introducing a drop of plasma into the test device, and then adding the specific reagent.

The reading of the result is carried out after 15 minutes, being considered as unreactive test when only control bar is observed or reactive if control and test bars are seen.

When the result is discrepant (Determine™ HIV-1/2 test is reactive and Uni-Gold™ test is unreactive), the Uni-Gold™ test is repeated, if it remains unreactive the result is considered indeterminate and the test is repeated at the next antenatal visit.

When the Uni-Gold™ test is reactive, and in the case of pregnant women, post-test counseling begins and blood is collected, which is immediately sent to the laboratory for TCD4+ lymphocyte analysis. However regardless of the level of these, the pregnant woman initiates antiretroviral treatment, to avoid the mother-to-child transmission of the infection.

In the centre's routine, tests for HIV antibodies screening are done at the first antenatal visit and are repeated three months later when they are unreactive.

### Search for *Treponema pallidum* infection

The laboratory diagnosis of *T. pallidum* infection was carried out on the search for treponemal and non-treponemal anti-bodies. In the centre's routine antenatal visit, the immunochromatographic treponemal SD BIOLINE Syphilis 3.0 test is carried out. In the scope of this study, the treponemal Determine Syphilis TP and non-treponemal RPR (Rapid Plasm Reagin-MACRO-VUETM RPR) were carried out, and titration was carried out in all cases where this was reactive.



The search for specific antibodies by the SD BIOLINE Syphilis 3.0 test to pregnant women was carried out simultaneously with the HIV test by the nurses assigned to the Maternal Child Health Service of the Centre, according to the same procedures.

Pregnant women when they open the antenatal visit sheet are advised to perform the laboratory test for *Treponema pallidum* infection, and are explained all blood collection procedures and reading of the results.

After the explanation and authorization, the blood necessary for the test is collected by finger stick of the left ring finger with a lancet. After a small pressure and with the help of an appropriate pipette provided by the kit, blood is drawn into the SD BIOLINE Syphilis 3.0 test. A drop of the specific reagent is then placed.

The reading of the results is carried out after 15 minutes. The presence of only the control bar indicates unreactive result, whereas the presence of two bars (control and test) is interpreted as a reactive result. When a result is reactive the sexual partner is notified for therapeutic procedures.

The results of this test were obtained from the data recorded in the register of antenatal visit on Maternal and Child Health.

The non-treponemal RPR test used in this study was the commercial Macro-Vue™ RPR Card Test, which allows a macroscopic reading of the reaction.

The test was also carried out in the laboratory of Maxixe Health Centre with plasma sample. For its execution, it was followed the protocol established by the commercial house in both qualitative and quantitative assessment.

**Qualitative assessment:** the plasma in one of the circles of the card, it was placed 50 µl of undiluted sample, spreading it throughout the surface of the card. A drop of antigen suspension was then added and the card was shaken on the auto-stirrer at 100 rpm within 10 minutes. The test was considered reactive when flocculation was visualized and unreactive in the absence of flocculation.

**Quantitative assessment:** All reactive samples in the qualitative test were titrated. For such serial dilutions of factor two were performed until a point at which a reaction was not reactive 50 µl of saline solution was placed from the second to the last circle of the card and 50 µl of the sample was placed in the first and second circles.

The contents of the second circle were homogenized and removed from these 50 µl to the third, and so on successively with 50 µl being discarded at the end.

The contents of each circle were spread and a drop of 20 µl of antigen suspension was added to each of the dilutions, maintaining the subsequent procedures as stated above. The last dilution in which reactivity was observed was taken as the title.

The search for specific antibodies for the diagnosis of syphilis was also carried out by the treponemal Determine™ Syphilis TP test, in all the pregnant women users of Maxixe Health Centre who joined the study.

This test was carried out in the laboratory of Maxixe Health Centre, for this, blood was obtained by vein puncture collected for anticoagulant tube EDTA. For the Determine™ Syphilis TP test, using the appropriate pipette 50 µL of plasma was introduced into the device.

After one minute the Chase buffer reagent was introduced and after 15 minutes the results were read. The presence of the control bar only indicates an unreactive result, while the presence of two bars (control and test) is interpreted as a reactive result.

### **Trichomonas vaginalis**

The vaginal exudates collected for the AMIES transport medium was used for the research of *T. vaginalis*, for direct wet mount.

For the microscopic examination from the swab with the collection, a little of the vaginal exudates was placed on a glass slide, a drop of physiological solution was added and covered with a lamella.

The preparation was visualized in a light field microscope with a 40X objective, and the presence of *Trichomonas vaginalis* was confirmed by the observation of the characteristic movement of this microorganism. All laboratory tests described previously were carried out in the laboratory of Maxixe City Health Centre

### **Data analysis**

The data were analyzed using statistical package SPSS (Statistical Package for the Social Sciences) version 22 and Excel 2010 was also used.

### **Results**

In this study, 303 users of Maxixe Health Centre were invited to participate. However, only 253 participants were included because 36 were under the age of 18 and were not accompanied by someone who would sign the informed consent and 14 did not agree to participate, claiming that they were not authorized by their partners to do so. Altogether, 50 users were excluded from the study.

Regarding age, all the participants answered that question, being their ages between 17 and 41 years. The mean age was 24.8, with a standard deviation of 5.4, median of 24 and mode of 18 years. However, considering all the participants, even those not included in the study, it was observed that 69/303 (22.8%) of users were aged 18 or under.

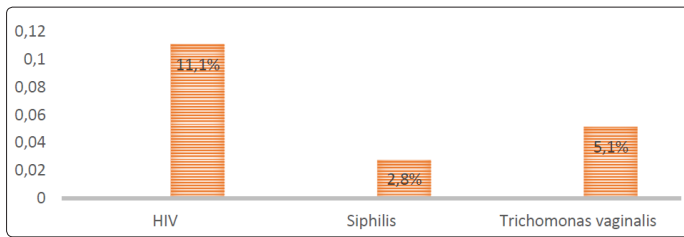
The distribution of the participants by the different levels of education indicated in the survey and the grades they are attending.

Eleven participants 11/253 (4.3%) stated that they did not have any level of education, 77/253 (30.4%) of the participants attended primary school, 33/253 (13%) of the participants attended the primary level of the primary education (EP1) and 44/253 (14.7%) of attended the primary level of primary education (EP2) 131/253 (51.8%) of the participants stated to have secondary education, among these 86/253 (34.3%) hold the General basic education and 45/253 (17.8%) of the participants have General Secondary Education. Nineteen women attended technical education, having 3/253 (1.2%) obtained the basic professional level and 16/253 (6.3%) the technical and professional Education. Regarding higher education, 10/253 (4%) had undergraduate degrees and 5/253 (2%) reported being higher education students.

Regarding their occupations, the majority of the participants, 152/253 (60.1%), declared that they were unemployed. Among those who reported having an occupation, 101/253 (39.9%) work in the civil service 27/253 (10.7%), 23/253 (9.1%) were domestic servants, 16/253 (6, 3%) were studying, 19/253 (7.5%), 5/253 (2%), 4/254 (1.6%) were traders, peasants, hairdressers, respectively, while 7/253, 8%) mentioned other occupations.

At the time of the study, 1/253 (0.4%), 5/253 (2%), 22/253 (8.7%), 33/253 (13%), 43/253 (17%), 41 / 253 (16.2%), 43/253 (17%), 45/253 (17.8%) and 20/253 (7.9%) pregnant women were at the first, second, third, fifth, sixth, seventh, eighth and ninth month of pregnancy, respectively.

### Results of the Laboratory Tests



**Chart 1:** HIV prevalence, Syphilis e Trichomonas vaginalis

HIV Antibodies test was carried out in 253 women included in the study (Chart 1). The Determine™ HIV-1/2 and Uni-Gold™ tests were reactive 30/253 (11.9%) and 28/253 (11.1%) of the samples, respectively. The absence of reactivity was observed in two samples with the Uni-Gold™ test. The results of the two samples that were reactive by the Determine™ HIV-1/2 test and unreactive with the Uni-Gold™ test were considered indeterminate according to MISAU (2008).

Among the 28 reactive participants in both tests, 19/253 (7.5%) were new diagnoses and 9/253 (3.6%) were known cases. The prevalence of HIV infection was 11.1%. Among the 19 new cases 15/19 (78.9%) were diagnosed at the first antenatal visit, while 4/19 (21.1%) were diagnosed in the subsequent visits, and these participants made their first visits in South Africa.

The results of the MACRO VUE RPR and Determine Syphilis TP tests were used for the diagnosis of Syphilis. Seven of the 253 (2.8%) (Chart 1) and 21/253 (8.3%) samples of the women in the study were reactive, 246/253 (97.2%) and 232/253 (91, 7%) were unreactive for the first and second tests, respectively.

The results of the SD BIOLINE Syphilis 3.0 test were read in the antenatal visits and were considered reactive in 7/253 (2.8%) as previously explained in the section on materials and methods. Reactive samples by the RPR test (7) were titrated. All had a titration greater than or equal to 1: 8. The seven cases of active syphilis were diagnosed at the first antenatal visit. When investigating the clinical history of 14/253 (5.5%) pregnant women whose samples were only reactive with Determine syphilis TP, 9/14 (64.3%) had had syphilis in the past and 5/14 (35.7%) had reported that they had STI but failed to mention which. The prevalence of active syphilis was of 2.8%. Microscopic analysis of wet mount of vaginal exudates for Trichomonas vaginalis test was performed in all participants, with 13/253 (5.1%) positive samples (Chart 1) and 240/253 (94.9%)

negative samples. Eight of the thirteen participants (61.5%) in whom T. vaginalis was diagnosed reported symptoms while 5/13 (38.5%) reported no symptoms. Five out of thirteen participants 5/13 (38.5%) infected with T. vaginalis were diagnosed at the first antenatal visit, while 8/13 (61.5%) were diagnosed in the subsequent visits.

### Association between Risk Behaviours and Infections Number of sexual partners

Table 1 shows the relationship between the number of sexual partners in the last two years and HIV infection: 19/208 (9.1%), 6/33 (18.2%), 2/7 (28.6% %) and 1/1 (100%) with one, two, three and more than three partners, respectively.

By Fisher's exact test statistically significant differences were observed regarding the number of sexual partners in the last two years for HIV infection (p=0,026).

Table 1 shows the association between the number of sexual partners in the last two years and Treponema pallidum infection: 4/208 (1.9%) and 3/33 (9.1%) participants who had one and two sexual partners, respectively.

By Fisher's exact test no statistically significant differences were observed regarding the number of sexual partners in the last two years for T. pallidum infection (p=0,188).

Table 1 shows the association between the number of sexual partners in the last two years and T. vaginalis infection: 10/208 (4.8%), 1/33 (3.0%), 1/7 (14, 3%) women had one; two and three sexual partners, respectively. One of the individuals infected by T. vaginalis did not answer this question.

By Fisher's exact test, no statistically significant differences were observed in the number of sexual partners in the last two years for T. vaginalis infection (p=0,207). Four participants did not answer this question.

**Table 1: Association between the numbers of partners the participants had in the last two years and HIV, Treponema pallidum and T. vaginalis infections**

Number of Partners	HIV				Total
	With infection	%	Without infection	%	
1	19	9.1%	189	90.9%	208
2	6	18.2%	27	82.8%	3
3	2	28.6%	5	71.4%	7
more than 3	1	100%	0	0%	1
Total	28		221		249
Syphilis					
Number of Partners	With infection	%	Without infection	%	Total
1	4	1.9%	204	98.1%	208
2	3	9.1%	30	90.9%	33
3	0	0,0%	7	100, 0%	7
more than 3	0	0,0%	1	100, 0%	1
Total	7		242		249

Trichomonas vaginalis					
Number of Partners	With infection	%	Without infection	%	Total
1	10	4.8%	198	85.2%	208
2	1	3.0%	32	97.0%	33
3	1	14.3%	6	85.7%	7
more than 3	0	0.0%	1	100.0%	1
Total	12		237		249

### Condom Use

The relation between condom use in the last two years before pregnancy and HIV infection was as follows: 15/146 (10.4%) reported using condoms sometimes while 12/105 (11.4%) have never used condoms (Table 2).

One of the individuals infected with HIV did not answer this question. By Fisher's exact test did no statistically significant differences were observed regarding condom use and HIV infection ( $p=0,259$ ).

Regarding *Treponema pallidum* infection, 5/105 (4.8%) reported having used condoms sometimes while 2/146 (1.4%) never used condoms (Table 2).

By Fisher's exact test no statistically significant differences were observed regarding condom use and *T. pallidum* infection ( $p=0,180$ ).

Regarding *T. vaginalis* infection, 9/146 (6.1%) and 4/105 (3.8%) reported having used condoms sometimes and never, respectively (Table 2). By Fisher's exact test no statistically significant differences were observed regarding condom use and *T. vaginalis* ( $p=0,610$ ). Two participants did not answer to this question.

**Table 2: Relation between condom use in participants in the last two years and HIV, *Treponema pallidum* and *Trichomonas vaginalis* infections**

Condom use	HIV				Total
	With infection	%	Without infection	%	
Sometimes	15	10.4%	131	89.7%	146
always	0	0,0%	0	0,0%	0
Never	12	11.4%	93	88.6%	105
Total	27		224		251
Syphilis					
Condom use	With infection	%	Without infection	%	Total
Sometimes	2	1.4%	144	98.6%	146
always	0	0,0%	0	0,0%	0
Never	5	4.8%	100	95.2%	105
Total	7		244		251
Trichomonas vaginalis					
Condom use	With infection	%	Without infection	%	Total
Sometimes	9	6.1%	137	85.2%	146
always	0	0,0%	0	97.0%	0

Never	4	3.8%	101	85.7%	105
Total	13		238		251

### Knowledge about STI/HIV

In order to verify the participants' knowledge about HIV/STI regarding their transmission and prevention, a few questions were made. In the question about which STI they know or have heard about, they mentioned as follow: 247/253 (97.6%) HIV/AIDS, 165/253 (65.2%) syphilis, 188/253 (74.3%) gonorrhoea, 14/253 (5.5%) trichomoniasis and 11/253 (4.3%) chlamydia.

In the question on prevention of STI or HIV/AIDS acquisition, 223/253 (88.1%) of women mentioned condom use, 15/253 (5.9%) said they did not know about it, 10/253 (4.0%) reported condom use and fidelity.

Actions such as not sharing sharp objects and condom use, abstinence, fidelity, use of sterilized syringes were mentioned by 5/253 (2.0%) of the participants, respectively.

### Discussion

The population of the present study was pregnant women users of Maxixe Health Centre [30, 26, 36]. Other studies of this kind also used this type of population because it generally reflects what is happening in the rest of the community, being easy to implement a screening, since they have to attend surveillance antenatal visits. This procedure aims to better the mother and her newborn health [37-39].

The characteristics of the participants who volunteered for the study were very diverse: they were from different levels of education, as verified in the other studies [40-42], although it was carried out in a urban area health centre, in order to cover a large population considered more susceptible to HIV/STI acquisition, as well as at transmitting these infections to their newborns. Several studies carried out in Mozambique show that urban women have a higher prevalence of HIV infection compared to rural ones [30, 31].

The main public health measure aimed at reducing HIV/STI transmission chain and co-infection among these microorganisms, minimizing their complications, is related to their early detection and correct treatment [43-45]. Pregnant women are a group where this goal is most easily achieved, as long as screening programs are in place during prenatal consultations during pregnancy. The identification and understanding of the nature of local sexual networks can help to direct the interventions to the communities most susceptible to these infections [26, 46, 47].

Epidemiological surveillance of HIV and *Treponema pallidum* infections in pregnant women in Mozambique is usually done by screening about 300 women at each sentinel post between the ages of 15-49 during their first prenatal consultation at intervals of 2 to 2 years [31].

This screening is carried out simultaneously in all posts considered Sentinel Posts all over the country [48]. The results found in each of the rounds are presented in the "HIV Epidemiological Surveillance Round report [18].

Thus, epidemiological data on screening existing in Mozambique only refer to pregnant women at their first prenatal consultation at



Sentinel Posts. As previously described, and even if they do not include information regarding male or non-pregnant women, the international consensus is that the prevalence of HIV infection among pregnant women is a reliable reflection of trends over time in the evolution of HIV infection prevalence among the entire adult population (men and women). However, in most of these studies there are no survey results [49]. Several studies in sub-Saharan Africa and elsewhere have shown that surveys are important because they demonstrate the sexual, social and economic behavioral factors, attitudes, practices, that may be related to susceptibility to HIV/STI infections, for example in a study carried out in Namibia [50].

However, Kirunga e Ntozi (1997) argues that it is difficult to generalize these studies because the susceptibility to infection may be influenced by some cultural factors, geographic aspects and other environmental factors. In Mozambique, according to WLSA, 2003, women and men incorporate in their practices the values of male power as right and just. The models of education and religious influence determine that women are not prepared, as adults, to negotiate with the partner about sexuality in reproduction or pleasure. In this situation, women are, on the one hand, subject to STI/HIV contamination, without being able to take precautions, not being entitled to a choice over their bodies. In summary, biologically, women are more vulnerable to HIV infection than men, and girls are even more vulnerable [51]. However, the most important factor in determining the differential in transmission and impact of STI/HIV infections on women is the social component. In Mozambique, women are taught that sex is a survival strategy, so they often submit to men's decisions, having less ability to negotiate safe sex, fidelity or abstinence [52]. Coerced or forced sex and sexual violence exacerbate women's biological and social vulnerabilities to infection. Girls tend to initiate regular sexual intercourse earlier than boys, increasing then the risk of transmission [53].

In many African countries, cultural and ethnic factors, such as beliefs, taboos and myths, place directly women's health at risk. For example, in some cultures, men infected with STIs including HIV infection have sex with virgin girls believing that they can be cured [52, 54].

In recent years in Mozambique, the incidence of HIV/STIs has been reduced. This is due to several community awareness and education campaigns on the importance of using condoms in sexual intercourse, as well as on some habits, some social and cultural practices that somehow contribute to the spread of these infections in the society.

The increase in sentinel posts and the availability of rapid diagnostic tests that are easy to perform in most health units have also contributed to this situation [22, 23].

However, studies on risk behavior, knowledge on the HIV and STI transmission mode, as well as on the prevalence of other sexually transmitted infections in certain population groups have not been carried out. It is therefore expected that the results of this study which are described below contribute to a better understanding of this subject.

In the present study, the mean age was 24.8. Regarding the mean age, this was consistent with most of the studies that evaluated the prevalence of HIV/STI infection in pregnant women and its association with sociodemographic factors, in which the mean age

ranged from 20 to 30 years. However, a study conducted in Maputo by Melo et al (2008) to search HIV infection and other STIs, the mean age of the study population was 19 years [9, 30, 36].

In studies performed in pregnant women in Angola and Geneva (Switzerland) by Alvané, (2011) and by William et al, (2015) the mean ages were 27 and 32.2, respectively.

The different levels of education of the participants and the grades they are attending were analyzed, and the majority of the participants had the secondary education 150/253 (59.3%). These observations were similar those reported in pregnant women in several studies conducted in Nigeria by Etukumana et al, (2010) and Botswana by Romoren et al (2007). However, in another study on the prevalence of bacterial vaginosis and associated factors in pregnant women by Shayo et al, (2012), the number of participants with primary level was the majority. In Tanzania, Msuya et al. (2009) and in the southern Mozambique (Xai-Xai, Maputo), Schacht et al. (2014) found a larger number of participants with primary education. A study conducted in Guinea-Bissau in pregnant women by Sane (2014) found a larger number of participants without any level of education, yet all these populations were from rural areas, contrary to the population of this study. Given this fact, the small group of women with no level of education in this study (4.3%) may eventually have more knowledge or be better able to acquire it than another population. Since the level of education is an important point for greater access to information, those women living in urban areas are more likely to acquire knowledge about HIV infection and other STIs, with a reduction in the transmission of these microorganisms. However, although education creates greater protection against attitudes, practices and risk behaviours against STIs, we cannot lose sight of the fact that the hierarchy of social relations of gender that sets masculine domination, ends up being the most striking element that determines the risk practices. In the case of Mozambique, there is also a poverty factor that affects most of the country's population [37,40,42,93]

Most participants started the first prenatal consultation (PNC) in the second trimester of pregnancy (63.6%), although there were participants who started it in the third trimester of pregnancy (6.3%). Similar observations were found by Biza et al, 2015, Mozambique and, Pires et al., 2014, in Nampula was found that 52% and 60% of participants started their prenatal consultations in the second trimester, respectively. In most countries, it is recommended that prenatal consultations should be started in the first trimester of pregnancy to allow early and effective follow-up [13, 55-57]. Villar et al. (2007) reported that a greater number of antenatal visits are associated with fewer complications during pregnancy, delivery and postpartum.

About 74% of the women included in this study went to their first antenatal visit in the second and third trimesters of pregnancy, which is not in accordance with the norms in force in Mozambique, which recommend that the first prenatal consultation must be in the first trimester of pregnancy [22, 58], and that a minimum of 4 antenatal visits during pregnancy should be made [59-61].

As for the number of prenatal consultations, the majority of participants 56.1% had more than one antenatal visits. Most of these participants, about 100% reported that they have heard or were aware of HIV infection and more than 50% of them reported that

they have heard or were aware of gonorrhea and syphilis. The study carried out by IDS (2011), observed that practically all Mozambicans have heard of HIV/AIDS. This may be associated with: previous prenatal consultations, since before the beginning of the service there are some lectures, but mainly about HIV infection, and on the information about HIV infection that exists in the various curricula of the national system of education, thus more educated women are more likely to have been informed about HIV and tested for this virus [31, 62-64]. A study carried out in Mozambique found that 98% of women and 100% of men report having heard about HIV infection, and even among women without education and living in rural areas more than 95% of respondents are aware of HIV/AIDS [31]. It should be noted that in the IDS survey (2011) there was widespread knowledge about HIV/AIDS among Mozambicans. Nearly 100% of the women and men interviewed in this study reported having heard about HIV [65-67]. Since women with secondary and higher education had all heard about HIV/STI, and in women with lower levels of education than those mentioned above, it was found that most of them had heard about this infection, being a minority that had never heard about HIV/IST [67]. Information on the forms of HIV transmission is crucial for strengthening the population in the awareness on the prevention of this infection. Thus, this information is important for the youngsters who are vulnerable to STIs/HIV because they are exposed to risky behaviours [68, 69], such as unprotected sex with multiple partners [31]. Antenatal care is an opportunity to increase women's education about HIV infection [31, 70, 71].

About STI/HIV prevention 88.1% of women mentioned condom use, unlike the study by WBSH in 2011, which found 57% of women mentioning condom use in sexual intercourse. INE (2011) observed that knowledge about HIV/STI prevention visibly increases with the level of education. On the other hand, a study by IDS (2011) showed that the level of educational has a positive relation with the knowledge of means to avoid the spread of HIV/STI [6].

With regard to the number of sexual partners in the last two years, it was observed that the majority (82.2%) of the participants reported only one sexual partner. Although the largest number of these women claimed only one partner, 16.2% of them admitted having had more than one sexual partner in the above mentioned period, and 2.8% of these women had had more than two sexual partners. Yet INSIDA, in a study carried out in 2009 in Inhambane province, found that 2% of women had multiple partners, although this study did not cover women and men as a whole. In another publication on this subject in pregnant women, most participants reported having more than one sexual partner [72].

Concerning the use of condoms in sexual intercourse with the same partner, most participants stated that they used it at times 48.1% and never 51.4%. The greater vulnerability of this gender continues to be more worrying [31]. Although the cause is often a lack of information, cultural causes, beliefs, customs, rituals, which are very difficult to penetrate and influenced by several factors, must also be taken into account. The lack of collaboration from partners who do not accept condom use should also be considered [73, 74].

On the other hand, a study by Silva and Andrade, (2005) on the feminization of HIV/AIDS in Mozambique, found that most women are simply waiting for the man to take the initiative to propose the use of condoms, as they do not have the power to make the proposal.

Mozambican women have been taught since menarche to obey their partner's wishes and demands and, according to national statistics (IDS, 2011), the fact that women are the majority among poor and illiterate people without work increases their vulnerability.

Regarding the reasons for not using condom with the same sexual partner, the majority of the participants 53.4% reported confidence in their partners and 30.3% the desire to have children. Since 57.7% and 41.5% of the women used condoms sometimes or never used them, the vast majority 99.2% does not use it constantly. This was observed by Silva and Andrade, (2005), in a study on the feminization of HIV/AIDS in Mozambique.

Casimiro et al, (2011) affirm that the relationship between men and women in Mozambican society is based on the demarcation of distinct functions, to a certain extent favoring men, allowing them opportunities unequally in relation to women, increasing their vulnerabilities to STI/HIV infections. For a long time the social construction of the feminine gender is based on submission to man, inferiority and inability to guarantee equal rights for both sexes. Modifying this reality is not an easy task and seems to require the formulation of policies and actions of different social actors in an integrated way [75-77].

In Mozambique and in many health units the diagnosis of other STIs is syndrome except for *Treponema pallidum* and HIV infections, which makes it difficult to know the diagnosis of each infection specifically, since the syndrome approach, the pathogen is not identified [48, 78].

In this study, 11.1% of women were infected with HIV. In the epidemiological surveillance rounds of Maxixe Health Centre, with detection of HIV infection through the use of rapid tests, it was observed that the results obtained were similar. However, when compared to other locations in Mozambique, it was observed that the prevalence is lower. Several studies in Mozambique on pregnant women show regional differences in the prevalence of HIV infection [30, 76]. The previous epidemiological surveillance rounds of HIV infection at Maxixe were as follows: 8%, 6%, 10%, 13%, 10% and 13.5% in 2000, 2001, 2002, 2004, 2007 and 2009, respectively [79].

In another study conducted in different centres in Mozambique by Dauane (2010), the prevalence's were as follows: 34.92% in Xai-Xai, 28% in Manhiça, 26% in Chókwè, 28.14% in Beira, 14.95 % in Pemba, 25.48% Manica and 9.7% Maxixe.

A study by Menéndez et al 2010 in Manhiça found a prevalence of 12%. In another countries such as Nigeria, Ekanem et al., 2011 in Ethiopia, Mulu et al., 2007 in South Africa, Mullick et al., 2005 and Tanzania, Msuya et al. 2009, found 0.2%, 9.6% 18-39% and 6.9% of prevalence's, respectively. In Beira, Gennaro et al., 2016, found a prevalence of 15.6% of HIV infection in pregnant women.

Syphilis in Mozambique continues to be a huge public health problem, particularly in pregnant women, making it difficult to eliminate congenital syphilis (WHO, 2005).

Rapid tests do not require laboratory structures or qualified personnel to carry them out; they do not require the transport of samples and the need to collect venous blood. Serological tests, especially Point of Care (POC), have played a crucial role in screening programs



as a clinical diagnostic tool, especially in asymptomatic people in the latent stage of the disease [79-81]. Syphilis is also a significant cause of adult morbidity and may increase the risk of HIV infection. Its control is facilitated by the availability of accessible, sensitive diagnostic tests with rapid effective and treatment [35, 82, 83].

The three tests used in this study were reactive simultaneously in 2.8% of the participants. Comparing these results with those obtained in other investigations carried out at this Health Centre, using also rapid treponemal tests, it was observed that they were similar ranging from 2% to 4%.

The previous epidemiological surveillance rounds at the Maxixe Health Centre had the following prevalence's: 4% and 2% in 2007 and 2009, respectively [76].

The prevalence's of this infection in the southern region of Mozambique were 3.3% and 2.5% in 2007 and 2009, respectively [76].

In Manhiça (Southern of Mozambique), Menéndez et al in 2010, found a prevalence of 10%. In Tanzania, Msuya et al in 2009 in Nigeria, Ekanem et al in 2011, in Ethiopia Mulu et al in 2007 found prevalence's of 0.9%, 1.2%, and 1%, respectively. In Beira, Gennaro et al in 2016 reported a 3.4% prevalence of *Treponema pallidum* infection in pregnant women.

The prevalence of *Trichomonas vaginalis* infection found in this study was 5.1%, being lower than that reported in other investigations conducted in Mozambique. However, it should be noted that this study was performed in an urban area compared to another study conducted in the country.

A study conducted in Manhiça in a rural area by Menéndez et al, 2010, the prevalence found was 31% in 262 women. Other studies conducted in Botswana by Romoren et al, 2007, Tanzania by Msuya et al. 2009 and Nigeria by Ekanem et al, 2011, found prevalence's of: 19%, 5% and 5.2, respectively.

### Study limitations

Any survey has its limitations. Participants can omit the truth when answering the questions, especially when it comes to sensitive issues such as their sexual behavior. In addition, and because in the survey there were questions about past history, individuals may not remember events accurately.

It is not possible to know with certainty the future outcome of some of the situations mentioned in this study, since it is a cross-sectional survey that are carried out in a single moment, without follow-up of the participants over the time.

### Conclusion

Many actions can be taken in guiding and defining new policies to stop the transmission and complications of STIs/HIV in order to reduce their impact and diffusion. Mozambique is a country with a great cultural diversity, so it is necessary to know what cultural barriers exist in the population where it is intended to intervene.

The need for local epidemiological studies to identify different aspects related to the distribution and dissemination of these infections is of fundamental importance for financing and to know

how to act in the programmers of prevention and control of these infections, according to the type of population and its cultural practices. The trajectory of the policies of these infections has been strongly marked by the influence of perspectives and suggestion of modes of external exogenous action models, often without taking into account local customs. In this process, policies and strategies lack creative and innovative nature to respond to socio-cultural specificities within the existing diversity in Mozambique [84-86].

A great effort needs to be made to develop models of containment of these infections taking into account the specific cultural realities of each region.

STIs do not spread from one region to another without being carried by people. Therefore, the proposal of this study, which does not only allow to assess the prevalence of HIV and STI, in a population group of pregnant women, but also to verify whether the norms for the diagnosis and treatment of these infections are followed. The analysis of this situation will allow the adjustment of the standards of conduct of health personnel, if these are not in accordance with those recommended at national and international level [87-95].

The largest number of women in this study had general secondary education but was unemployed. This may be due to the fact that it is in an urban area, where education opportunities are greater but where there are more employment difficulties to their level of education, which is further exacerbated by the gender issue. Their educational level may be the basis of their demonstrated STIs knowledge.

The fact that they are unemployed may lead to greater submission to their sexual partners and hence the justification for the difference between knowledge and risk behaviours found in this study.

Thus, it seems that the use of contraceptives is easier than the use of condoms, which may be related to the negotiation necessary for the use of condoms by the sexual partner. Oral contraception is a woman-only decision that her sexual partner may not even know about. Taking into consideration that the vast majority of pregnant women started their prenatal consultations in the second trimester of pregnancy, while the Ministry of Health of Mozambique recommend that these should begin in the first trimester, it would be important to know the reasons behind this fact.

The prevalence of HIV infection in the population studied was high, even when compared with other parts of sub-Saharan Africa and especially for the most affected group that is between 17-31 years.

The discrepancy in results between the two treponemal tests performed (SD BIOLINE Syphilis 3.0, routinely used at Maxixe Health Centre and Determine syphilis TP, used by the study investigator) was 5.5%, since 14 samples were considered as reactive only in the second test. The prevalence of active and past syphilis, taking into account the results of the Determine syphilis TP test is 8.3%. The prevalence of active syphilis was found in 2.8% of the population of the study. The difference in results between the two tests is due to the fact that it is the norm in the Health Centre that whenever a woman had a previous reactive test and then treated, the treponemal test is reported as unreactive, which may lead to some cases of reinjection are not diagnosed and treated. In the present study, it was not observed, since all of these samples, the non-treponemal test was uncreative [96-105].

Screening and treatment standards of syphilis in pregnancy determine that at least two rapid tests during pregnancy must be done at the first prenatal consultation and one at the third trimester of pregnancy.

For these women, and until the time of pregnancy they were observed in this study (the majority in the second and third trimesters), only one specific rapid test was performed.

The number of women with diagnosed vaginal infections who reported no symptoms was 19%, with special emphasis on *T. vaginalis*, since 38.5% of women infected with this microorganism had no symptoms. Taking into account that the WHO recommendation on syndrome approach is followed in Mozambique, all asymptomatic women would be left untreated. This can lead to serious consequences during pregnancy and for the newborn as well as facilitating the HIV transmission.

## References

1. OMS (2005) Orientações para o tratamento de infecções sexualmente transmissíveis. Genebra WHO.
2. Este D, Worthington C, Leech J (2009) Making Communities Stronger: Engaging African Communities in a Community Response to HIV/AIDS in Calgary, FINAL REPORT.
3. Feresu SA, Harlow SD, Woelk GB (2014) Risk Factors for Low Birth weight in Zimbabwean Women: A Secondary Data Analysis. *PLoS One* 10: e0129705.
4. Menéndez C, Castellsague X, Renom M, Sacarlal J, Quinto L, et al. Prevalence and Risk Factors of Sexually Transmitted Infections and Cervical Neoplasia in Women from a Rural Area of Southern Mozambique. *Infect Dis Obstet Gynecol* 2010: 609315.
5. Oliveira LPN (2011) Sífilis adquirida e congênita, Universidade Castelo Branco, Salvador, Brasil.
6. UNAIDS (2004) Epidemiological facts sheets on HIV/AIDS and sexually transmitted infections Mozambique.
7. Centers for Disease Control and Prevention (CDC) (2015) Sexually Transmitted Diseases Treatment Guidelines, Morbidity and Mortality Weekly Report, Recommendations and Reports 64.
8. Centers for Disease Control and Prevention (CDC) (2014) Sexually Transmitted Diseases Treatment Guidelines 2014: 18.
9. Luján J, Oñate WA, Delva W, Claeys P, Sambola F, et al. (2008) Prevalence of sexually transmitted infections in women attending antenatal care in Tete province, Mozambique. *S Afr Med J* 98: 49-51.
10. Baggaley R, Hensen B, Ajose O, Grabbe KL, Wong VJ, et al. (2012) From caution to urgency: the evolution of HIV testing and counselling in Africa, *Bulletin of World Health Organization*. 90: 652-658.
11. Melo J, Folgosa E, Manjate D, Osman N, Francois I, et al. (2008) Low prevalence of HIV and other sexually transmitted infections in young women attending a youth counselling service in Maputo, Mozambique. 13: 17-20.
12. Murray PR, Rosenthal KS, Pfaller MA (2009) *Microbiologia médica*, 6ª edição, editora Elsevier, 2009.
13. Joint United Nations Programme on HIV/AIDS (UNAIDS) and World Health Organization (WHO). *AIDS epidemic update*, 2009a.
14. Sousa AM (2007) *an epidemia pelo HIV/AIDS e suas repercussões sobre a saúde da população moçambicana (1986 A 2003)* Escola Nacional de Saúde Pública, dissertação do mestrado, Rio de Janeiro, Brasil.
15. Assefa A (2014) A Three Year Retrospective Study on Seroprevalence of Syphilis among Pregnant Women at Gondar University Teaching Hospital, Ethiopia, African Health Sciences.
16. Casimiro I (2012) Research report of the Research Project "Aids Challenge in its Socioeconomic, Cultural and Political Dimensions in Brazil, South Africa and Mozambique 2011-2012".
17. Osman NB, Challis K, Folgosa E, Cotiro M, Bergström S (2000) An intervention study to reduce adverse pregnancy outcomes as a result of syphilis in Mozambique.
18. Population Services International (PSI) (2008) *Reducing Multiple Concurrent Partnerships in Mozambique*.
19. Avelleira JCR, Bottino G (2006) Sífilis: diagnóstico, tratamento e controle, *Educação Médica Continuada*.
20. Monteiro APA (2011) *HIV/AIDS Prevention Interventions in Mozambique as Conflict of Cultures: the case of Dondo and Maringue Districts in Sofala Province*, thesis of doctoral degree, University of the Witwatersrand, Johannesburg.
21. Vieira ACS, Head JF, Rocha MSG, Casimiro IMAPC (2014) A Epidemia de HIV/Aids and ação does Estado. Diferenças entre Brasil, África do Sul e Moçambique. *Rev Katálysis* 17: 196-206.
22. Republic of Mozambique (2012) *Global AIDS Response Progress Report for the Period 2010 – 2011*. Mozambique: National Aids Council.
23. Di Gennaro F, Pizzol D, Guilande G, Monno L, Boscardin C, et al. (2016) HIV and Syphilis prevalence in pregnant women in Beira, Mozambique, Italian conference on AIDS antiviral Research.
24. OMS Moçambique (2008) Rumo à melhoria da saúde da mãe, do recém-nascido, da criança e do adolescente em Moçambique: província de Gaza Na liderança, boletim electrónico número.
25. OMS (2008) *Eliminação mundial da sífilis congénita: fundamento lógico e estratégia para acção*, Genebra, Suíça.
26. MISAU (2006) *Guia para Tratamento e Controle das Infecções de Transmissão Sexual (ITS)*, Maputo.
27. Fernandes LEBC (2014) *Prevalência e fatores associados à presença de infecções sexualmente transmissíveis em gestantes infectadas pelo HIV acompanhadas em um Centro especializado Na baixada Fluminense, 2014, Mestrado em Programa de Pós-Graduação em Medicina Tropical*.
28. INSIDA (2009) *Inquérito Nacional de Prevalência, Riscos Comportamentais e Informação sobre o HIV e SIDA em Moçambique*.
29. USAID (2010) *Estudo sobre vulnerabilidade e risco de infecção pelo HIV entre homens que fazem sexo com homens Na Cidade de Maputo, 1ª EDIÇÃO, 2010*.
30. Dauane LMR (2010) *Análise de prevalência de HIV em mulheres grávidas de Moçambique (2001-2007), 2010, dissertação do mestrado, Universidade de Lisboa, Portugal*.
31. *Inquérito de Indicadores de Imunização, Malária e HIV/SIDA em Moçambique (IMASIDA) (2015) Relatório de Indicadores Básicos*, Ministério da Saúde (MISAU) Instituto Nacional de Estatística (INE), Moçambique.
32. MISAU (2010) *Inquérito Nacional de Prevalência, Riscos Comportamentais e Informação sobre HIV e SIDA em Moçambique*. Maputo, Ministério da Saúde, 2010.
33. Olokoba AB, Olokoba LB, Salawu FK, Danburam A, Des OO, et al. (2008) Syphilis and Human Immunodeficiency Virus co-infection in North-East ern Nigeria, *international journal of tropical medicina*.
34. Vuylsteke B, Bastos R, Barreto J, Crucitti T, Folgosa E, et al. (1993) High prevalence of sexually transmitted diseases in rural area in Mozambique.

35. Schacht C, Hoffman HJ, Mabunda N, Lucas C, Alons CL, et al. (2014) High Rates of HIV Seroconversion in Pregnant Women and Low Reported Levels of HIV Testing among Male Partners in Southern Mozambique: Results from a Mixed Methods Study.
36. MISAU (2014) Fluxograma de atendimento para os Serviços de Saúde Reprodutiva, Materna e Neonatal, Maputo, Moçambique.
37. Abdulai MA (2012) Factors influencing condom use among women in rural Ghana: A cross-sectional survey, Vrije Universities. Amsterdam, the Netherlands.
38. Alessi AMB, Okasaki ELJ (2016) Diagnóstico, tratamento e prevenção das vaginoses e vulvovaginites Durante a gestação, Ver Enferm UNISA. <http://www.unisa.br/graduacao/biologicas/enfer/revista/arquivos/2007-01.pdf> 24.08.2016.
39. National Center for Disease Prevention and Control Department of Health (NCDPC). Guidelines on the Management of Sexually Transmitted Infections (STI) in Pregnancy.
40. Gaspar MC (2002) Population size, distribution, and mortality in Mozambique, 1960-1997". In Wils A. (Orgs.) Population-Development-Environment in Mozambique: Background Readings. Luxemburg: International Institute for Applied Systems Analysis 2002: 5-34.
41. Goldenberg RL, McClure EM, Saleem S, Reddy UM (2010) Infection – related stillbirths, *Lancet* 375: 1482-1490.
42. Gunn JKL, Asaolu IO, Center KE, Gibson SJ, Wightman P, et al. (2016) Antenatal care and uptake of HIV testing among pregnant women in sub-Saharan Africa: a cross-sectional study. *Journal of the International AIDS Society* 19: 20605
43. Haddad LB, Feldacker C, Jamieson DJ, Tweya H, Cwiak C, et al. (2015) Pregnancy Prevention and Condom Use Practices among HIV-Infected Women on Antiretroviral Therapy Seeking Family Planning in Lilongwe, Research article, Malawi. *PLoS One* 10: e0121039.
44. Mayaud P, McCormick D (2001) Interventions against sexually transmitted infections (STI) to prevent HIV infection. *Br Med Bull* 58: 129-153.
45. McClure EM, Goldenberg RL (2009) Infection and stillbirth. *Semin Fetal Neonatal Med* 14: 182-189.
46. Geelhoed D, Stokx J, Mariano X, Lázaro CM, Roelens K (2015) Risk factors for stillbirths in Tete, Mozambique. *Int J Gynaecol Obstet* 130: 148-152.
47. Neves DP, Lane MA, Linardi MP, Victor RWA (2008) *Parasitologia humana*, 11ª edição, Editora atheneu.
48. MISAU (2007) Pré-natal e puerpério atenção qualificada e humanizada, manual técnico, Maputo, 2007.
49. MISAU (2012) Caderneta de saúde da mulher, Maputo, Moçambique.
50. Kirunga CT, JPM Ntozi (1997) Socio-economic determinants of HIV serostatus: a study of Rakai District, Uganda. *Health Transition Review* 7: 175-188.
51. WHO (2007) Global strategy for the prevention and control of sexually transmitted infections: 2006-2015: breaking the chain of transmission, Geneva.
52. WHO (2003) Shaping the Future the World Health Report, WHO Library Cataloguing-in-Publication Data. Geneva, Switzerland.
53. Eaton JW, Rehle TM, Jooste S, Nkambule R, Kim AA, et al. (2014) Recent HIV prevalence trends among pregnant women and all women in sub-Saharan Africa: implications for HIV estimates. *AIDS* 4: S507-514.
54. Moçambique (2010) Instituto Nacional de Estatística. Indicadores sócio-demográficos. Censos de 1997 e 2007. Maputo.
55. Costa CSC, Vila VSC, Rodrigues FM, Martins CA, Pinho LMO (2013) Características do atendimento pré-natal Na Rede Básica de Saúde. *Revista electrónica de enfermagem* 15: 516-522.
56. Cuinhane CE, Coene G, Roelen K, Vanroelen C (2016) Understanding HIV Positive Women"s Experiences with Antenatal Care in Rural Maputo Province, Mozambique. *Clinics in Mother and Child Health* 13: 246.
57. Langa J, Sousa C, Sidat M, Kroeger K, McLellan-Lemal E, et al. (2014) HIV risk perception and behavior among sex workers in three major urban centers of Mozambique. *PLoS One* 9: e94838.
58. MISAU (2007) Direcção Nacional de assistência médica, programa nacional de controlo das ITS/VIH/SIDA, relatório sobre a revisão dos dados de vigilância epidemiológica do VIH Ronda.
59. Freire SSA (2012) Sífilis e gestação: estudo comparativo de dois períodos (2006 e 2011) em população de puérperas. *J bras Doenças Sex Transm* 24: 32-37.
60. Nehemia EJJM (2014) Factores associados a morbilidade materna grave: a relação com o HIV e aids, Maputo, Moçambique, programa de pós-graduação em saúde colectiva, Universidade Federal da Bahia.
61. Pires P, Siemens R, João D, Mureheira E, Baptista A, et al. (2014) Women"s Perceptions about Ante-natal Care Access, Marrere Hospital, Nampula, Mozambique. *International Journal of Research* 3: 784-794.
62. Almeida FSR (2011) Tricomoníase: aspectos clínicos, diagnóstico e tratamento, Universidade Castelo Branco, Salvador-Bahia.
63. Audet CM, Burlison JR, Moon TD, Mohsin S, Vergara AE, et al. (2010) Sociocultural and epidemiological aspects of HIV/AIDS in Mozambique. *BMC International Health and Human Rights* 10: 15.
64. Contreras E, Zuluaga SX, Ocampo V (2008) Syphilis: the Great Mimicker *Infect* 12.
65. Ferreira LJM (2013) Infecção por *Treponema pallidum*: análise serológica e pesquisa de DNA, 2013 dissertação para obtenção do grau de mestre em Microbiologia Médica, Instituto de Higiene e Medicina Tropical, Universidade Nova de Lisboa.
66. Fishel J D, Bradley SEK, Young PW, Mbofana F, Botão C (2011) HIV no seio dos casais em Moçambique: Estado serológico, conhecimento do estado, e fatores associados com a serodiscordância do HIV, 2011, análise profunda do Inquérito Nacional de Prevalência, Riscos Comportamentais e Informação sobre o HIV e SIDA em Moçambique (INSIDA, 2009).
67. Inquérito Demográfico e de Saúde (IDS) (2003) HIV/SIDA e Outras Doenças de Transmissão Sexual, Moçambique.
68. Costa IB (2009) Epidemiologia molecular do Vírus da Imunodeficiência Humana 1 (HIV-1) em mulheres (mães e grávidas) dos estados do acre e tocantins, programa de Pós-graduação, biologia de agentes infecciosos e parasitários Brasil.
69. Kark SL (2003) The social pathology of syphilis in Africans, *International Journal of Epidemiology*.
70. Florey L (2013) Preventing Malaria during Pregnancy in Sub-Saharan Africa: Determinants of Effective IPTp Delivery ICF International Calverton, Maryland.
71. Hilliard S, Agutin S, Rose CD (2014) Messages on pregnancy and family planning that providers give women living with HIV in the context of a Positive Health, Dignity, and Prevention intervention in Mozambique. *Int J Womens Health* 6: 1057-1067.
72. Etukumana EA, TD Thacher, AS Sagay (2010) HIV Risk Factors among Pregnant Women in a Rural Nigerian Hospital.



- West Indian Med J 59: 424-428.
73. Adeleke MA, Adebimpe WO, Sam-Wobo SO, Wahab AA, Akinyosoye LS, et al. Sero-prevalence of malaria, hepatitis b and syphilis among pregnant women in Osogbo, Southwestern Nigeria. *Journal of Infectious Diseases and Immunity* 5: 13-17.
  74. Andrade RG, Iriart JAB (2015) Estigma e discriminação: experiências de mulheres HIV positivo nos bairros populares de Maputo, Moçambique. *Cadernos de Saúde Pública* 31: 565-574.
  75. Lammers J, van Wijnbergen SJG, Willebrands D (2013) Condom use, risk perception, and HIV knowledge: a comparison across sexes in Nigeria. *HIV AIDS (Auckl)* 5: 283-293.
  76. MISAU (2009) Vigilância Epidemiológica do HIV e seu Impacto Demográfico em Moçambique: Atualização, Ronda 2009, grupo técnico multisectorial de apoio a luta contra o HIV/SIDA em Moçambique.
  77. Montoya PJ, Blanco AJ, Gloyd S, Lukehart SA, Brentlinger PE, (2006) Comparison of the diagnostic accuracy of a rapid immunochromatographic test and them rapid plasma reagin test for antenatal syphilis screening in Mozambique. *Bull World Health Organ* 84: 97-104.
  78. MISAU (2015) Testes para diagnóstico de sífilis, Comissão Nacional de incorporação de tecnologias da Sistema Único de Saúde, relatório de recomendação, 2015.
  79. MISAU (2012) International Training & Education Center for Health Moçambicanos e Americanos juntos Na luta contra o HIV/SIDA, Formação de Provedores de Saúde em Prevenção Positiva.
  80. Moreira AL (2013) Diagnóstico tardio da infecção por VIH Na ilha de Santiago, tese do mestrado no Instituto de Higiene e Medicina Tropical, Universidade Nova de Lisboa.
  81. National AIDS Council, Republic of Mozambique. Global AIDS Response Progress Report (GARPR) for the Period 2010-2011: Mozambique: National AIDS Council and UNAIDS, 2012.
  82. Maúngue HB (2015) A face feminina do HIV E SIDA: um estudo sobre as experiências de mulheres infectadas pelo HIV Na cidade de Maputo, Moçambique.
  83. Schacht CD (2015) Factors influencing mother-to-child transmission of HIV during pregnancy and breastfeeding in Mozambique, 2015, Doctoral thesis submitted to the Faculty of Medicine and Health Sciences, Ghent University.
  84. Lihana RW, Ssemwanga D, Abimiku A, Ndemi N (2012) Update on HIV-1 Diversity in Africa: A Decade in Review. *AIDS Rev* 14: 83-100.
  85. Manuel S (2011) Políticas de HIV E SIDA e dinâmicas socioculturais em Moçambique, notas para reflexão.
  86. Martins MMBP (2010) Conhecimentos e comportamentos sobre algumas infecções sexualmente transmissíveis dos alunos dos ensinos básico e secundário de uma escola da area da grande Lisboa, Instituto de Higiene e Medicina Tropical, Universidade Nova de Lisboa.
  87. Biza A, Jille-Traas I, Colomar M, Belizan M, Harris JR, et al. (2015) Challenges and opportunities for implementing evidence-based antenatal care in Mozambique: a qualitative study, *BMC Pregnancy and Childbirth* 15: 200.
  88. Ekanem EI, Ekott M, Udo AE, Efiok EE, Inyang-Out A (2011) Prevalence of sexually transmitted diseases in pregnant women in Ikot Ekpene, a rural community in Akwa Ibom State, Nigeria. *Open Journal of Obstetrics and Gynecology* 2: 18353.
  89. Guinsburg R, Santos AMN (2010) Critérios diagnósticos e tratamento da sífilis congênita Documento Científico – Departamento de Neonatologia Sociedade Brasileira de Pediatria.
  90. Hussain T, Kulshreshtha KK, Sinha S, Yadav VS, Katoch VM (2006) HIV, HBV, HCV and syphilis co-infections among patients attending the STD clinics of district hospitals in Northern India. *International Journal of Infectious Diseases* 10: 358-363.
  91. Jackson H (2012) Sida em África: Continente em Crise”; Safaids, SAT, Asdi, UNFPA, Zimbabwe, 2004.
  92. Janeiro D. G. P. Sífilis congénita: caracterização da infecção e avaliação de técnicas laboratoriais para o seu diagnóstico, IHMT/UNL.
  93. Msuya SE, Uriyo J, Hussain A, Mbizvo EM, Jeansson S, et al. (2009) Prevalence of sexually transmitted infections among pregnant women with known HIV status in northern Tanzania. *Reprod Health* 6: 4.
  94. Mullick S, Watson-Jones D, Beksinska M, Mabey D (2005) sexually transmitted infections in pregnancy: prevalence, impact on pregnancy outcomes, and approach to treatment in developing countries, *Tropical medicine, Sex Transm Infect* 81: 294-302.
  95. Mulu A, Kassu A, Tessema B, Yismaw G, Tiruneh M, et al. (2007) Seroprevalence of Syphilis and HIV-1 during pregnancy in a teaching Hospital in Northwest Ethiopia. *Journal of infectious diseases* 60: 193-195.
  96. Raimundo IM (2011) Migração e HIV/SIDA em Moçambique: Desafios da região centro de Moçambique. *GEOUSP - Espaço e Tempo, São Paulo, N° 29: 43-55.*
  97. Sane S (2014) Análise do programa de prevenção da transmissão vertical do vírus HIV Na ONG Associação Céu e Terras” Guiné-Bissau, 2007- 2011.
  98. Sawers L, Stillwaggon E (2008) Understanding the Southern African Anomaly Poverty, Endemic Disease, and HIV. Department of Economics Working Paper Series.
  99. Shayo PA, Kihunrwa A, Massinde AN, Mirambo M, Rumanyika R, et al. (2012) Prevalence of bacterial vaginosis and associated factors among pregnant women attending at Bugando Medical Centre, Mwanza, Tanzania. *Tanzania Journal of Health Research* 14: 175-182.
  100. Silvas TC, Andrade X (2005) Feminização do SIDA em Moçambique: A cidade de Maputo, Quelimane e distrito de Inhassunge Na província da Zambézia, Como estudos de caso.
  101. Tavares HP, Santos DCDM, Abbade JF, Negrato CA, Campos PA, et al. (2016) Prevalence of metabolic syndrome in non-diabetic, pregnant Angolan women according to four diagnostic criteria and its effects on adverse perinatal outcomes, *Diabetol Metab Syndr* 8: 27.
  102. Villar J, Carroli G, Khan-Neelofur D, Piaggio G, Gülmezoglu M (2007) Patterns of routine antenatal care for low-risk pregnancy. *Cochrane Database Syst Rev* 4: CD000934.
  103. 103. Williame A, Blanchard-Rohner G, Combescure C, Irion O, Posfay-Barbe K, et al. (2015) Awareness of Cytomegalovirus Infection among Pregnant Women in Geneva, Switzerland: A Cross-sectional Study. *International Journal of Environmental Research and Public Health* 12: 15285-15297.
  104. Women Law in Southern Africa Research and Education Trust (WLSA) (2003) Feminização do SIDA em Moçambique: Estudo Piloto. Maputo. Moçambique.
  105. World Bank Support for Health in Mozambique (WSH) (2011) Reproductive health at a glance Mozambique.

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