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AETIOLOGY AND ANTIMICROBIAL RESISTANCE PATTERNS OF URINARY TRACT INFECTIONS (UTIs) IN PREGNANT WOMEN ATTENDING TO MASVINGO PROVINCIAL HOSPITAL IN 2023.

BY

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A PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF BACHELOR OF MEDICAL LABORATORY SCIENCES HONOURS IN THE COLLEGE OF HEALTH, AGRICULTURE AND NATURAL SCIENCES

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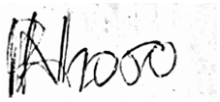
ABSTRACT

Urinary tract infections (UTIs) are common complications during pregnancy and can lead to adverse maternal and fetal outcomes if left untreated cause perinatal and maternal morbidity and mortality. Understanding the prevalence and antibiotic susceptibility patterns of UTIs among pregnant women is crucial for guiding appropriate management strategies and optimizing maternal and neonatal health. This study aimed to determine the prevalence of UTIs, the causative bacteria the antibiotic susceptibility patterns of uropathogens among pregnant women attending Masvingo Provincial Hospital (MPH) in the year 2023. A cross sectional laboratory based analysis of laboratory records was conducted to identify pregnant women who were diagnosed with UTIs at Masvingo provincial hospital from January to December 2023. Data on patient demographics, urine culture results, and antibiotic susceptibility profiles were collected and analysed. Descriptive statistics were used to determine the prevalence of UTIs and the antibiotic susceptibility patterns of bacteria were assessed. A total of 271 pregnant women were included in the study, of which 52 were diagnosed with UTIs because of the significant positive urine culture and varying antibiotic sensitivity pattern, resulting in a prevalence rate of 19.19%. *Escherichia coli* was the most common uropathogen isolated (38.46%). Other microorganisms included were *Staphylococcus aureus* (21.15%), *Klebsiella* spp (17.31%), *Proteus* (9.61%), *Streptococcus* spp (5.77%), *S.saprophyticiccus* (3.35%) and *Enterobacter* (3.35%). The antibiotic susceptibility patterns varied among the identified uropathogens, with most showing high susceptibility to gentamicin and ciprofloxacin, while demonstrating lower susceptibility to ampicillin and tetracycline. These findings necessitate the importance of routine screening for UTIs during pregnancy and the need for empirical antibiotic therapy based on local susceptibility patterns to ensure optimal maternal and fetal outcomes.

Keywords: Prevalence, Urinary tract infection, pregnancy, uropathogens, antibiotic sensitivity

DECLARATION

I Ruvimbo Julia Nhoro declare this proposal my original work except where sources have been cited and acknowledged. The work has never been submitted by someone, nor will it be submitted by someone else.

Ruvimbo Julia Nhoro  29 April 2024

Student's Full Name **Student's Signature**

Mr Zororai Chiwodza  29 April 2024

Supervisor's full name **Main Supervisors' Signature**

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I would like to thank God almighty for his love grace and favour and allowing this journey to come to fruition.

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To my friends and family, my pillars of strength, thank you for the love, the support, encouragement, you are greatly appreciated.

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I would also like to acknowledge and thank the staff at Masvingo provincial hospital laboratory for their help and assistance in conducting my research study.

DEDICATION

I dedicate this dissertation to my parents. My source strength and encouragement, I am truly grateful for you.

ACRONYMS AND ABBREVIATIONS

WHO – World health organisation

UTIs – Urinary tract infections

ASB – Asymptomatic bacteriuria

MRFs – Maternal risk factors

MPH – Masvingo provincial hospital

MPHL – Masvingo provincial hospital laboratory

IUGR – Intrauterine growth restriction

AUREC – Africa university research and ethics committee.

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CHAPTER 1

1.1 Introduction

This study provides an overview of the frequency of urinary tract infections in pregnant mothers. Investigating also the antimicrobial patterns, the possible outcomes for the maternal and foetal health. It will emphasise the necessity of the research as well as its goals and how they contribute to exposing the issue for the purpose of finding treatments and control measures.

1.2 Study background

Urinary tract infections (UTIs) represent a significant health concern, particularly among pregnant women, due to their potential complications for both the mother and the foetus. UTIs during pregnancy have been associated with adverse outcomes such as preterm birth, low birth weight, sepsis, acute respiratory distress syndrome (ARDS) and even maternal morbidity. Understanding the prevalence of UTIs in pregnant women is crucial for implementing effective preventive strategies and treatment protocols.

Urinary tract infections (UTIs) are any infections that affect the urinary system. The urinary tract system consists of the bladder, urethra, ureters and kidneys. Although they can occur in any part of the urinary tract, infections usually affect the lower urinary tract which include the urethra and bladder (cystitis) (CDC, 2021).UTIs are a common health concern affecting individuals of all ages and genders (Maternal and Reproductive Health, n.d.)

The prevalence of UTIs during pregnancy varies across different populations and regions. According to a study by Nicolle (2008), approximately 2% to 10% of pregnant women experience symptomatic UTIs, while the prevalence of asymptomatic bacteriuria (ASB) can be as high as 2% to 7%. For example, a systematic review and meta-analysis of studies from Latin America reported that the prevalence rates of ASB, lower UTI and pyelonephritis were 18.45%,

7.54% and 2.34%, respectively. These rates are higher than the global estimates of 2–10% for ASB, 1–4% for lower UTI and 0.5–2% for pyelonephritis (Henrique, Rodrigues, Stela Verzinhasse Peres, Pulcineli, & Aurélio, 2023). However, the data on UTIs in pregnant women from other regions, especially Africa are scarce and inconsistent limiting the generalizability and comparability of the findings. These figures underscore the importance of screening and managing UTIs in this vulnerable population.

E. coli (*Escherichia coli*) is the most common causative organism implicated in UTIs among pregnant women. E. coli accounts for nearly 80% of UTIs in pregnant women (Mazor-Dray et al. 2014). Other pathogens such as *Klebsiella pneumoniae, Enterococcus faecalis, Proteus mirabilis* and *Staphylococcus saprophyticus* also contribute to UTIs in in expectant mothers but to a lesser extent.

Antimicrobial resistance poses a significant challenge in the management of UTIs during pregnancy. The widespread use of antibiotics has led to the emergence of multidrug-resistant strains, compromising the effectiveness of conventional treatment options. High rates of resistance were observed among uropathogenic *E. coli* isolates from pregnant women, particularly against commonly prescribed antibiotics such as ampicillin, trimethoprim-sulfamethoxazole and ciprofloxacin (Tadesse et al. 2017).

UTIs during pregnancy are influenced by various risk factors. Anatomical and physiological changes, such as urinary stasis and hormonal alterations, increase the susceptibility of pregnant women to UTIs. Additionally, factors like socioeconomic status, maternal age, sexual activity, and previous history of UTIs can also contribute to the development UTIs during pregnancy. A study by Smaill and Vazquez (2016) highlighted that pregnant women with a history of recurrent UTIs are at particularly high risk for developing symptomatic infections during pregnancy.

The consequences of UTIs in pregnant women can be grave, impacting both maternal and foetal health. Untreated or inadequately managed UTIs during pregnancy are associated with adverse outcomes, including preterm birth, low birth weight, intrauterine growth restriction and even maternal morbidity. There is a significant association between UTIs during pregnancy and the risk of preterm birth, emphasizing the importance of timely detection and treatment of UTIs in this population (Wing et al. 2018).

Furthermore, UTIs during pregnancy can lead to complications such as acute pyelonephritis, which may necessitate hospitalization and intravenous antibiotic therapy. Acute pyelonephritis poses not only immediate risks to maternal health but also increases the likelihood of adverse foetal outcomes, including preterm labor and neonatal sepsis.

UTIs represent a considerable concern for pregnant women, given their association with adverse maternal and foetal outcomes. Understanding the prevalence of UTIs in pregnant women and the antimicrobial patterns of causative bacteria is essential for guiding clinical practice and public health interventions. Effective strategies for the prevention, screening, and treatment of UTIs during pregnancy must consider both the microbial epidemiology and antimicrobial resistance profiles to ensure optimal maternal and neonatal outcomes.

1.3 Problem Statement

Urinary tract infections (UTIs) in pregnant women represent a significant clinical challenge, as they are associated with adverse maternal and foetal outcomes. Despite numerous studies highlighting the implications of UTIs during pregnancy, including increased risks of preterm birth, low birth weight, and maternal morbidity, there remains a gap in understanding the precise prevalence, causative bacteria, and antimicrobial resistance patterns in this vulnerable population (Wing et al., 2018; Nicolle, 2008).While it is well-established that UTIs can have detrimental effects on pregnancy outcomes, the lack of comprehensive data on the

epidemiology and microbial characteristics of UTIs in pregnant women hinders the development of targeted prevention and treatment strategies. Existing research often focuses on symptomatic UTIs, with limited attention given to asymptomatic bacteriuria, which can also have significant implications for maternal and foetal health (Smaill & Vazquez, 2016).

1.4 Study Justification

Research on the prevalence of urinary tract infections (UTIs) in pregnant women for a year crucial for public health impact, clinical relevance, maternal and foetal health concerns, and resource allocation.it is also important to see UTIs progress during the year and to see the fluctuations in the cases in the duration of the study period. UTIs pose a significant global burden, and understanding their prevalence and microbial characteristics is essential for guiding public health policies and interventions. Limited local data and dynamic microbial resistance patterns make this study essential. The findings can guide healthcare providers in managing UTIs, improve patient outcomes, and help allocate resources effectively. Thus, conducting research on UTI prevalence in Masvingo Zimbabwe in 2023 is justified due to its potential to fill knowledge gaps and improve maternal and neonatal health outcomes.

Healthcare professionals can customize screening, diagnosis, and treatment procedures by using the study's data on the prevalence of UTIs, the bacteria that cause them, and the patterns of antibiotic resistance in pregnant women. This data can improve the use of antibiotics, lower maternal and new-born complications, increase public knowledge of UTIs, and guide the creation of policies and the distribution of resources. Additionally, it gives expectant mothers the assurance to get help as soon as they feel symptoms, which will benefit both their health and the health of their unborn child. The results can also be used to properly allocate resources and direct the creation of guidelines. Therefore making this a significant study in Masvingo, even on national level to fill in the knowledge gap, improve maternal and foetal health outcomes as well as decrease the prevalence of UTIs in this population.

1.5 Research Objectives

Broad objective

- This study aims to establish the prevalence, aetiology and antimicrobial resistance patterns of UTIs in pregnant women attending Masvingo Provincial Hospital during the January to December period.

Specific objective

- To establish the prevalence of urinary tract infections in pregnant women, attending MPH from January to December 2023.
- To establish the bacteria that causes Urinary tract infections in pregnant women?
- To assess the antimicrobial resistance patterns exhibited by the bacteria isolated from pregnant women with urinary tract infections.

1.6 Research Questions

- What is the prevalence of UTIs among pregnant women attending to Masvingo Provincial Hospital in 2023?
- Which bacterial pathogens are most commonly associated with UTIs in pregnant women?
- What are the antimicrobial resistance patterns exhibited by the causative bacteria?
- Is there an association between UTIs during pregnancy and adverse maternal and foetal outcomes?

1.7 Study Limitations

The study challenges include diagnostic challenges, incomplete data, and limited follow-up and external validity. Incomplete data may also be influenced by recall bias. Limited follow-up may lead to incomplete information on pregnancy outcomes and treatment effectiveness. The study's findings may not be directly applicable to other settings or populations.

1.8 Study delimitations

This study was done at Masvingo Provincial Hospital and did not include other antenatal clinics. The research focused on UTIs in pregnant women at Masvingo Provincial hospital, which may not be applicable to non-pregnant individuals. Time constraints may limit the scope of the research as the study will be done from January to December 2023 as different years might experience different factors that influence aetiology and antimicrobial resistance.

1.9 Summary

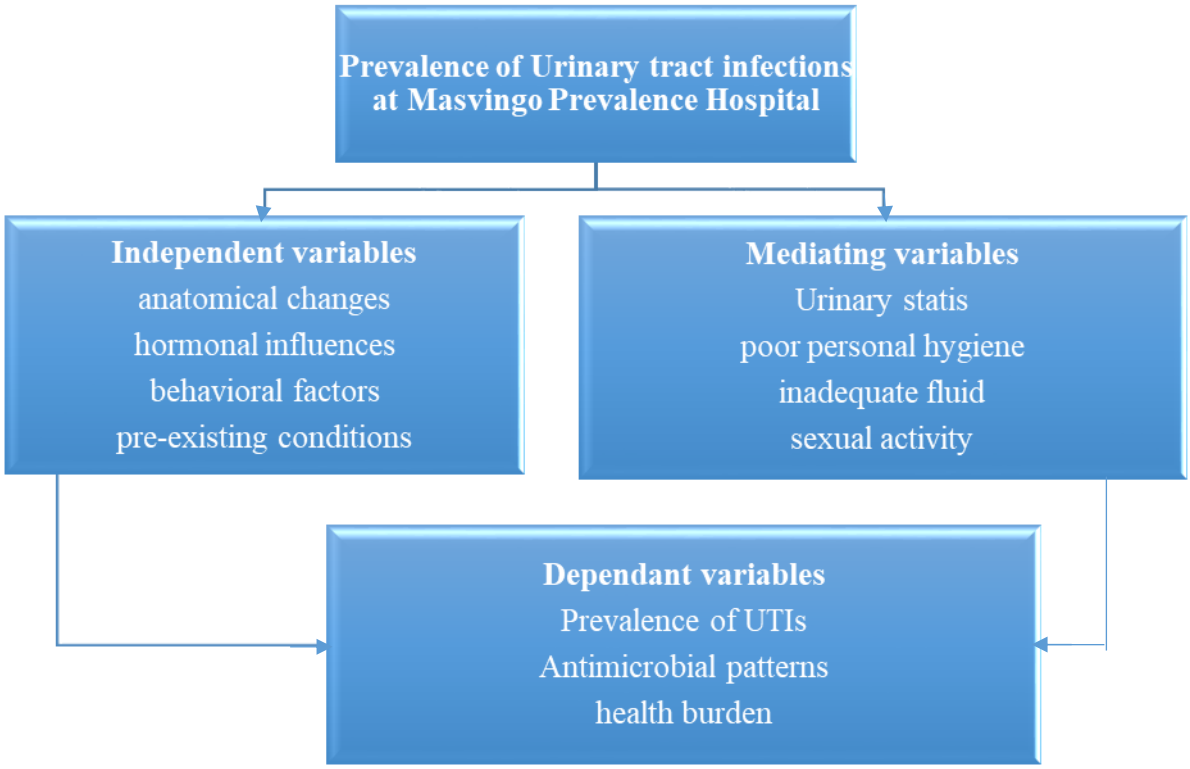
The research aims to investigate the prevalence and causative bacteria of UTIs in pregnant women, assess the antimicrobial patterns and examine their impact on maternal and foetal health outcomes. The prevalence of UTIs during pregnancy is higher compared to non-pregnant women, and several risk factors contribute to their development. By exploring these risk factors and understanding their implications for maternal and foetal health, healthcare providers can develop effective preventive strategies and implement timely interventions to reduce the burden of UTIs in pregnant women.

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

Urinary tract infections (UTIs) are common bacterial infections that affect individuals across all age groups, including pregnant women. UTIs during pregnancy pose significant risks to both maternal and foetal health. It is crucial to understand the prevalence of UTIs in pregnant women, the causative bacteria as well as the antimicrobial patterns of the bacteria.

2.2 CONCEPTUAL FRAMEWORK



CONCEPTUAL FRAMEWORK

The conceptual framework shows the relationship between the independent variables, mediating variables and the dependant variables. By understanding the relationships between these variables, researchers can identify potential risk factors and develop effective preventive

strategies, screening protocols and management approaches to reduce the prevalence of UTIs in pregnant women and reduce the associated maternal and foetal health consequences.

2.3 Prevalence of UTIs in pregnant women.

Urinary tract infections (UTIs) during pregnancy pose a significant health risk to both mothers and foetuses. Several factors contribute to the prevalence of UTIs in pregnant women, including anatomical and physiological changes during pregnancy, urinary stasis, hormonal alterations, sexual activity and previous history of UTIs (Nicolle, 2008). Socioeconomic factors such as poor access to healthcare and inadequate sanitation facilities also play a role, particularly in low-resource settings like Zimbabwe and other parts of Africa (Masinde et al., 2017).

The prevalence of UTIs among pregnant women in Zimbabwe is limited, with a study reporting a 2.7% prevalence in Harare (Chirenje et al. 2001). However, this study is dated and more recent data is need to understand current prevalence trends. Additionally, several studies in Africa show an 18.9% prevalence in Nigeria (Idowu et al. 2014) and 16.5% in Ethiopia (Ali et al2015). Pregnant women worldwide frequently get UTIs, various regions have reported differing prevalence rates (Amiri et al 2019). For example**,** a study in India reported a prevalence rate of 9.4% among pregnant women attending antenatal care clinics (Thakur, 2016), while a prevalence rate of 6.3% was obtained in a study conducted in Thailand (Lumbiganon, 2015). These variations can be attributed to differences in study design, methodology and population characteristics. Systematic review metaanalysis revealed a 23.9 prevalence on a global level (Nahid Ebadi Salari et al., 2023). Asia 10.7% reported the highest occurrence followed by Africa 8.2%, Europe 7.2% and North America 5.5%. Asymptomatic bacteriuria, defined as significant bacterial counts in urine without symptoms occurs in approximately 2–10% of pregnant patients (Sheppard et al., 2023). These asymptomatic

infections can progress to symptomatic UTIs, posing risks to both the mother and the developing foetus.

2.3 Literature review in relation to the causative bacteria of UTIs in pregnant women.

Understanding the causative bacteria with relation to the prevalence of UTIs in pregnant women is crucial for effective management. Therefore, there is a need to review and examine the bacterial profile of UTIs in pregnant women in Zimbabwe, Africa, and global prevalence. Numerous studies have investigated the bacterial isolates associated with UTIs in pregnant women in which the following bacteria have been identified.

The most common organism responsible for 75-90% bacteriuria in pregnancy is *E. coli*. It is a gram negative bacterium found in GIT and associated with ascending infection into the urinary tract. It accounts for approximately 87% of cases (Mazor-Dray et al., 2014). Other gram-negative bacteria such as *Klebsiella pneumoniae*, *Proteus mirabilis*, and *Enterobacter species*. Can also cause UTIs in pregnant women (Smaill & Vazquez, 2016). Klebsiella species contribute to 19% of UTIs in pregnant women. *Staphylococcus sapropyticus* is associated with 6% of cases. *Enterococcus faecalis* is responsible for 4% of cases while *Proteus mirabilis* accounts for 15% of UTIs.

In Africa, the prevalence of asymptomatic bacteriuria (ABU) among pregnant women ranges from 3.1% to 33.4%. Routine screening for bacteriuria by urine culture is recommended during early pregnancy to identify and manage infections promptly. Specific data on UTIs in pregnant women in Zimbabwe are limited. However, given the regional trends, it is likely that E. coli remains the predominant pathogen. Further research is needed to understand the local epidemiology.

2.5 Antimicrobial patterns of the causative bacteria.

Understanding the antimicrobial susceptibility patterns of causative bacteria is crucial for the treatment and management of UTIs in pregnant women. Susceptibility tests are frequently used as a reason not to initiate UTI treatment. The rise in antibiotic resistance in urinary pathogens has been observed globally, and it has emerged as a significant global public health concern. This is especially true in developing countries, where factors such as high levels of poverty, ignorance, inadequate hygiene and a high prevalence of counterfeit and spurious drugs of dubious quality are all contributing factors.

Due to regional variations in antibiotic resistance, it is important to understand the distribution of urinary pathogens and their antibiotic susceptibility in a particular situation. This information can assist in choosing the best treatment. Furthermore, regular surveillance and monitoring studies are necessary due to the dynamic nature of antibiotic resistance.

According to a study done in Ethiopia (Ejerssa et al., 2021), Amikacin was effective against 100% of the isolated *Escherichia coli* strains. Furthermore, nitrofurantoin and gentamicin were found to be effective against 92.3% and 85.7% of *E.coli*, respectively. On the other hand, 42.9% of isolated *E.coli* became resistant to both co-trimoxazole and amoxicillin-clavulanate, while 50% of them demonstrated resistance to ampicillin.71% of the isolated *Proteus species* were sensitive to gentamicin, while all of them were vulnerable to amikacin and nitrofurantoin. On the other hand, 71.4% of the Proteus species exhibited resistance against both nalixidic acid and cotrimoxazole. Furthermore, it was shown that while all Klebsiella pneumoniae isolates were resistant to ampicillin 80% and amoxicillin-clavulanate 60%, they were susceptible to amikacin, gentamicin, and nitrofurantoin. A resistance to both ampicillin and amoxicillin-clavulanate was observed in Pseudomonas aeruginosa. However, all of them showed susceptibility to ceftriaxone.

2.6 Possible outcomes of UTIs in pregnant women

Urinary tract infections can be classified as lower UTIs, such as prostatitis, urethritis, and cystitis, or higher UTIs, such as pyelonephritis (infection of the kidney), depending on the affected anatomical site (Ejerssa et al., 2021). The consequences of UTIs during pregnancy can also have both short-term and long-term impacts on maternal and foetal health. Maternal complications may include an increased risk of preterm labor, which can lead to neonatal morbidity and mortality, gestational hypertension, renal failure and preeclampsia. UTIs during pregnancy are also associated with an elevated risk of low birth weight infants and gestational hypertension (Henrique, et al, 2023). In severe cases, untreated or recurrent UTIs can progress to pyelonephritis, a kidney infection that can cause significant maternal morbidity.

For the foetus, UTIs in pregnancy can result in intrauterine growth restriction, low birth weight, intrauterine foetal death and prenatal mortality and morbidity. This is characterized by inadequate foetal growth and development. Additionally, there is an increased risk of neonatal sepsis, a serious condition that can be life-threatening for the new-born when the bacteria from a maternal UTI spreads to the baby's blood stream (UCSF Health, 2019).

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

The chapter highlighted the research design, study population, exclusion criteria and inclusion criteria, sample size, sampling procedure, pilot study, study setting, data analysis and ethical considerations. The research was carried out on the prevalence of UTIs in pregnant women at Masvingo Provincial Hospital looking at the causative bacteria and the antimicrobial patterns.

3.2 Research design

This study was a retrospective cross sectional laboratory-based survey (prevalence study). This study design excluded manipulating variables, provided the current information, and gave the researcher a chance to look at multiple characteristics at once and the study took place at a single point in time (Cherry & Gans 2019). A quantitative research design was used for the collection and analysis of the data.

3.3 Data Collection.

Data was gathered from Masvingo Provincial hospital (MPH) laboratory records. A data abstraction form was used to collect information. A data abstraction form is a standard instrument used to collect scientific data systematically. Data collection allowed better analytical comparisons. Information regarding the age pre-existing conditions as well urine test records was accessed from the doctor's notes as both soft and hard copies of laboratory results books. The researcher analysed the urine test results, resultant causative bacteria as well as the results of the drug sensitivity tests. Data collection from records was relatively less time consuming and a cheaper method of data collection.

3.4 Study population.

In this study the targeted population was Masvingo residents of all races, age groups, educational status, socio-economic status and residential areas whose doctors' laboratory tests

included any indicators of urinary tract infections, the causative bacteria and the antimicrobial patterns attending to Masvingo Provincial Hospital.

3.5 Exclusion criteria.

The study excluded all patients without clinical data such as the age, ward from which the sample was received. Data from incomplete tests that may have been carried out on patient samples was also excluded.

3.6 Inclusion Criteria.

The research was carried out at Masvingo Provincial Hospital using the data from its laboratory (MPHL). The data in this study included data from all patients that would have requested tests to investigate presence of microorganisms in urine samples.

3.7 Sample size.

The calculated sample size was 271 participants using a 90% confidence interval, 0.5 standard deviation and a margin of error of 5% on patients infected with UTIs.

Sample size formula:

$$\text{Necessary sample size} = \frac{(\text{Z-score})^2 \times \text{standard deviation} \times (1\text{-standard deviation})}{(\text{Margin of error})^2}$$

Where:

Z= Z score for 90% Confidence Interval which is 1.645

Standard deviation= 0.5

Margin of error =5%

Using the above formula to calculate the necessary sample size that is:

$$\text{Necessary sample size} = \frac{(1.645)^2 \times (0.5)\ (1-0.5)}{}$$

$(5/100)^2$

Necessary sample size= 270.60 (round up)

Therefore sample size was 271

3.8 Sampling procedure.

This research study implemented a convenience sampling method. This method required that all the data that was complete and available was included in the research study so as to provide accurate results on the prevalence of UTIs in pregnant women at Masvingo provincial Hospital (MPH). The researcher was comparing different variables at the same time such as urine culture results in relation to UTIs. From these results the researcher was able to see the causative bacteria as well as the drug susceptibility of the bacteria.

3.9 Pilot study.

A pilot study was carried out on a small scale to test the strengths and the weaknesses of the research instruments and adjustments will be made based on the outcome of the pilot study.

3.10 Study setting.

The study was carried out at Masvingo Provincial Hospital. This is where the data was collected from both the clinicians and the scientists and the laboratory records.

3.11 Data analysis.

The data was represented in a graphs, pie charts, tables for easy interpretation and to illustrate the relationship between the dependant variables and the number of the UTIs recorded at MPH in the year 2023 from January to December. SPSS version 22 was used to analyze the data that is gathered and entered onto an Excel sheet. Quantitative data was examined through the application of distribution and association measures.

3.12 Ethical consideration.

Ethical clearance for this study came from Africa University Research and Ethics Committee (AUREC) and MPH. The researcher ensured that the code of confidentiality is maintained. The research was also of non-maleficence to the study sample but of beneficence to the public as it will provide more insight on the prevalence of UTIs in pregnant women and the risk factors to the mother and foetal health therefore promoting ways in which the risk factors can be reduced and treatments can be formulated.

3.13 Summary

This chapter focused on the research design, the study population, sampling procedures, sample criteria, ethical considerations and how the research data will be collected and analysed.

CHAPTER 4: DATA ANALYSIS AND PRESENTATION

4.1 Introduction

This chapter focused on the analysis of the data and the presentation of the research study conclusions. Where appropriate, the data was presented as tables, line graphs and pie charts. The collected raw data was given in a format that showed the frequency of UTIs in expectant mothers, the bacteria that cause them and the patterns of antibiotic resistance in the bacteria in 2023 from January to December.

4.2 Prevalence of UTIs in pregnant women

A sample size of 271 pregnant women was required for this research study. It was found that only 52 patients appeared to have UTIs determined by the growth that was obtained on the urine culture plates. 219 of the patients had no UTIs as there was no growth obtained on the culture plates. Therefore the prevalence of UTIs at Masvingo Provincial Hospital in 2023 from January to December was 19.19%.

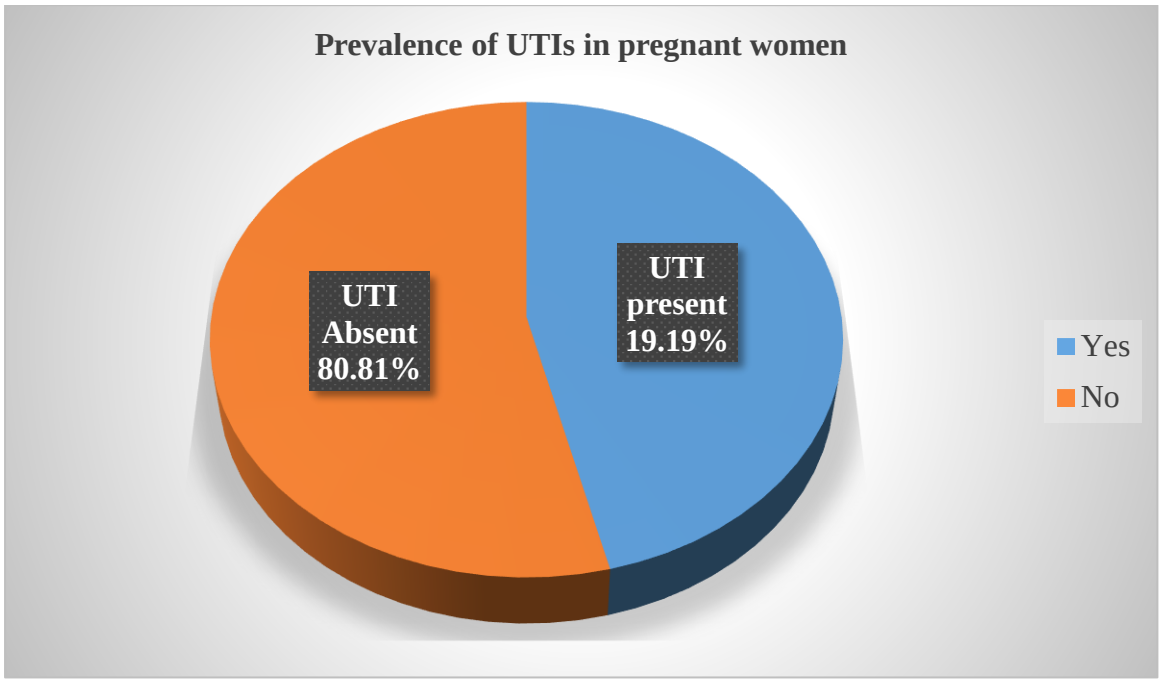


Figure 1. Prevalence of UTIs in pregnant women.

4.3 Demographic characteristics of study participants.

The researcher recruited 271 study participants and only 52 had a urinary tract infection giving the prevalence of UTIs to be 19.19% and the patients who were pregnant but did not have UTIs were 219 (80.81%). Of the 52 patients the highest frequency of cases of UTIs were in the age group 15-25 which presented with 30 cases (57.69). The age group 26-35 presented with 16 cases (30.77%). The least number of cases were obtained in the age group 36-45 with 6 cases (11.54%). The majority of the pregnant women with the UTI were married (28 women, 53.85%) and from the urban areas (36 women, 69.23%). The mean age of pregnant mothers with UTIs was 24.7 with a range of 15-45 years.

Table 1. Sociodemographic characteristics of pregnant women with UTIs.

Variables	Numbers (n=52)	Percentages (%)
AGE (years)		
15-25	30	57.69
26-35	16	30.77
36-45	6	11.54
MARITAL STATUS		
Single	13	25
Married	*28*	53.85
Divorced	11	21.15
RESIDENTIAL AREA		

Urban	36	69.23
Rural	16	30.77

4.3.1 Prevalence of UTIs in pregnant women according to age groups.

Most pregnancies were between 15-25 years followed by 26-35 years and the least number of pregnancies were from 36-45 year category. It was seen that expectant mothers between 15-25 years recorded the highest prevalence of UTIs of 23.08%, the age group 26-35 years presented a prevalence of 16.67% while pregnant women aged 36-45 presented a prevalence of 13.33%.

Table 2. Prevalence of UTIs in pregnant women according to age groups.

	NUMBER OF PATIENTS (n=271)	**PRESENCE OF A UTI (n=52)/% n(%)**	**ABSENCE OF A UTI (n=219) n(%)**
AGE			
15-25	130	30(23.08)	100(76.92)
26-35	96	16(17.36)	80(82.64)
36-45	45	6(13.33)	39(94)
Total	**271**	**52(19.18)**	**219(80.82)**

4.4 Common symptoms of Urinary tract infections (n=52)

The most common symptom of UTI amongst the pregnant women who had UTIs was frequent urination with a percentage of 53.85%. The other symptoms observed included painful urination, a burning sensation, nausea and cloudy urine. The prevalence of these symptoms amongst these patients were 32.69%, 26.92%, 23.08% and 9.62% respectively.

Table 3. Common symptoms of UTIs in pregnancy.

SYMPTOMS	NUMBER OF SUBJECTS	PERCENTAGE OF PATIENTS %
Frequent urination	28	53.85
Nausea	12	23.08
Painful urination	17	32.69
Cloudy urine	5	9.62
Burning sensation	14	26.92

4.5 Bacteria obtained from pregnant women with urinary tract infection

At MPH out of the 271 pregnant women, 52 had laboratory confirmed UTI infections, giving a positive culture rate of 19.19%. *E.coli* was the most prevalent organism isolated with 20 isolates (38.46%) of the total isolates. The second most prevalent with 11 (21.15%) of the isolates were *S. aureus*. The number of the remaining isolates of bacteria that were found were as follows: *Proteus* spp. 5 (9.62%), *S. saprophyticus* 2 (3.85%), *Klebsiella* spp 9 (17.31%), *Streptococcus* spp. 3 (5.77%), and *Enterobacter* spp. 2 (3.85%).

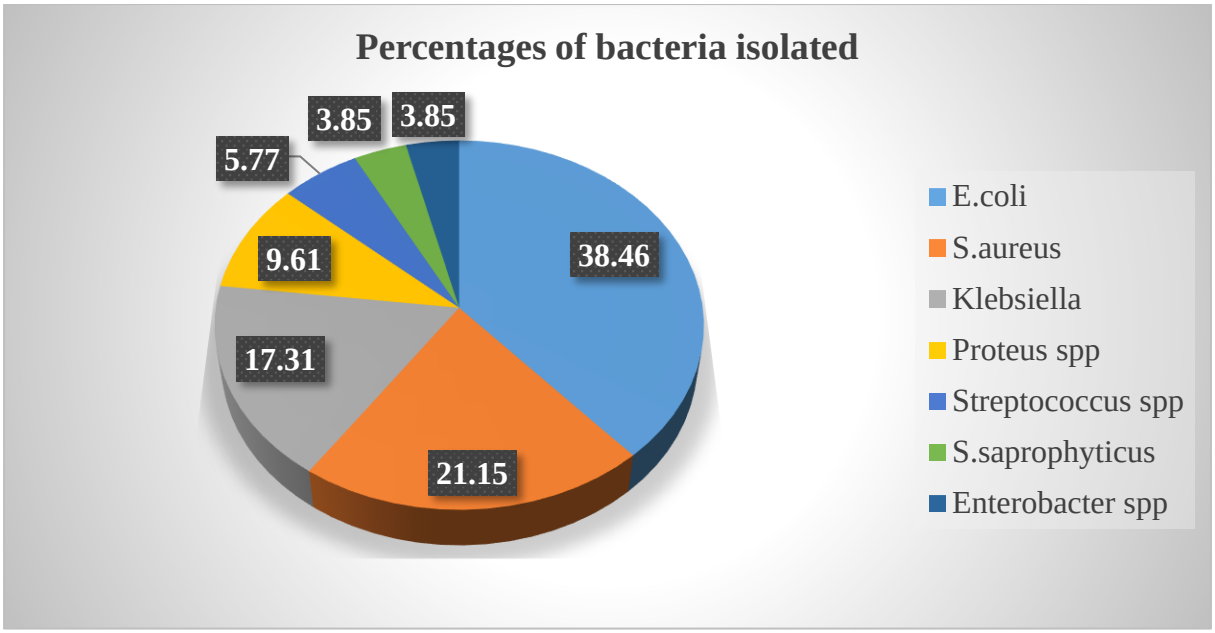


Figure 2. Bacteria isolated from pregnant women with Urinary tract infection.

4.6 Antibiotic sensitivity of the causative bacteria of UTIs.

The graph below shows the antibiotic sensitivities of the uropathogens isolated in the research study. The bacteria were treated with ampicillin, ceftriaxone, gentamicin, ciprofloxacin, tetracycline, penicillin and imipenem. The sensitivities of the bacteria to the antibiotics ranged from 10%-90%. As illustrated in the graph below each bacterial species showed varying sensitivities to the drugs. The gram negative bacteria isolates showed that, the most prevalent bacteria *E.coli* had the highest sensitivity to Gentamicin (90%) and least sensitivity to Penicillin and tetracyclin (20%).

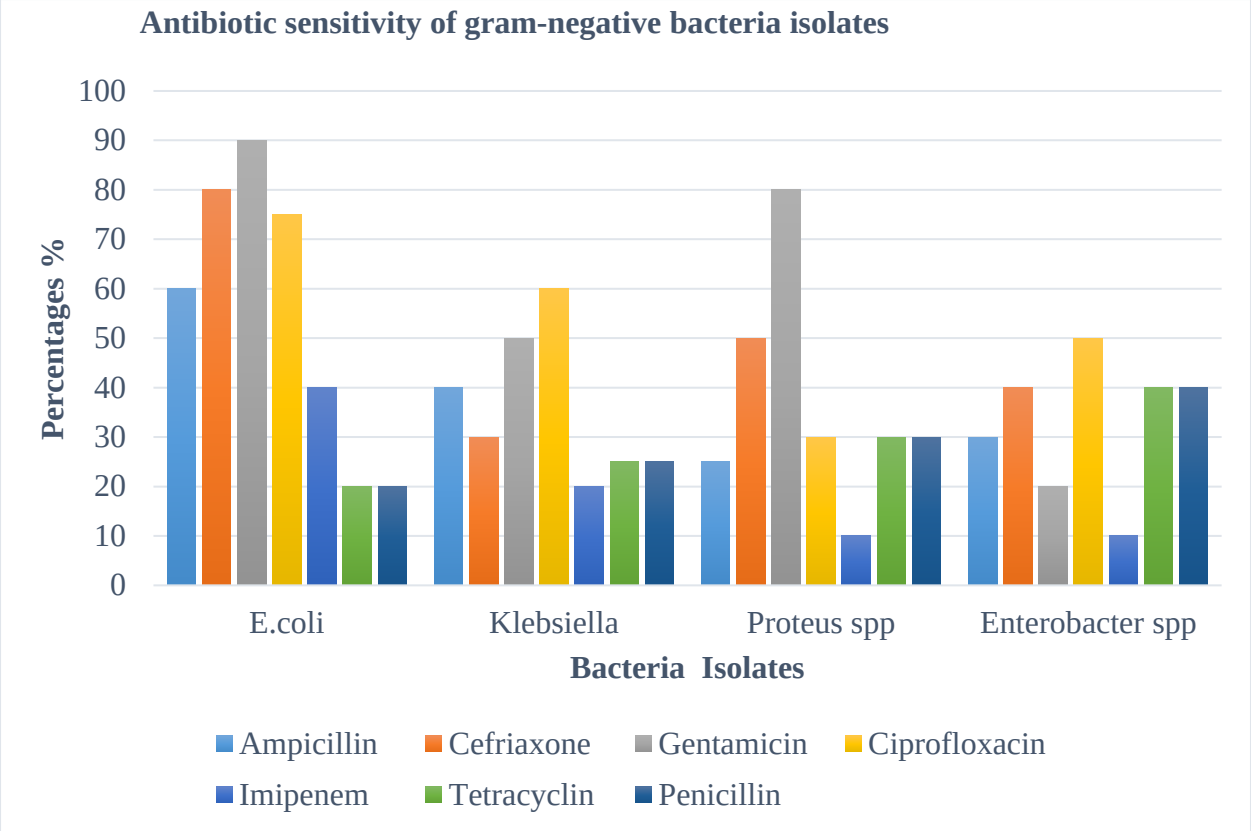


Figure 3. Antibiotic sensitivity pattern of gram negative causative bacteria of UTIs.

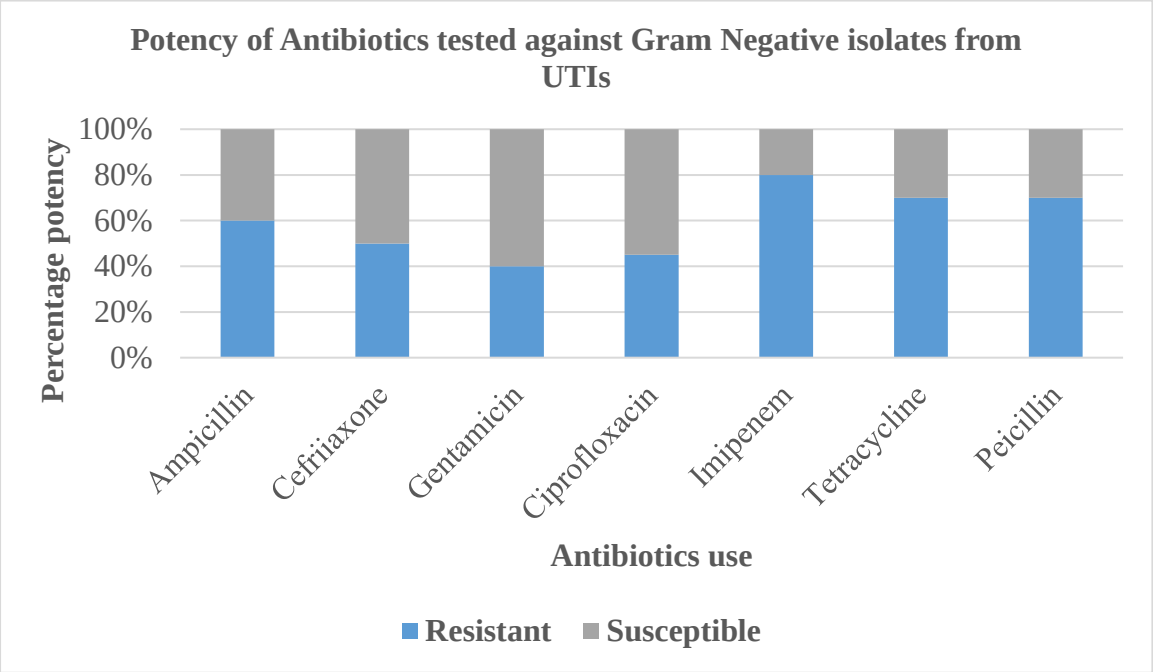


Figure 4. Overall Gram Negative isolates resistance patterns to Antibiotics.

The gram negative isolates of bacteria which cause UTIs in pregnant women showed great overall susceptibility to Gentamicin (60%). The other drugs that showed susceptibility were Ciprofloxacin (55%) and Cefriaxone (50%). The most resistant drugs for the gram negative bacteria were Imipenem (80%), tetracycline and penicillin (70%).

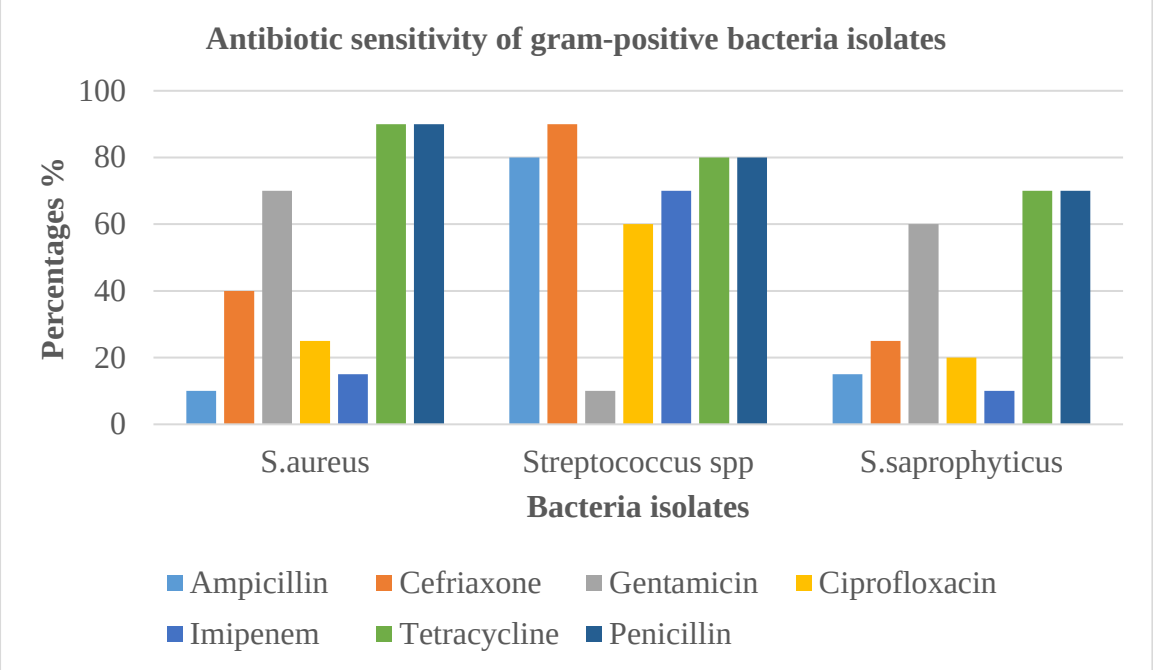


Figure 5. Antibiotic sensitivity pattern of gram-positive causative bacteria of UTIs.

The graph above shows the antibiotic sensitivities of the uropathogens isolated in the research study. The bacteria were treated with ampicillin, ceftriaxone, gentamicin, ciprofloxacin, tetracycline, penicillin and imipenem. The sensitivities of the bacteria to the antibiotics ranged from 10%-90%.In the graph for gram positive bacteria the second most prevalent causative bacteria for UTIs in pregnancy *S.aureus* showed highest sensitivity to Tetracycline and penicillin (90%) and the least sensitivity to Ampicillin(10%).

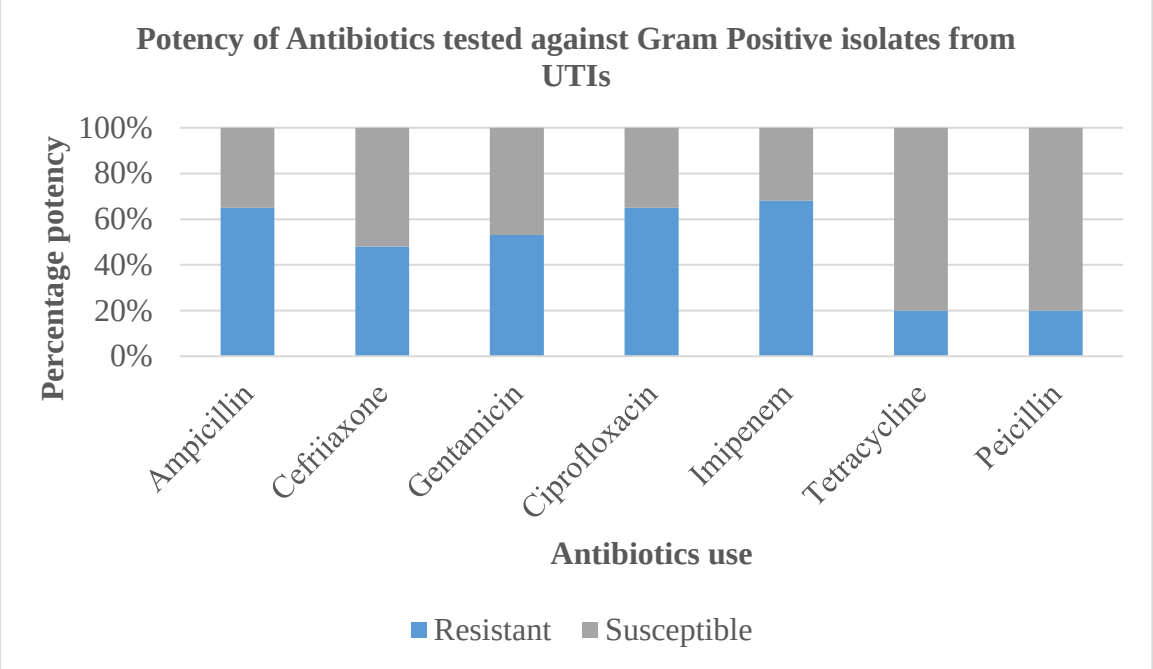


Figure 6. Overall gram positive isolates resistance patterns to Antibiotics.

The gram positive bacterial isolates showed highest susceptibility to Penicillin and Tetracycline (80%) respectively. However most of the drugs showed great resistance to the bacteria with the highest resistance to imipenem (68%). Other antibiotics that showed resistance were ciprofloxacin and ampicillin (65%).

CHAPTER 5

5.1 Introduction

This chapter summarizes all of the research findings, notes any unexpected information that was found, and identifies any information gaps. This will be carried out in light of the previously completed literature review and study objectives. The results of this study will be compared and contrasted with those of previous, related investigations. There will also be a discussion of the study's shortcomings, public health consequences, suggestions, dissemination of the findings, and possible courses of action.

5.2 Prevalence of Urinary tract infection in pregnant women

In this research the study population was 271 pregnant women and the number of pregnant women with UTIs was 52 and 219 without UTIs. The prevalence of UTIs among pregnant women at MPH in 2023 was therefore 19.19% which was higher than the previous literature where the prevalence was 23.9 % on a global level (Nahid Ebadi Salari et al., 2023). However the prevalence in this study is in accordance with some of the prevalence in the previous literature for some countries in Africa which recorded 18.9% and 16.5% for Nigeria (Idowu et al. 2014) and Ethiopia respectively (Ali et al2015). Maternal age may be a contributing factor to UTI susceptibility, as indicated by the relationship between maternal age and UTI risk. According to this study, younger pregnant women may be more susceptible to UTIs due to age-related changes in bladder function or hormonal variations.

The findings of this study are also supported by a study done in South Africa which reported a prevalence of 22.4% among pregnant women, this suggests a potentially similar burden of UTIs in the southern African region (Mahomed et al. 2014). According to a study done in Pakistan by Shaikh et al. (2016), 15.6% of pregnant women had UTIs. This result indicates possible variances in UTI rates among various geographic regions and populations, as it is lower than the prevalence found at Masvingo Provincial Hospital. Additionally, a study conducted in

Turkey in 2019 by Karaman et al. discovered that pregnant women had a higher prevalence of UTIs 24.8%. The findings of other research studies conducted in different regions are consistent with this prevalence rate. According to Sujatha et al. (2017), pregnant women at a tertiary care hospital in India had a 22.6% prevalence of UTIs. Pregnant women attending prenatal care clinics had a prevalence of 14.3%, according to a Hooton et al. (2018) study conducted in the United States. The focus of this investigation was on pregnant women with UTI symptoms, asymptomatic patients remained unreported and hence contributing to the low prevalence compared to the other regions mentioned. Also a greater number of the cases presented were those of urban with a percentage of 69.23% compared to that of rural which was 16%. This could be because of the fact that Masvingo provincial hospital is in the urban area hence the higher percentage, most women in the rural area might prefer to visit the nearest clinic in their area hence the lower percentage of UTIs.

Pregnant women's UTI prevalence at Masvingo Provincial Hospital in 2023 (19.19%) is within the range reported by other research carried out in other locations. Variations in the prevalence of UTIs may be caused by variables including access to prenatal care, healthcare infrastructure, socioeconomic position, and geographic location. Factors like age, race, socioeconomic level, and geography can have an impact on the occurrence of UTIs. UTI rates are also influenced by differences in the physiological changes associated with pregnancy, cultural norms, diagnostic practices, and the environment. Due to variations in healthcare access, cleanliness habits, and environmental factors, urban regions with larger population densities may have higher prevalence of UTIs. Variations in environmental factors, cultural norms, and diagnostic practices can potentially impact the risk of UTIs. To ensure that UTI prevalence rates across research are comparable, standardization of diagnostic criteria and procedures is important.

5.3 Causative bacteria of UTIs in pregnant women

E. coli was the most common bacteria isolated in this study and this is similar to most other studies. This supports the fact that most organisms causing UTI are from the lower gastrointestinal tract which acts as a reservoir for organisms like *E. coli* (Flores-Mireles et al., 2015). In this study the percentage of *E.coli* was 38.46% which was more than the findings done in Ghana where the percentage was 27.80% (Onoh, Egwuatu, EZEONU, ONOH, & Umeora, 2013). According to a study carried out in Iran by Karami et al. (2019), pregnant women attending prenatal care clinics had 75% of their UTI cases caused by *E. coli*. Comparably, a study conducted in Nigeria by Amiri et al. (2018) found that in 80% of the UTI cases involving pregnant women in their sample, *E. coli* was the causal agent. In Pakistan, however, a study by Akram et al. (2017) found a lower percentage: *E. coli* was found to be the causal agent in 60% of UTI cases involving pregnant women. Diverse research populations, geographical regions, sample sizes, and laboratory techniques for bacterial identification could account for these fluctuations in the proportion of E. coli as the primary causal bacteria of UTIs.

S. aureus was the next most common bacteria isolated and presented a percentage of 21.15%.this prevalence is higher than studies done previously. *S. aureus* was shown to be responsible for just 5% of UTI infections among pregnant women visiting obstetrics and gynaecology clinics, according to a study done in Jordan by Al-Momani (2018). Also, 6% of UTI cases among pregnant patients visiting a tertiary care hospital in India were linked to *S. aureus* (Sharma et al. (2016). In a study done in Bangladesh the percentage was 4% also contrasting the high *S.aureus* percentage in this study. The percentages of the remaining isolates of bacteria that were found were as follows *Proteus* spp. (9.62%), *S. saprophyticus* (3.85%), *Klebsiella* (17.31%), *Streptococcus spp*. (5.77%), and *Enterobacter* spp. (3.85%). These are also important UTI causing bacteria in pregnant women (Akhtar et al., 2015). According to earlier research, *E. coli* is the most common organism isolated from UTI cases,

which emphasizes the pathogen's importance in the pathophysiology of UTIs. Other bacterial species like *S. aureus, Klebsiella spp* and *Proteus spp* are present, which highlights the variety of microbiological causes of UTIs and the significance of customized antibiotic therapy directed by susceptibility testing.

5.4 Sensitivity of the causative bacteria to UTIs in pregnant women.

The current study shows the patterns of antimicrobial susceptibility to several bacterial pathogens that are frequently linked to urinary tract infections (UTIs) in expectant mothers. The percentages that represent the susceptibility patterns show how many isolates are susceptible to certain antibiotics. For example, a study conducted in Egypt by Ahmed et al. (2018) found that *E. coli* had comparable trends of being highly susceptible to ciprofloxacin and gentamicin, but less susceptible to tetracycline and ampicillin. Similarly, *S. aureus* was found to have a high susceptibility to clindamycin and erythromycin but a poor susceptibility to penicillin in a study conducted in the United States by Smith et al. (2017). Antibiotic usage patterns, geographic location, healthcare practices, and bacterial strain changes are some of the factors that may have an impact on the variances in antimicrobial susceptibility patterns observed in various research. Discrepancies in susceptibility results can also be caused by variations in laboratory techniques and interpretation criteria. Antimicrobial resistance patterns and the effects of UTIs on pregnancy outcomes are among the other elements that need to be investigated in order to fully understand the factors influencing UTI prevalence and microbial etiology among pregnant women. Clinical management and the creation of guidelines would benefit greatly from longitudinal studies that monitor the frequency of UTIs and the dynamics of microbiological populations throughout pregnancy.

5.5 Health burden

Urinary tract infections (UTIs) during pregnancy are linked to an increased risk of preterm labor due to inflammatory responses triggered by infection. These infections can cause contractions in the uterus and cervix, disrupting the normal pregnancy progression. The presence of UTIs can also induce stress on the maternal body, leading to elevated stress hormones and increased risk of preterm labor. Low birth weight can also be a result of UTIs, affecting neonatal health and development. Furthermore, chronic inflammation can impair placental function and fetal development, potentially leading to intrauterine growth restriction (IUGR). UTIs can also lead to sepsis, a life-threatening condition characterized by a systemic inflammatory response (Lin et al., 2021). Impaired renal function and maternal health conditions can increase the risk of severe infections and sepsis (Bakhtawar et al., 2020). Early detection and prompt treatment are crucial to prevent complications and ensure the health and safety of both the mother and fetus (Belyayeva & Jeong, 2022).

5.6 Limitations

This being a cross sectional laboratory based study did not allow the researcher the opportunity to follow-up with the patients or documentation of the discharged patients over longer periods of times Studies with greater length would shed greater clarity on the patterns and shifts in antibiotic resistance throughout study period. The fact that the research was carried out at only MPH meant that the populations and healthcare settings in Masvingo were not well represented. Research conducted at a single center may not generalize to different healthcare environments or geographic areas.

5.7 Conclusion

The study established at the distribution of UTI cases by age, marital status, and residential location offers important information about the demographic associations of UTIs in expectant mothers. The results of this study highlight the significance to treat and screen for UTIs in expectant mothers. UTIs are a common health concern during pregnancy, as indicated by the prevalence rate of 19.19%, which necessitates routine surveillance and timely treatment. Early detection and care are crucial since untreated symptomatic UTIs can result in problems like pyelonephritis and premature delivery. Routine UTI screening should be given top priority by medical professionals during prenatal care visits, especially for the high-risk patients this study discovered.

5.8 Recommendations

A factor to be investigated would be recurring UTI history and the frequency of UTIs during pregnancy emphasizes the significance of a thorough medical history evaluation. In order to lower the risk of difficulties during pregnancy, women who have previously experienced UTIs should be under closer observation and treated with preventive measures. Similarly, women who are multiparous should have regular UTI screenings because the cumulative impact of several pregnancies may make them more susceptible to UTIs. To improve outcomes for both mothers and new-borns, prenatal care programs should include education on preventive measures and early detection of UTI symptoms.

It is necessary to conduct more study to examine other risk factors and treatments to lessen the incidence of UTIs in expectant mothers. For the purpose of developing guidelines and improving clinical practice, longitudinal studies monitoring the incidence of UTIs during pregnancy and their effects on maternal and fetal health outcomes would be extremely beneficial. This lowers the morbidity and death rates for mothers and new-borns. Furthermore, rather than depending exclusively on symptomatic presentations, the prevalence of

asymptomatic UTIs found during routine screenings emphasizes the significance of universal screening techniques.

To address this unsatisfactory situation, effective and continuous health education of the public, especially expecting women, about the importance of early booking, routine prenatal care of pregnancy, and early indicators of urinary tract infections must be put into place immediately. The Ministry of Health and Childcare can also carry out research using a large number of participants in order to generalize findings, some of which may include the many risk factors and their causes whether environmental, hormonal or otherwise.

REFERENCES

- Amiri, M., Lavasani, Z., Norouzirad, R., Najibpour, R., Mohamadpour, M., Nikpoor, A. R., … Zare Marzouni, H. (2015). Prevalence of Urinary Tract Infection among Pregnant Women and its Complications in Their Newborns during the Birth in the Hospitals of Dezful City, Iran, 2012 - 2013. *Iranian Red Crescent Medical Journal*, *17*(8). https://doi.org/10.5812/ircmj.26946
- Balachandran, L., Jacob, L., Al Awadhi, R., Yahya, L. O., Catroon, K. M., Soundararajan, L. P., … Hussein, Y. A. (2022). Urinary Tract Infection in Pregnancy and Its Effects on Maternal and Perinatal Outcome: A Retrospective Study. *Cureus*, *14*(1). https://doi.org/10.7759/cureus.21500
- Ghouri, F., Hollywood, A., & Ryan, K. (2018). A systematic review of non-antibiotic measures for the prevention of urinary tract infections in pregnancy. *BMC Pregnancy and Childbirth*, *18*(1). https://doi.org/10.1186/s12884-018-1732-2
- Liem, S., Mol, B., Abu-Hanna, A., Ravelli, A., & Schaaf, J. (2012). Ethnic and Racial Disparities in the Risk of Preterm Birth: A Systematic Review and Meta-Analysis. *American Journal of Perinatology*, *30*(06), 433–450. https://doi.org/10.1055/s-0032-1326988
- Tadesse, B. T., Ashley, E. A., Ongarello, S., Havumaki, J., Wijegoonewardena, M., González, I. J., & Dittrich, S. (2017). Antimicrobial resistance in Africa: a systematic review. *BMC Infectious Diseases*, *17*(1). https://doi.org/10.1186/s12879-017-2713-1
- Nicolle, L. E. (2008). Urinary tract infections in special populations: diabetes, renal transplant, HIV infection, and spinal cord injury. Infectious Disease Clinics of North America, 22(1), 61-86.
- Smaill, F. M., & Vazquez, J. C. (2016). Antibiotics for asymptomatic bacteriuria in pregnancy. Cochrane Database of Systematic Reviews, (10).

- Wing, D. A., Fassett, M. J., Getahun, D., & Racial and Ethnic Disparities Consortium on Preterm Birth (2018). Effect of asymptomatic bacteriuria treatment on the prevalence of preterm birth: a systematic review and meta-analysis. Obstetrics & Gynecology, 132(1), 237-247.
- Ailes, E. C., Summers, A. D., Tran, E. L., Gilboa, S. M., Arnold, K. E., Meaney-Delman, D., & Reefhuis, J. (2018). Antibiotics Dispensed to Privately Insured Pregnant Women with Urinary Tract Infections — United States, 2014. *MMWR. Morbidity and Mortality Weekly Report*, *67*(1), 18–22. https://doi.org/10.15585/mmwr.mm6701a4
- Ejerssa, A. W., Gadisa, D. A., & Orjino, T. A. (2021). Prevalence of bacterial uropathogens and their antimicrobial susceptibility patterns among pregnant women in Eastern Ethiopia: hospital-based cross-sectional study. *BMC Women's Health*, *21*(1). https://doi.org/10.1186/s12905-021-01439-6
- Amiri, M., Lavasani, Z., Norouzirad, R., Najibpour, R., Mohamadpour, M., Nikpoor, A. R., Raeisi, M., & Zare Marzouni, H. (2015). Prevalence of Urinary Tract Infection among Pregnant Women and its Complications in Their Newborns during the Birth in the Hospitals of Dezful City, Iran, 2012 - 2013. *Iranian Red Crescent Medical Journal*, *17*(8). https://doi.org/10.5812/ircmj.26946
- Balachandran, L., Jacob, L., Al Awadhi, R., Yahya, L. O., Catroon, K. M., Soundararajan, L. P., Wani, S., Alabadla, S., & Hussein, Y. A. (2022). Urinary Tract Infection in Pregnancy and Its Effects on Maternal and Perinatal Outcome: A Retrospective Study. *Cureus*, *14*(1). https://doi.org/10.7759/cureus.21500
- Ghouri, F., Hollywood, A., & Ryan, K. (2018). A systematic review of non-antibiotic measures for the prevention of urinary tract infections in pregnancy. *BMC Pregnancy and Childbirth*, *18*(1). https://doi.org/10.1186/s12884-018-1732-2

- Liem, S., Mol, B., Abu-Hanna, A., Ravelli, A., & Schaaf, J. (2012). Ethnic and Racial Disparities in the Risk of Preterm Birth: A Systematic Review and Meta-Analysis. *American Journal of Perinatology*, *30*(06), 433–450. https://doi.org/10.1055/s-0032-1326988
- Martínez-Mesa, J., González-Chica, D. A., Bastos, J. L., Bonamigo, R. R., & Duquia, R. P. (2014). Sample size: how many participants do I need in my research? *Anais Brasileiros de Dermatologia*, *89*(4), 609–615. Pubmed. https://doi.org/10.1590/abd1806-4841.20143705
- Tadesse, B. T., Ashley, E. A., Ongarello, S., Havumaki, J., Wijegoonewardena, M., González, I. J., & Dittrich, S. (2017). Antimicrobial resistance in Africa: a systematic review. *BMC Infectious Diseases*, *17*(1). https://doi.org/10.1186/s12879-017-2713-1
- Yeta, K. I., Michelo, C., & Jacobs, C. (2021). Antimicrobial Resistance among Pregnant Women with Urinary Tract Infections Attending Antenatal Clinic at Levy Mwanawasa University Teaching Hospital (LMUTH), Lusaka, Zambia. *International Journal of Microbiology*, *2021*(4042686), 1–9. https://doi.org/10.1155/2021/8884297
- UCSF Health. (2019). Urinary Tract Infections. Retrieved from ucsfhealth.org website: https://www.ucsfhealth.org/conditions/urinary-tract-infections
- Akhtar, M., Mohsin, N., Zahak, A., Ain, M., Pillai, P. K., Kapur, P., & Ahmad, M. (2015). Antimicrobial Sensitivity Pattern of Bacterial Pathogens in Urinary Tract Infections in South Delhi, India. *Reviews on Recent Clinical Trials*, *9*(4), 271–275. https://doi.org/10.2174/1574887109666141127104220
- Ezechi, O. C., Fasubaa, O. B., & Dare, F. O. (2004). Antibiotic Sensitivity Patterns of Microbial Isolates from the Urine of Pregnant Women with Urinary Tract Infections. *Tropical Journal of Obstetrics and Gynaecology*, *20*(2). https://doi.org/10.4314/tjog.v20i2.14413

- Flores-Mireles, A. L., Walker, J. N., Caparon, M., & Hultgren, S. J. (2015). Urinary Tract infections: epidemiology, Mechanisms of Infection and Treatment Options. *Nature Reviews Microbiology*, *13*(5), 269–284. https://doi.org/10.1038/nrmicro3432
- Nana, T., Bhoora, S., & Chibabhai, V. (2021). Trends in the epidemiology of urinary tract infections in pregnancy at a tertiary hospital in Johannesburg: Are contemporary treatment recommendations appropriate? *Southern African Journal of Infectious Diseases*, *36*(1). https://doi.org/10.4102/sajid.v36i1.328
- Onoh, R., Egwuatu, EZEONU, P., ONOH, T., & Umeora, O. (2013). Antibiotic sensitivity pattern of uropathogens from pregnant women with urinary tract infection in Abakaliki, Nigeria. *Infection and Drug Resistance*, *PMC10256441*(37303774), 225. https://doi.org/10.2147/idr.s46002

APPENDICES

Appendix A: Budget for conducting the research study

Activity	**Amount (US$)**
Transport	$20
Stationery	$10
Total	**$30**

Appendix B: Time table January- December 2024

	JANUARY	FEBRUARY	MARCH	APRIL
Write proposal				
Approval from AUREC				
Permission from study site				
Data collection				
Data analysis				
Results and Recommendations				
Submission of final research project				

Appendix C: Data collection template

					DRUG SENSITIVITY					
SAMPLE ID		AGE	SEX	PATHOGEN ISOLATED	Amikacin	Nitrofurantoin	Gentamicin	Ampicillin	Nalixidic acid	Cotrimoxazole

Appendix D: Approval letter from study site and Supervisor

AFRICA UNIVERSITY
(A United Methodist-Related Institution)

"Investing in Africa's Future"

DEPARTMENT OF BIOMEDICAL AND LABORATORY SCIENCES
COLLEGE OF HEALTH, AGRICULTURE AND NATURAL RESOURCES

14 March 2024

Masvingo Provincial Hospital Medical Superintendent

Dear Sir/ Madam

RE: APPLICATION FOR DISSERTATION STUDIES FOR RUVIMBO NHORO

This letter serves to confirm that I am supervising the above-mentioned student in her final year dissertation.

She has satisfied the requirements of the college in developing her research proposal and it is ready for ethical review.

Your facilitation for the review of the proposal is greatly appreciated.

Thank you

Mr Z Chiwodza

Research Supervisor

zchiwodza@africau.edu

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ZIMBABWE

Africa University

PO Box 1320

Fairview Road (Off Nyanga Rd)

Old Mutare

Mutare

7 December 2023

RE: PERMISSION TO CONDUCT A RESEARCH STUDY AT MASVINGO PROVINCIAL HOSPITAL

Dear Miss Ruvimbo Julia Nhoro, your application to carry out an academic research study at Masvingo Provincial Hospital was successful.

Permission to use the hospital laboratory data adherering to your proposed topic "Prevalence of Urinary Tract infections amongst pregnant women attending to Masvingo Provincial Hospital from January 2023 to December 2023" has been granted for academic purposes only.

Any publication has to be approved by the Ministry of Health and Childcare through the correct protocol. Feedback on your research findings will be expected.

Yours Sincerely

MASVINGO PROVINCIAL HOSPITAL LABORATORY MANAGER

M. MASHAKADA

LABORATORY
LAB MANAGER
07 DEC 2023
P.O BOX 114, MASVINGO

Appendix E: Approval letter from AUREC

Investing in Africa's future

AFRICA UNIVERSITY RESEARCH ETHICS COMMITTEE (AUREC)

P.O. Box 1320 Mutare, Zimbabwe, Off Nyanga Road, Old Mutare-Tel (+263-20) 60075/60026/61611 Fax: (+263 20) 61785 Website: www.africau.edu

Ref: AU3247/24

27 March, 2024

Ruvimbo Julia Nhoro
C/O Africa University
Box 1320
MUTARE

RE: **PREVALENCE OF URINARY TRACT INFECTIONS (UTIS) IN PREGNANT WOMEN AT MASVINGO PROVINCIAL HOSPITAL FROM JANUARY TO DECEMBER 2023**

Thank you for the above-titled proposal that you submitted to the Africa University Research Ethics Committee for review. Please be advised that AUREC has reviewed and approved your application to conduct the above research.

The approval is based on the following.

a) Research proposal

- **APPROVAL NUMBER** AUREC3247/24
  This number should be used on all correspondences, consent forms, and appropriate documents.
- **AUREC MEETING DATE** NA
- **APPROVAL DATE** March 27, 2024
- **EXPIRATION DATE** March 27, 2025
- **TYPE OF MEETING**: Expedited
  After the expiration date, this research may only continue upon renewal. A progress report on a standard AUREC form should be submitted a month before the expiration date for renewal purposes.
- **SERIOUS ADVERSE EVENTS** All serious problems concerning subject safety must be reported to AUREC within 3 working days on the standard AUREC form.
- **MODIFICATIONS** Prior AUREC approval is required before implementing any changes in the proposal (including changes in the consent documents)
- **TERMINATION OF STUDY** Upon termination of the study a report has to be submitted to AUREC.

AFRICA UNIVERSITY
RESEARCH ETHICS COMMITTEE (AUREC)
APPROVED
P.O. BOX 1320, MUTARE, ZIMBABWE

Yours Faithfully

MARY CHINZOU
ASSISTANT RESEARCH OFFICER: FOR CHAIRPERSON
AFRICA UNIVERSITY RESEARCH ETHICS COMMITTEE