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Knowledge, Attitude & Practice Toward Corona Virus Infection among Pregnant Women Attending Antenatal care at public hospitals in Sana'a-Yemen

Research Project Submitted to the Faculty of medicine, 21 September University of Medical & Applied Sciences as A Partial Fulfillment for the Requirements of the bachelor's degree in medicine

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CERTIFICATE

This is to certify that the thesis entitled *" Knowledge, Attitude & Practice Toward Corona Virus Infection among Pregnant Women Attending Antenatal care at public hospitals in Sana'a-Yemen"* which *Submitted to the Faculty of medicine, 21 September University of Medical & Applied Sciences As A Partial Fulfillment for the award* **BSc. degree in medicine**. It is a recorded of the original and bona fide work carried out by *researcher team* under our guidance. This research project embodies the work of the candidate themselves and no part thereof has been submitted for any other degree.

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Dedication

This research project is dedicated to:

Our Parents, who never stop giving us themselves

in countless ways,

To all our families, the symbol of love and

Encourage and support us,

All the people in our life who touch our hearts.

Acknowledgment

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Abbreviations	Definition
CDC	Center for Disease Control and Prevention
COVID-19	Coronavirus Disease 2019
HCoV	Human CoronaVirus
MERS-CoV	Middle East Respiratory Syndrome
rRT-PCR	Real-Time reverse Transcriptasepolymerase Chain Reaction
RTPCR	Reverse Transcriptasepolymerase Chain Reaction
SARS-CO-2	Server Acute Respiratory Syndrome Coronavirus Disease
SPSS	Statistical Package for Social ScienceS
WHO	World Health Organization

Abstract

Background of the study

Novel COVID-19 is a new respiratory infection that started in China, Wuhan, and has spread rapidly throughout the world, so the World Health Organization has called it the "pandemic of the century.".

Pregnant women do not seem to be at higher risk of getting SARS-CoV-2, the virus that causes COVID-19. However, studies have shown an increased risk of developing severe COVID-19 if they are infected, compared with non-pregnant women of a similar age.

Objective of the study:

The objective of the study was to assess the knowledge, attitude and practices about COVID-19 among pregnant women Attending Antenatal care at public hospitals in Sana'a-Yemen

Methods:

KAP study was done to examine knowledge, attitude and practices about COVID-19 from November 2022 to December 2022. A sample size of 205 pregnant women was included in this study. A multistage random sampling method was used to select the study population. All Pregnant women were asked questions regarding, demographic variables, knowledge, attitude and practices toward COVID-19. Data was analyzed using SPSS, version 26. Descriptive statistics was used (Frequency and number). The relationship between independent and dependent variables were measured by used chi-square tests as appropriate. Two-tailed, p-value <0.05 was considered statistically significant.

Results:

The study results showed that the most pregnant women of the study were (37.2%) between 23-27 years. Most of the pregnant women (80%) were from Urban. (86.8%) were housewife. Most (74.6%) of pregnant women were

educated, Majority of pregnant women (53.7%) thought that getting pregnant during the pandemic was not safe. Most of the pregnant women (168 women among 205 participants) knew that social distancing is essential for preventing the infection. Most of the pregnant women (91.7 %) had changes in the diet and were taking additional nutritional supplements to help develop immunity against corona virus. The anxiousness and complications to the baby and the mother was high among the pregnant women (77.1 %). The preventive measures known by participants were washing hands frequently with soap and water or rubbing hands with alcohol-based sanitizers (86.3 %), maintaining at least 1-meter distance between yourself and others (80.5%), covering mouth and nose when coughing or sneezing and wearing face mask in public (46.8%). Many pregnant women preferred staying indoors during lockdown and not visiting public gatherings to prevent getting infected by Covid-19 (82.4%).

Conclusions:

The majority of pregnant women (53.7%) thought that getting pregnant during the pandemic was not safe, (90.7%) of pregnant women had good attitude towards the preventive measures against the infection.

Recommendations:

For Ministry of Public Health and Population Should increase health education and counseling for pregnant women to improve the level of knowledge about COVID-19 especially its effects on pregnancy.

الملخص

خلفية الدراسة:

كوفيد-١٩ الحديث هو عدوى جديدة تصيب الجهاز التنفسي بدأت في الصين، ووهان، وانتشرت بسرعة في جميع أنحاء العالم ، لذلك أطلقت عليها منظمة الصحة العالمية اسم "جائحة القرن".

لا يبدو أن النساء الحوامل أكثر عرضة للإصابة بـ -SARS-CoV-2، الفيروس المسبب لـ كوفيد-١٩. ومع ذلك، فقد أظهرت الدراسات زيادة خطر الإصابة الشديدة بـ كوفيد-١٩ إذا أصبن, مقارنة بالنساء غير الحوامل في نفس العمر.

الهدف من الدراسة:

كان الهدف من الدراسة هو تقييم المعرفة والمواقف والممارسات حول كوفيد-١٩ بين النساء الحوامل اللائي يترددن على رعاية ما قبل الولادة في المستشفيات العامة في صنعاء – اليمن.

الطُرق:

أُجريت دراسة المعرفة والمواقف والممارسات لفحص المعرفة والمواقف والممارسات حول كوفيد-١٩ من نوفمبر ٢٠٢٢ إلى ديسمبر ٢٠٢٢. حجم العينة ٢٠٥ من النساء الحوامل أدرجت في هذه الدراسة. تم استخدام طريقة أخذ العينات العشوائية متعددة المراحل لاختيار مجتمع الدراسة. تم طرح أسئلة على جميع النساء الحوامل تتعلق بالمتغيرات الديموغرافية والمعرفة والمواقف والممارسات تجاه كوفيد -١٩. تم تحليل البيانات باستخدام SPSS، الإصدار ٢٦. تم استخدام الإحصاء الوصفي (التكرار والعدد). العلاقة بين المتغيرات المستقلة والتابعة تم قياسها عن طريق اختبارات مربع كاي المستخدمة حسب الاقتضاء. ثنائية الذيل, قيمة-p 0.05>اعُتبرت ذات دلالات إحصائية.

النتائج:

أظهرت نتائج الدراسة أن معظم النساء الحوامل في الدراسة كانت (٣٧,٢٪) تتراوح أعمارهن بين ٢٣ و ٢٧ سنة. معظم النساء الحوامل (٨٠٪) كانوا من المناطق الحضرية. (٨٦,٨ ٪) كُن ربات منزل. كانت معظم النساء الحوامل (٧٤,٦٪) متعلمات، واعتقدت غالبية النساء الحوامل (٥٣,٧٪) أن الحمل أثناء الجائحة ليس آمنًا. معظم النساء الحوامل (١٦٨ امرأة من بين ٢٠٥ مشاركة) عرفت أن التباعد الاجتماعي ضروري لمنع العدوى. خضعت معظم النساء الحوامل (٩١,٧٪) لتغييرات في النظام الغذائي وتناولن مكملات غذائية إضافية للمساعدة في تطوير مناعة ضد فيروس كورونا. كان القلق والمضاعفات على الأم والطفل مرتفعاً بين النساء الحوامل (٧٧,١٪). كانت الإجراءات الوقائية التي يعرفها المشاركون هي غسل اليدين بشكل متكرر بالماء والصابون أو فرك اليدين بمطهرات كحولية (٨٦,٣٪) ، والحفاظ على مسافة متر واحد على الأقل بينك وبين الآخرين (٨٠,٥٪) ، تغطية الفم والأنف عند السعال أو العطس ولبس قناع الوجه في الأماكن العامة (٤٦,٨٪). فضلت العديد من النساء الحوامل البقاء في المنزل أثناء حظر التجول وعدم زيارة التجمعات العامة لمنع الإصابة بفيروس كوفيد-١٩ (٨٢,٤٪).

الاستنتاجات:

غالبية النساء الحوامل (٥٣,٧٪) يعتقدن أن الحمل أثناء الجائحة ليس آمناً ، (٩٠,٧٪) من النساء الحوامل لديهن موقف جيد تجاه التدابير الوقائية ضد العدوى.

التوصيات:

لوزارة الصحة العامة والسكان: يجب زيادة التثقيف الصحي والاستشارات للنساء الحوامل لتحسين مستوى المعرفة حول كوفيد-١٩ و تأثيراته على الحمل.

Chapter 1
Introduction

1.1 Introduction of the study

Novel COVID-19 is a new respiratory infection (Englund and Chu, 2018) that started in China, Wuhan, has become a global pandemic. it was growing internationally at an accelerated rate and had spread to over 110 nations (WHO, 2020). Coronaviruses are single-stranded, non-sectioned, enveloped viruses that cause disease ranging from common cold to severe and fatal disease. The term corona virus derives from the Latin word corona, meaning crown or halo; the designation arises from the appearance of coronavirus versions seen by electron microscopy, in which the virus particles show a crown like fringe usually referred to as spikes [Rasmussen, S. A, 2020].

At present, the exact dynamics and transmission of the virus have not been determined. However, according to WHO, the virus can be transmitted via air-droplets and fomites during close and unprotected contact between an infected person and a healthy person [WHO, 2020]. According to the Centre for Disease Control and Prevention (CDC) SARS CoV-2 is transmitted from person to person through close contact (within 6 ft); from an infected person via respiratory droplets during coughing or sneezing or when touching a surface or an object that is contaminated with the virus, including touching one's eyes, nose or mouth [CDC, 2020].

Most people infected with the virus will experience mild to moderate respiratory illness and recover without requiring special treatment. However, some will become seriously ill and require medical attention. Older people and those with underlying medical conditions like cardiovascular disease, diabetes, chronic respiratory disease, or cancer are more likely to develop serious illness. Anyone can get sick with COVID-1 9 and become seriously ill or die at any age [WHO, 2023]

1.2 Problem statement

Globally, 15 February 2023, there have been 756,291,327 confirmed cases of COVID-19, including 6,841,640 deaths, reported to WHO. As of 13 February 2023, a total of 13,195,777,466 vaccine doses have been administered.

In Yemen, from 3 January 2020 to 5:50pm CET, 15 February 2023, there have been 11,945 confirmed cases of COVID-19 with 2,159 deaths, reported to WHO. As of 2 January 2023, a total of 1,242,982 vaccine doses have been administered [WHO, 2023]

Pregnant women are considered a special category of population due to the unusual immune suppression induced by pregnancy [Royal college of obstetricians and gynecologists]. The immunological and physiological changes in pregnancy might make pregnant women at higher risk of serious disease or death with Covid-19 compared to the general public [Qiao, J. , 2020]. However, little information is available about Covid-19 infection during pregnancy [Chen, D, 2020]. There are limited case series reporting the impact on women affected by coronaviruses during pregnancy [Poon, L. C, 2020]. In women infected by other coronavirus infections such as Middle East Respiratory Syndrome (MERS-CoV) and severe acute respiratory syndrome (SARS-CoV), the risk of death in women infected during pregnancy tended to be higher than in non-pregnant women [Nie, R, 2019].

Pregnant women are at an increased risk for severe illness from COVID-19.5 The rate of morbidity, cesarean section delivery and preterm birth were also found to be increased.6 Vertical transmission is a matter of debate. [Anjorin AA, 2020].

People with COVID-19 have had a wide range of symptoms reported – ranging from mild symptoms to severe illness. Symptoms may appear 2-14

days after exposure to the virus. Anyone can have mild to severe symptoms. Possible symptoms include: Fever or chills Cough Shortness of breath or difficulty breathing Fatigue Muscle or body aches. Headache New loss of taste or smell Sore throat Congestion or runny nose Nausea or vomiting Diarrhea. When to seek Emergency medical attention look for emergency warning signs for COVID 19: trouble breathing Persistent pain or pressure in the chest new confusion Inability to wake or stay awake Pale, gray, or blue-colored skin, lips, or nail beds, depending on skin tone

To reduce the continued spread of the coronavirus disease and its related mortality, the World Health Organization has recommended a range of preventive steps, including daily hand washing with water and soap, social distance, hand and mouth covering when coughing and avoiding eyes, nose and mouth touching [WHO, 2020]

pregnant and breastfeeding women with COVID-19 should be investigated as of outside pregnancy and should receive proven therapies (such as corticosteroids and tocilizumab) on a risk/benefit basis. Admitted women should receive multidisciplinary care with input from senior decision makers and early escalation where required. There are no safety concerns - surrounding the COVID-19 vaccination and fertility or pregnancy, and so it should be offered to women based on their age and clinical risk group, in line with non-pregnant women. [COVID-19 in pregnancy – PubMed]

The past three unprecedented outbreaks of emerging human coronavirus infections at the beginning of the 21st century have highlighted the importance of readily available, accurate, and rapid diagnostic technologies to contain emerging and re-emerging pandemics. Real-time reverse transcriptase-polymerase chain reaction (rRT-PCR) based assays performed on respiratory specimens remain the gold standard for COVID-19

diagnostics. [COVID-19 in pregnancy – PubMed]. In addition to the increased risk of the mothers, there is a strong association between COVID-19 and fetal and neonatal complications such as fetal distress, fetal tachycardia, low birth weight, neonatal asphyxia, and stillbirth. [CDC, 2020]

The past three unprecedented outbreaks of emerging human coronavirus infections at the beginning of the 21st century have highlighted the importance of readily available, accurate, and rapid diagnostic technologies to contain emerging and re-emerging pandemics. Real-time reverse transcriptase-polymerase chain reaction (rRT-PCR) based assays performed on respiratory specimens remain the gold standard for COVID-19 diagnostics.

1.3 Research Questions

1. What is the attitude among pregnant women regarding COVID-19?

2. What is the level of knowledge among pregnant women regarding COVID-19?

3. What is the level of practices among pregnant women regarding COVID-19?

1.4 Significance of the Study

Coronavirus disease pandemic has resulted in death of thousands of people across several countries. Several preventive measures have been recommended to halt the spread of the disease and its associated mortality. Pregnant women are a vulnerable group to COVID-19. The study assesses their knowledge, attitudes, and practices towards the virus. Understanding these factors can help design effective interventions to prevent COVID-19 transmission. Effective interventions can protect pregnant women and their unborn babies. There are limited case series reporting the impact on women

affected by coronaviruses during pregnancy little information is available about Covid-19 infection during pregnancy.

1.5 Research Objectives

1. 5.1 General Objective:

To assess the knowledge, attitude and practices about COVID-19 among pregnant women.

1. 5.2 Specific objectives:

1. To identify the level of knowledge among pregnant women about COVID-19 and its effect on pregnancy.

2. To determine the level of attitude among pregnant women about COVID-19.

3. To examine the level of practices among pregnant women about COVID-19.

4. To assess the relationship between the knowledge, attitudes and practices of pregnant women and demographic characteristics of pregnant women.

1.6 Procedural definitions

- **Demographic characteristics:** Refers to age of pregnant women, residency, educational level, occupation

- **Knowledge:** Level of information of pregnant women regarding to COVID 19

  - **Good knowledge**: Participants who scored more than ≥ mean (which was 8 for the study).

  - **Inadequate knowledge**: Women who scored < mean score knowledge question.

- o **Practices**: Level of practices of pregnant women regarding to COVID 19.

  - **Good practice**: women who scored more than 50% (which was 5 for the study) on the practice of COVID19 disease preventive measures questionnaire.

  - **Poor Practice**: women who scored less than 50% on the practice of COVID 19 disease preventive measures questionnaire.

- o **Attitudes**: Level of attitudes of pregnant women regarding to COVID 19

- o **Age:** Age of pregnant women in Year.

- o **Level of education:** The level of pregnant women knowledge which they have**.**

- o **Occupation:** Types of occupation of pregnant women.

- o **Residency:** Place of living of pregnant women.

Chapter 2

Literature Review

2.1 Introduction:

Novel COVID-19 is a new respiratory infection *(Englund and Chu, 2018)* that started in China,Wuhan, and has spread rapidly throughout the world, so the World Health Organization has called it the "pandemic of the century." (WHO, 2020) Coronavirus disease (COVID-19) is an infectious disease caused by the SARS-CoV-2 virus. Most people infected with the virus will experience mild to moderate respiratory illness and recover without requiring special treatment. However, some will become seriously ill and require medical attention. Older people and those with underlying medical conditions like cardiovascular disease, diabetes, chronic respiratory disease, or cancer are more likely to develop serious illness. Anyone can get sick with COVID-19 and become seriously ill or die at any age.

2.2 The virus: classification and origin

SARS-CoV-2 is a member of the family Coronaviridae and order Nidovirales. The family consists of two subfamilies, Coronavirina and Torovirinae and members of the subfamily Coronavirinae are subdivided into four genera: (a) Alphacoronavirus contains the human coronavirus (HCoV)-229E and HCoV-NL63; (b) Betacoronavirus includes HCoV-OC43, Severe Acute Respiratory Syndrome human coronavirus (SARS-HCoV), HCoV-HKU1, and Middle Eastern respiratory syndrome coronavirus (MERS-CoV); (c) Gammacoronavirus includes viruses of whales and birds and; (d) Deltacoronavirus includes viruses isolated from pigs and birds (Burrell C, Howard C and Murphy F, 2016). SARS-CoV-2 belongs to Betacoronavirus together with two highly pathogenic viruses, SARS-CoV and MERS-CoV. SARS-CoV-2 is an enveloped and positive-sense single-stranded RNA (+ssRNA) virus (Kramer A and Schwebke I, 2006).

2.3 Transmission:

The role of the Huanan Seafood Wholesale Market in propagating disease is unclear. Many initial COVID-19 cases were linked to this market suggesting that SARS-CoV-2 was transmitted from animals to humans (Li Q, Guan X and Wu P, 2020). However, a genomic study has provided evidence that the virus was introduced from another, yet unknown location, into the market where it spread more rapidly, although human-to-human transmission may have occurred earlier (Yu W and Tang G, 2020). Clusters of infected family members and medical workers have confirmed the presence of person-to-person transmission (Chan JF and Yuan S, 2020). After January 1, less than 10% of patients had market exposure and more than 70% patients had no exposure to the market (Li Q, Guan X and Wu P, 2020). Person-to-person transmission is thought to occur among close contacts mainly via respiratory droplets produced when an infected person coughs or sneezes. Fomites may be a large source of transmission, as SARS-CoV has been found to persist on surfaces up to 96 h (Kramer A and Schwebke I, 2006) and other coronaviruses for up to 9 days (Kampf G and Todt D, 2020). Whether or not there is asymptomatic transmission of disease is controversial. One initial study published on January 30 reported asymptomatic transmission (Rothe C and Schunk M, 2020), but later it was found that the researchers had not directly interviewed the patient, who did in fact have symptoms prior to transmitting disease (Kupferschmidt K., 2020). A more recent study published on February 21 also purported asymptomatic transmission (Bai Y and Yao L, 2020), but any such study could be limited by errors in self-reported symptoms or contact with other cases and fomites.

Findings about disease characteristics are rapidly changing and subject to selection bias. A study indicated the mean incubation period was 5.2 days

(95% confidence interval (95%CI): 4.1–7.0) (Li Q, Guan X and Wu P, 2020).

The incubation period has been found to be as long as 19 or 24 days (Huang C and Wang Y, 2020), (Chu DKW and Pan Y, 2020), although case definitions typically rely on a 14 day window (Global surveillance for human infection with novel coronavirus, 2019).

The basic reproductive number (R0) has been estimated with varying results and interpretations. R0 measures the average number of infections that could result from one infected individual in a fully susceptible population (Bauch C and Oraby T., 2013). Studies from previous outbreaks found R0 to be 2.7 for SARS (Riley S and Fraser C, 2003) and 2.4 for 2009 pandemic H1N1 influenza (Yang Y and Sugimoto JD, 2009). One study estimated that that basic reproductive number (R0) was 2.2 (95% CI: 1.4–3.9) (Li Q, Guan X and Wu P, 2020). However, later in a further analysis of 12 available studies found that R0 was 3.28 (Liu Y, Gayle A and Wilder-Smith JR A., 2020).

Because R0 represents an average value it is also important to consider the role of super spreaders, who may be hugely responsible for outbreaks within large clusters but who would not largely influence the value of R0 (Kucharski A and Althaus C., 2015). During the acute phase of an outbreak or prepandemic, R0 may be unstable (Bauch C and Oraby T., 2013). In pregnancy, a study of nine pregnancy women who developed COVID-19 in late pregnancy suggested COVID-19 did not lead to substantially worse symptoms than in nonpregnant persons and there is no evidence for intrauterine infection caused by vertical transmission (Chen HEA., 2020).

In hospital setting, a study involving 138 COVID-19 suggested that hospital-associated transmission of SARS-CoV-2 occurred in 41% of patients (Wang D and Hu B, 2020). Moreover, another study on 425 patients found that the proportion of cases in health care workers gradually increased by time (Li Q,

Guan X and Wu P, 2020). These cases likely reflect exposure to a higher concentration of virus from sustained contact in close quarters. Outside China, as of February 12, 2020, there were 441 confirmed COVID-19 cases reported in 24 countries (WHO: coronavirus disease 2019) of which the first imported case was reported in Thailand on January 13, 2020 (WHO: coronavirus disease 2019, Sookaromdee P and Wiwanitkit V., 2020). Among those countries, 11 countries have reported local transmission with the highest number of cases reported in Singapore with 47 confirmed cases (WHO: coronavirus disease 2019).

2.4 Risk factors :

The incidence of SARS-CoV-2 infection is seen most often in adult male patients with the median age of the patients was between 34 and 59 years (Bai Y and Yao L, 2020), (Wang D, Hu B., 2020), (Huang C and Wang Y, 2020), (Chang, Lin M, 2020). SARS-CoV-2 is also more likely to infect people with chronic comorbidities such as cardiovascular and cerebrovascular diseases and diabetes (Chen N, Zhou M and Dong X, 2020). The highest proportion of severe cases occurs in adults ≥60 years of age, and in those with certain underlying conditions, such as cardiovascular and cerebrovascular diseases and diabetes (Bai Y and Yao L, 2020), (Wang D and Hu B, 2020). Severe manifestations maybe also associated with coinfections of bacteria and fungi (Chen N and Zhou M, 2020).

Fewer COVID-19 cases have been reported in children less than 15 years (Bai Y and Yao L, 2020), (Wang D and Hu B, 2020), (Huang C and Wang Y, 2020), (Chang and Lin M, 2020). In a study of 425 COVID-19 patients in Wuhan, published on January 29, there were no cases in children under 15 years of age (Li Q, Guan X and Wu P, 2020), (Liu W and Zhang Q, 2020). Nevertheless, 28 pediatric patients have been reported by January 2020

(Shen KL and Yang YH., 2020). The clinical features of infected paediatric patients vary, but most have had mild symptoms with no fever or pneumonia, and have a good prognosis (Shen KL and Yang YH., 2020). Another study found that although a child had radiological ground-glass lung opacities, the patient was asymptomatic (Chan JF-W and Yuan S, 2020). In summary, children might be less likely to be infected or, if infected, present milder manifestations than adults; therefore, it is possible that their parents will not seek out treatment leading to underestimates of COVID-19 incidence in this age group.

2.5 Pathogenesis and immune response:

Like most other members of the coronavirus family, Beta coronavirus exhibit high species specificity, but subtle genetic changes can significantly alter their tissue tropism, host range, and pathogenicity.

A striking example of the adaptability of these viruses is the emergence of deadly zoonotic diseases in human history caused by SARS-CoV (Peiris JSM and Guan Y, 2004) and MERS-CoV (Zaki AM and van Boheemen S, 2012). In both viruses, bats served as the natural reservoir and humans were the terminal host, with the palm civet and dromedary camel the intermediary host for SARS-CoV and MERS-CoV, respectively (Guan Y and Zheng BJ, 2003), (Alagaili AN and Briese T, 2014). Intermediate hosts clearly play a critical role in cross species transmission as they can facilitate increased contact between a virus and a new host and enable further adaptation necessary for an effective replication in the new host (Brennan G and Kitzman JO, 2014). Because of the pandemic potential of SARSCoV-2, careful surveillance is immensely important to monitor its future host adaptation, viral evolution, infectivity, transmissibility, and pathogenicity.

The host range of a virus is governed by multiple molecular interactions, including receptor interaction. The envelope spike (S) protein receptor binding domain of SARS-CoV-2 was shown structurally similar to that of SARS-CoV, despite amino acid variation at some key residues (Lu R, Zhao X and Li J, 2020). Further extensive structural analysis strongly suggests that SARS-CoV-2 may use host receptor angiotensin-converting enzyme 2 (ACE2) to enter the cells (Wan Y and Shang J, 2020), the same receptor facilitating SARS-CoV to infect the airway epithelium and alveolar type 2 (AT2) pneumocytes, pulmonary cells that synthesize pulmonary surfactant (Li W and Moore MJ, 2003). In general, the spike protein of coronavirus is divided into the S1 and S2 domain, in which S1 is responsible for receptor binding and S2 domain is responsible for cell membrane fusion (Lu R, Zhao X and Li J, 2020). The S1 domain of SARS-CoV and SARSCoV-2 share around 50 conserved amino acids, whereas most of the bat-derived viruses showed more variation (Lu R, Zhao X and Li J, 2020). In addition, identification of several key residues (Gln493 and Asn501) that govern the binding of SARS-CoV-2 receptor binding domain with ACE2 further support that SARS-CoV-2 has acquired capacity for person to person transmission (Wan Y and Shang J, 2020). Although, the spike protein sequence of receptor binding SARS-CoV-2 is more similar to that of SARSCoV, at the whole genome level SARS-CoV-2 is more closely related to bat-SL-CoVZC45 and bat-SL-CoVZXC21 (Lu R, Zhao X and Li J, 2020).

However, receptor recognition is not the only determinant of species specificity. Immediately after binding to their receptive receptor, SARS-CoV-2 enters host cells where they encounter the innate immune response. In order to productively infect the new host, SARS-CoV-2 must be able to inhibit or evade host innate immune signalling. However, it is largely unknown how SARSCoV-2 manages to evade immune response and drive

pathogenesis. Given that COVID-19 and SARS have similar clinical features (Huang C and Wang Y, 2020), SARS-CoV-2 may have a similar pathogenesis mechanism as SARSCoV.

In response to SARS-CoV infections, the type I interferon (IFN) system induces the expression of IFN-stimulated genes (ISGs) to inhibit viral replication. To overcome this antiviral activity, SARSCoV encodes at least 8 viral antagonists that modulate induction of IFN and cytokines and evade ISG effector function (Totura AL and Baric RS., 2012).

The host immune system response to viral infection by mediating inflammation and cellular antiviral activity is critical to inhibit viral replication and dissemination. However, excessive immune responses together with lytic effects of the virus on host cells will result in pathogenesis. Studies have shown patients suffering from severe pneumonia, with fever and dry cough as common symptoms at onset of illness (Huang C and Wang Y, 2020), (Chen N, Zhou M and Dong X, 2020). Some patients progressed rapidly with Acute Respiratory Stress Syndrome (ARDS) and septic shock, which was eventually followed by multiple organ failure and about 10% of patients have died (Chen N, Zhou M and Dong X, 2020). ARDS progression and extensive lung damage in COVID-19 are further indications that ACE2 might be a route of entry for the SARS-CoV-2 as ACE2 is known abundantly present on ciliated cells of the airway epithelium and alveolar type II cells (pulmonary cells that synthesize pulmonary surfactant) in humans (Hamming I and Timens W, 2004). Patients with SARS and COVID-19 have similar patterns of inflammatory damage. In serum from patients diagnosed with SARS, there is increased levels of proinflammatory cytokines (e.g. interleukin (IL)-1, IL6, IL12, interferon gamma (IFN), IFN-induced protein 10 (IP10), macrophage inflammatory proteins 1A (MIP1A) and monocyte chemoattractant protein-1 (MCP1)),

which are associated with pulmonary inflammation and severe lung damage (Wong CK and Lam CW, 2004). Likewise, patients infected with SARS-CoV-2 are reported to have higher plasma levels of proinflammatory cytokines including IL1_, IL-2, IL7, TNF-_, GSCF, MCP1 than healthy adults (Huang C and Wang Y, 2020). Importantly, patients in the intensive care unit (ICU) have a significantly higher level of GSCF, IP10, MCP1, and TNF-than those non-ICU patients, suggesting that a cytokine storm might be an underlying cause of disease severity (Huang C and Wang Y, 2020). Unexpectedly, anti-inflammatory cytokines such as IL10 and IL4 were also increased in those patients (Huang C and Wang Y, 2020), which was uncommon phenomenon for an acute phase viral infection. Another interesting finding, as explained before, was that SARS-CoV-2 has shown to preferentially infect older adult males with rare cases reported in children (Huang C and Wang Y, 2020), (Chen N, Zhou M and Dong X, 2020). The same trend was observed in primate models of SARS-CoV where the virus was found more likely to infect aged Cynomolgus macaque than young adults (Smits SL and de Lang A, 2010). Further studies are necessary to identify the virulence factors and the host genes of SARS-CoV-2 that allows the virus to cross the species-specific barrier and cause lethal disease in humans.

2.6 Clinical manifestations :

Clinical manifestations of 2019-nCoV infection have similarities with SARS-CoV where the most common symptoms include fever, dry cough, dyspnoea, chest pain, fatigue and myalgia (Huang C and Wang Y, 2020), (Wang D and Hu B, 2020), (Zhu N and Zhang D, 2020). Less common symptoms include headache, dizziness, abdominal pain, diarrhoea, nausea, and vomiting (Huang C and Wang Y, 2020), (Wang D and Hu B, 2020).

Based on the report of the first 425 confirmed cases in Wuhan, the common symptoms include fever, dry cough, myalgia and fatigue with less common are sputum production, headache, haemoptysis, abdominal pain, and diarrhoea (Li Q, Guan X and Wu P, 2020). Approximately 75% patients had bilateral pneumonia (Chen N, Zhou M and Dong X, 2020). Different from SARS-CoV and MERS-CoV infections,

However, is that very few COVID-19 patients show prominent upper respiratory tract signs and symptoms such as rhinorrhoea, sneezing, or sore throat, suggesting that the virus might have greater preference for infecting the lower respiratory tract (Huang C and Wang Y, 2020).

Chen HGJ and Wang C, (2020). "Pregnant and non-pregnant women have similar characteristics"

Severe complications such as hypoxaemia, acute ARDS, arrythmia, shock, acute cardiac injury, and acute kidney injury have been reported among COVID-19 patients (Huang C and Wang Y, 2020), Chen N, Zhou M and Dong X, (2020). "A study among 99 patients found that approximately 17% patients developed ARDS and, among them, 11% died of multiple organ failure".

The median duration from first symptoms to ARDS was 8 days (Wang D and Hu B, 2020).

2.7 Diagnosis:

Efforts to control spread of COVID-19, institute quarantine and isolation measures, and appropriately clinically manage patients all require useful screening and diagnostic tools. While SARS-CoV-2 is spreading, other respiratory infections may be more common in a local community. The WHO has released a guideline on case surveillance of COVID-19 on January 31, 2020 (Global surveillance for human infection with novel coronavirus,

2019). For a person who meets certain criteria, WHO recommends to first screen for more common causes of respiratory illness given the season and location. If a negative result is found, the sample should be sent to referral laboratory for SARS-CoV-2 detection.

Case definitions can vary by country and will evolve over time as the epidemiological circumstances change in a given location. In China, a confirmed case from January 15, 2020 required an epidemiological linkage to Wuhan within 2 weeks and clinical features such as fever, pneumonia, and low white blood cell count. On January 18, 2020 the epidemiological criterion was expanded to include contact with anyone who had been in Wuhan in the past 2 weeks (China CDC, 2020).
Later, the case definitions removed the epidemiological linkage.

The WHO has put forward case definitions (Global surveillance for human infection with novel coronavirus, 2019). Suspected cases of COVID-19 are persons (a) with severe acute respiratory infections (history of fever and cough requiring admission to hospital) and with no other aetiology that fully explains the clinical presentation and a history of travel to or residence in China during the 14 days prior to symptom onset; or (b) a patient with any acute respiratory illness and at least one of the following during the 14 days prior to symptom onset: contact with a confirmed or probable case of SARS-CoV-2 infection or worked in or attended a health care facility where patients with confirmed or probable SARS-CoV-2 acute respiratory disease patients were being treated. Probable cases are those for whom testing for SARS-CoV-2 is inconclusive or who test positive using a pan-coronavirus assay and without laboratory evidence of other respiratory pathogens. A confirmed case is one with a laboratory confirmation of SARS-CoV-2 infection, irrespective of clinical signs and symptoms.

Patel A and Jernigan DB., (2020) "For patients who meet diagnostic criteria for SARS-CoV-2 testing, the CDC recommends collection of specimens from the upper respiratory tract (nasopharyngeal and oropharyngeal swab) and, if possible, the lower respiratory tract (sputum, tracheal aspirate, or bronchoalveolar lavage). In each country, the tests are performed by laboratories designated by the government."

2.8 Laboratory findings:

Among COVID-19 patients, common laboratory abnormalities include lymphopenia (Chen N, Zhou M and Dong X, 2020),(Bai Y and Yao L, 2020), (Wang D and Hu B, 2020), prolonged prothrombin time, and elevated lactate dehydrogenase (Wang D and Hu B, 2020). ICU-admitted patients had more laboratory abnormalities compared with non-ICU patients (Wang D and Hu B, 2020), (Huang C and Wang Y, 2020). Some patients had elevated aspartate aminotransferase, creatine kinase, creatinine, and C-reactive protein (Bai Y and Yao L, 2020), (Huang C and Wang Y, 2020), (Chan JF-W and Yuan S, 2020). Most patients have shown normal serum procalcitonin levels (Bai Y and Yao L, 2020), (Wang D and Hu B, 2020), (Huang C and Wang Y, 2020).

Huang C and Wang Y, (2020) "COVID-19 patients have high level of IL1_, IFN-_, IP10, and MCP1".

Huang C and Wang Y, (2020) "ICU-admitted patients tend to have higher concentration of granulocyte-colony stimulating factor (GCSF), IP10, MCP1A, MIP1A, and TNF."

2.9 Radiology findings:

Radiology finding may vary with patients age, disease progression, immunity status, comorbidity, and initial medical intervention (Jin YH and

Cai L, 2020). In a study describing 41 of the initial cases of 2019-nCoV infection, all 41 patients had pneumonia with abnormal findings on chest computed tomography (CT-scan) (Huang C and Wang Y, 2020). Abnormalities on chest CT-scan were also seen in another study of 6 cases, in which all of them showed multifocal patchy ground-glass opacities notably nearby the peripheral sections of the lungs (Chan JF-W and Yuan S, 2020). Data from studies indicate that the typical of chest CT-scan findings are bilateral pulmonary parenchymal ground-glass and consolidative pulmonary opacities (Huang C and Wang Y, 2020), (Chen N, Zhou M and Dong X, 2020), (Bai Y and Yao L, 2020), (Wang D and Hu B, 2020), (Chang and Lin M, 2020), (Lei J and Li J, 2020). The consolidated lung lesions among patients five or more days from disease onset and those 50 years old or older compared to 4 or fewer days and those 50 years or younger, respectively (Zhu N and Zhang D, 2020).

As the disease course continue, mild to moderate progression of disease were noted in some cases which manifested by extension and increasing density of lung opacities (Chung M and Bernheim A, 2020). Bilateral multiple lobular and subsegmental areas of consolidation are typical findings on chest CT-scan of ICU-admitted patients (Huang C and Wang Y, 2020). A study among 99 patients, one patient had pneumothorax in an imaging examination (Chen N, Zhou M and Dong X, 2020).

2.10 Treatments:

Similar to MERS-CoV and SARS-CoV, there is still no specific antiviral treatment for COVID-19 (Tang JW and Tambyah PA, 2020). Isolation and supportive care including oxygen therapy, fluid management, and antibiotics treatment for secondary bacterial infections is recommended (Habibzadeh P and Stoneman EK., 2020).

Some COVID-19 patients progressed rapidly to ARDS and septic shock, which was eventually followed by multiple organ failure (Huang C and Wang Y, 2020), (Chen N, Zhou M and Dong X, 2020). Therefore, the effort on initial management of COVID-19 must be addressed to the early recognition of the suspect and contain the disease spread by immediate isolation and infection control measures (WHO, 2020).

Currently, no vaccination is available, but even if one was available, uptake might be suboptimal. A study of intention to vaccinate during the H1N1 pandemic in the United States was around 50% at the start of the pandemic in May 2009 but had decreased to 16% by January 2010 (Gidengil C and Parker A, 2012).

Neither is a treatment available. Therefore, the management of the disease has been mostly supportive referring to the disease severity which has been introduced by WHO. If sepsis is identified, empiric antibiotic should be administered based on clinical diagnosis and local epidemiology and susceptibility information.

Routine glucocorticoids administration are not recommended to use unless there are another indication (WHO, 2020). Clinical evidence also does not support corticosteroid treatment (Russell C and Millar J, 2020). Use of intravenous immunoglobulin might help for severely ill patients (Chen N, Zhou M and Dong X, 2020).

Drugs are being evaluated in line with past investigations into therapeutic treatments for SARS and MERS (Paules CI and Marston HD, 2020). Overall, there is not robust evidence that these antivirals can significantly improve clinical outcomes A. Antiviral drugs such as oseltamivir combined with empirical antibiotic treatment have also been used to treat COVID-19 patients (Huang C and Wang Y, 2020). Remdesivir which was developed for Ebola virus, has been used to treat imported COVID-19 cases in US

(Holshue ML and DeBolt C, 2020). A brief report of treatment combination of Lopinavir/Ritonavir, Arbidol, and Shufeng Jiedu Capsule (SFJDC), a traditional Chinese medicine, showed a clinical benefit to three of four COVID-19 patients (Wang Z and Chen X, 2020).

There is an ongoing clinical trial evaluating the safety and efficacy of lopinavir-ritonavir and interferon-_ 2b in patients with COVID-19 (Habibzadeh P and Stoneman EK., 2020). Ramsedivir, a broad spectrum antivirus has demonstrated in vitro and in vivo efficacy against SARS-CoV-2 and has also initiated its clinical trial (Wang M and Cao R, 2020), (de Wit E and Feldmann F, 2020). In addition, other potential drugs from existing antiviral agent have also been proposed (Liu X and Wang X-J., 2020), (Lu H., 2020).

2.11 Control and prevention strategies

Control and prevention strategies COVID-19 is clearly a serious disease of international concern. By some estimates it has a higher reproductive number than SARS (Liu Y, Gayle A and Wilder-Smith JR A., 2020), and more people have been reported to have been infected or died from it than SARS (Mahase E., 2020). Similar to SARS-CoV and MERS-CoV, disrupting the chain of transmission is considered key to stopping the spread of disease (Chan JFW and Lau SKP, 2015). Different strategies should be implemented in health care settings and at the local and global levels.

Health care settings can unfortunately be an important source of viral transmission. As shown in the model for SARS, applying triage, following correct infection control measures, isolating the cases and contact tracing are key to limit the further spreading of the virus in clinics and hospitals (Chan JFW and Lau SKP, 2015). Suspected cases presenting at healthcare facilities

with symptoms of respiratory infections (e.g. runny nose, fever and cough) must wear a face mask to contain the virus and strictly adhere triage procedure. They should not be permitted to wait with other patients seeking medical care at the facilities. They should be placed in a separated, fully ventilated room and approximately 2 m away from other patients with convenient access to respiratory hygiene supplies (Centers for Diseases Control and Prevention, 2020). In addition, if a confirmed COVID-19 case require hospitalization, they must be placed in a single patient room with negative air pressure – a minimum of six air changes per hour. Exhausted air has to be filtered through high efficiency particulate air (HEPA) and medical personnel entering the room should wear personal protective equipment (PPE) such as gloves, gown, disposable N95, and eye protection. Once the cases are recovered and discharged, the room should be decontaminated or disinfected and personnel entering the room need to wear PPE particularly facemask, gown, eye protection (Centers for Diseases Control and Prevention, 2020). In a community setting, isolating infected people are the primary measure to interrupt the transmission. For example, immediate actions taken by Chinese health authorities included isolating the infected people and quarantining of suspected people and their close contacts (Wang C and Horby PW, 2020). Also, as there are still conflicting assumptions regarding the animal origins of the virus (i.e. some studies linked the virus to bat (Paraskevis D and Kostaki EG, 2020), (Randhawa GS and Soltysiak MPM, 2020), while others associated the virus with snake (Ji W and Wang W, 2020), contacts with these animal fluids or tissues or consumption of wild caught animal meet should be avoided. Moreover, educating the public to recognize unusual symptoms such as chronic cough or shortness of breath is essential therefore that they could seek medical care for early detection of the virus. If large-scale community transmission occurs, mitigating social

gatherings, temporary school closure, home isolation, close monitoring of symptomatic individual, provision of life supports (e.g. oxygen supply, mechanical ventilator), personal hand hygiene, and wearing personal protective equipment such as facemask should also be enforced (Heymann DL, 2020). In global setting, locking down Wuhan city was one of the immediate measure taken by Chinese authorities and hence had slowed the global spread of COVID-19 (Heymann DL, 2020). Air travel should be limited for the cases unless severe medical attentions are required. Setting up temperature check or scanning is mandatory at airport and border to identify the suspected cases. Continued research into the virus is critical to trace the source of the outbreak and provide evidence for future outbreak (Heymann DL, 2020).

2.12 Previous studies:

Study in southwest Nigeria, conducted to assess the knowledge, attitude, and practice of preventive measures against COVID-19among antenatal attendees in Ekiti State University Teaching Hospital (EKSUTH), Ado-Ekiti. Data was collected using a self-administered validated questionnaire from consenting participants. This study found that about 87.2%, 79.2% and 74.5% of the pregnant women had good level of knowledge and practice of preventive measures as well as positive attitude towards COVID-19 respectively. The mean age, parity and gestational age of women was 28.45±5.51years, 2.21±1.61 and 27.73±8.99weeks respectively. Younger age group, higher education, being married, late trimester of pregnancy and urban residency were the significant determinants of good knowledge, attitude and practice of COVID-19 preventive measures, $p<0.05$.(Olusola Peter Aduloju et al., 2021).

Study in India, conducted to assess the knowledge, attitude and practice of preventive measures followed against Covid-19 infection among pregnant women attending the antenatal clinic at K S Hegde Medical Academy, Mangalore. Data was collected using a validated questionnaire was provided to the patient. It consisted of 2 parts, demographic data, and 25 questions regarding knowledge, attitude, and practices. A total of 202 pregnant women participated in the study and all the study participants (100 %) were aware of the Covid19 infection pandemic globally. The mean age of the study cohorts was 28 to 32 years, patients residing in urban area were 32.2 % and in rural area were 67.8 %. Most of the participants (72.4 %) had some formal education of minimum of secondary schooling, Majority of pregnant women (49.9) thought that getting pregnant during the pandemic was not safe. Most of the pregnant women (51.8 %) had opinion that if they are infected during pregnancy with Covid-19 infection then there are chances that the baby will get infected by vertical transmission. The knowledge regarding treatment for the virus was inadequate among majority of the participants, 197 women among 202 participants knew that social distancing is essential for preventing the infection, the anxiousness and complications to the baby and the mother was high among the pregnant women (73.9 %), the preventive measures known by participants were washing hands frequently with soap and water or rubbing hands with alcohol-based sanitizers (95.5 %), Many pregnant women preferred staying indoors during lockdown and not visiting public gatherings to prevent getting infected by Covid-19 (97 %).(Supriya Rai1 et al., 2021)

Study in Egypt, A descriptive study was conducted on 415 pregnant women attending antenatal care clinics in Kafrelsheikh, Egypt to assess their knowledge, attitude, and practice regarding coronavirus infection. The

results showed that 75.4% had good knowledge, 95% had a positive attitude, and 43.6% had excellent practice concerning the coronavirus pandemic. Factors such as completing secondary school or above and living in an urban area were associated with higher levels of knowledge, while being 25 years old and residing in an urban area were associated with better preventive practice (Ali et al., 2022).

Study in Turkey, A cross-sectional survey was conducted to assess the attitudes, concerns, and knowledge of near-term pregnant women regarding the COVID-19 pandemic. The study included 172 pregnant women from a single tertiary referral center in Turkey. The women generally trusted authorities (65%) and healthcare staff (92.4%) and had an increased respect for them (82.5%) during the outbreak. Most participants (87.2%) complied with self-quarantine rules. Half of the women felt vulnerable (52%) and expressed concerns (80%). Many women worried about getting infected themselves (35.5%) or transmitting the virus to their baby during delivery (42%). Approximately half of the women were unsure about the safety of breastfeeding during the outbreak (50%). Confusion and doubts regarding the impact of the pandemic on the mode of delivery were reported by 45% of the women. A significant proportion of participants did not know if COVID-19 could cause birth defects (76%) or preterm birth (64.5%). The study suggests the need for counseling and clear information to address misconceptions and concerns of pregnant women during the COVID-19 outbreak (Yassa et al., 2020)

Study in Ethiopia, cross-sectional study was employed among 415 pregnant women attending antenatal care at public hospitals in three Wollega zones, Ethiopia. An interviewer-administered structured questionnaire was used for data collection. This study indicates that more than two-thirds (75.4%; 95%

CI: 71.1–79.3%) and 43.6% of the pregnant women had adequate knowledge and good practice about the coronavirus pandemic, respectively. The pregnant women who attended secondary school and above and were urban residents were more likely to have good knowledge, AOR = 2.99 (1.7–5.0) and 1.6 (1.2–2.7), respectively. Maternal age ≤ 25 yearsand being an urban resident were the two predictors of good practice of preventive measures, AOR = 1.7 (1.2–2.6) and 2.3 (1.3–4.0), respectively.(Merga Besho et al, 2021)

Chapter 3

Methodology

3.1 Study Design

Descriptive cross-sectional questionnaire based study was done to examine knowledge, attitude and practices about COVID-19 from November 2022 to December 2022.

3.2 Study Setting

The study was performed at four Maternal and Child Health Centers (Al-Thawra, Al-Gomhory, Al-Sabeen and Al-Kwuait public hospitals) affiliated with the Sana'a City Ministry of Health and Population, the reasons given for choosing the above setting, as they are the main health centers in Sana'a where women attend for antenatal follow-up, immunization during pregnancy and other reproductive health services. These also represent a wide variety of individuals with various socio-demographic and obstetric features, as well as attendance levels was high.

3.3 Population and Sample of the study

All pregnant women attending antenatal care were enrolled in the study. The sample was 205 pregnant women

3.4 Inclusion and exclusion criteria

- **Inclusion Criteria:**

    The research included all the pregnant women who gave informed consent to participate in the research.

- **Exclusion Criteria:**

    Participants who had a problem with verbal contact and full hearing loss were excluded.

3.5 Sampling method

The sample were selected using convenience sampling was recruited during the study period (2 months) from the above-mentioned setting.

All consenting eligible pregnant women who attended during the study period to receive antenatal care.

3.6 Data collection methods and Tools

The data collection method was face to face interview. The data collection tool was a structured questionnaire: The researcher developed a structured Arabic questionnaire on the knowledge, practice and attitudes of preventive measures against coronavirus infection. Following a review of literature on the WHO guidelines on steps to prevent human to human transmission of COVID-19 infection, the questionnaire was developed and audited by highly qualified staff. It was designed using clear language constructs, keeping in mind the educational level of every woman.

The questionnaire composed of four aspects: (Appendix-A).

1. Socio-demographic characteristics of the pregnant women included age, level of education, place of residence, job and obstetrics data, as parity.

2. Knowledge towards COVID-19 infection and its prevention measures. This includes: 8 questions.

3. Attitudes of participants toward COVID-19 infection. This includes: 9 questions.

4. Practice of preventive measures of COVID-19 infection. This includes: 5 questions.

3.7 Statistical analysis

Statistical package for the social science (SPSS) software version 26 was used to data entry and analysis. Percent and frequency were used. Frequency and percentage were used for descriptive statistics. Chi square test was applied to test relationship among variables. P-value < 0.05 was considered significant.

Scoring System: knowledge and practice of preventive measures was answer either Yes or No with additional l don't' now optional.

3.8. Ethical considerations

This study was approved by Faculty of medicine to conducted this study, also litter was sent to hospitals managers to agree to participants on the study. (Appendix-B). The purposes of the study were explained to pregnant women and oral consent form was obtain. (Appendix-A).

Chapter 4
Results

4. Results

During this study (205) participants about Knowledge, Attitude & Practice Toward Corona Virus Infection among Pregnant Women Attending Antenatal care at public hospitals in Sana'a-Yemen, were included in the study.

4.1 Demographic data:

1- Age :

Table (1): Distribution of participant by Age

Age	Frequency	Percent
From 14-17 year	2	1%
From 18 - 22 year	30	14.6%
From 23 - 27 year	59	28.8%
From 28 - 32 year	42	20.5%
From 33 - 37 year	51	24.9%
From 38 - 42 year	21	10.2%
Total	205	100%

From the Previous Table, we can find out that the highest percentage of participants was between 23 - 27 year (28,8%). Second most group was people between 33 - 37 years (24.9%), while the group from 28 - 32 year (20.5%), while (14.6%) of them were from 18 - 22 year, and (10.2%) of them were from 38 - 42 year, finally the age group from 14 - 17 year (1%).
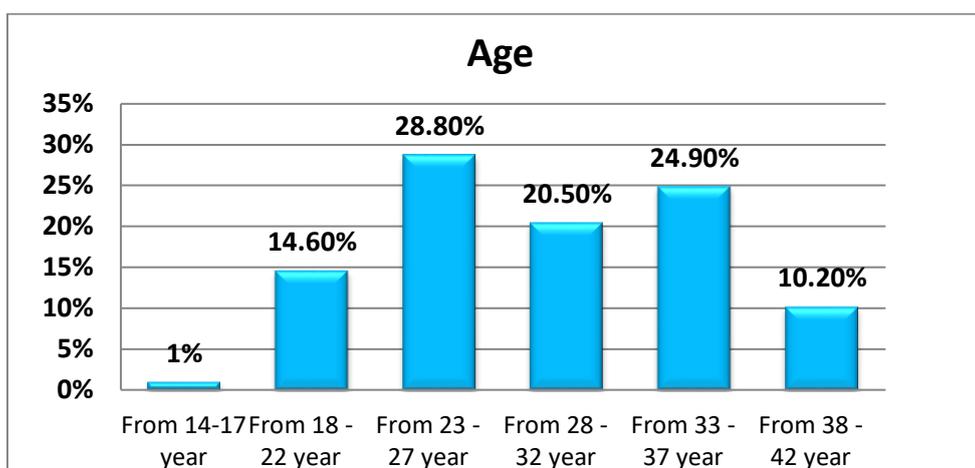
Figure(1) : Distribution of participant by Age

2- Geographical Area:

Table (2) Distribution of the participants according to Geographical area

Geographical area	Frequency	Percent
Rural	41	20%
Urban	164	80%
Total	205	100%

The above Table present the distribution Geographical area in studied participation high percent (80%) were Urban, while the Rural percent was (20%).
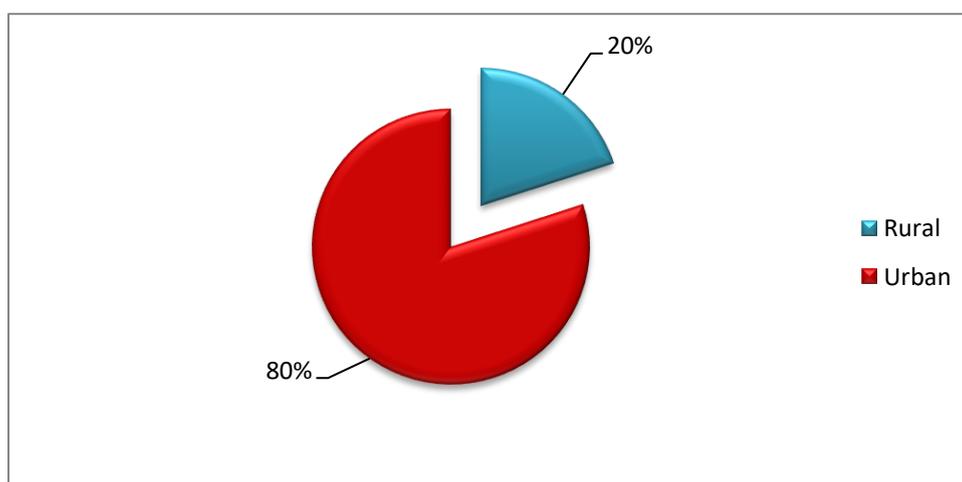
Figure(2): Distribution of the participants according to Geographical area

3- Education level:

Table (3) Distribution of the participants according to Education level

Education level	Frequency	Percent
Educated	153	74.6%
Not Educated	52	25.4%
Total	205	100%

The above Table present the distribution Education level in studied participation high percent (74.6%) were Educated, while the Not Educated percent was (25.4%).
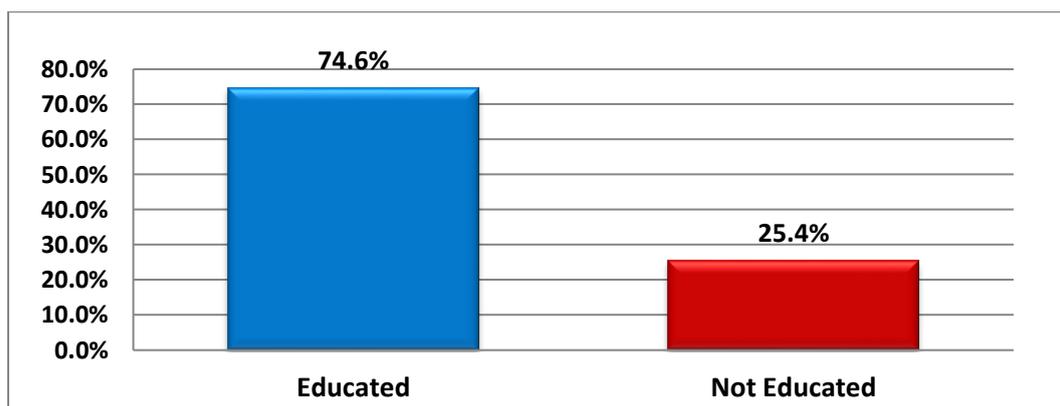
Figure(3): Distribution of the participants according to Education level

4- Occupation:

Table (4) Distribution of the participants according to Occupation

Occupation	Frequency	Percent
Skilled	4	2.0%
Student	9	4.4%
House Wife	178	86.8%
Employed	14	6.8%
Total	**205**	**100%**

The above Table present the distribution of the Occupation in studied participation, high percent (86.8%) were (House Wife), while the (Employed) percent was (6.8%), and (Student) percent was (4.4%) , and (Skilled) (2%).
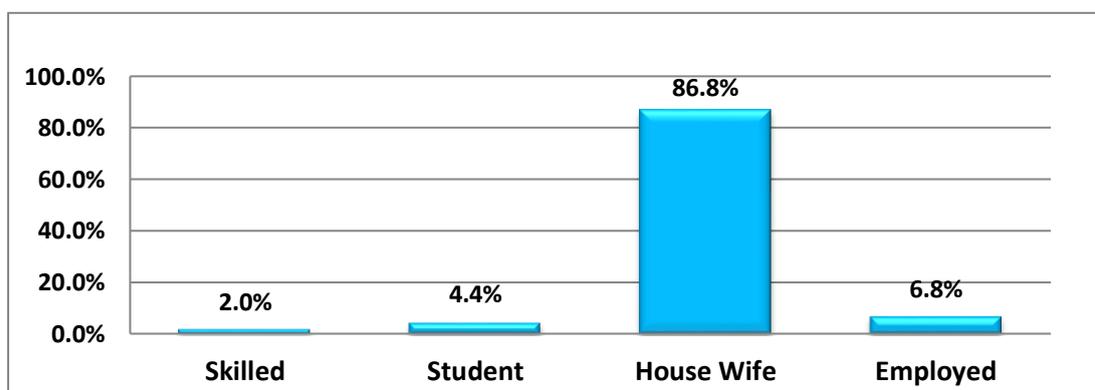
Figure(4): Distribution of the participants according to Occupation

5- Parity:

Table (5) Distribution of the participants according to Parity

Parity	Frequency	Percent
G1	46	22.4%
G2	47	22.9%
G3 and above	112	54.6%
Total	**205**	**100%**

The above Table present the distribution of the Parity in studied participation, high percent (54.6%) were (G3 and above), while the (G2) percent was (22.9%) , and the (G1) percent was (22.4%).
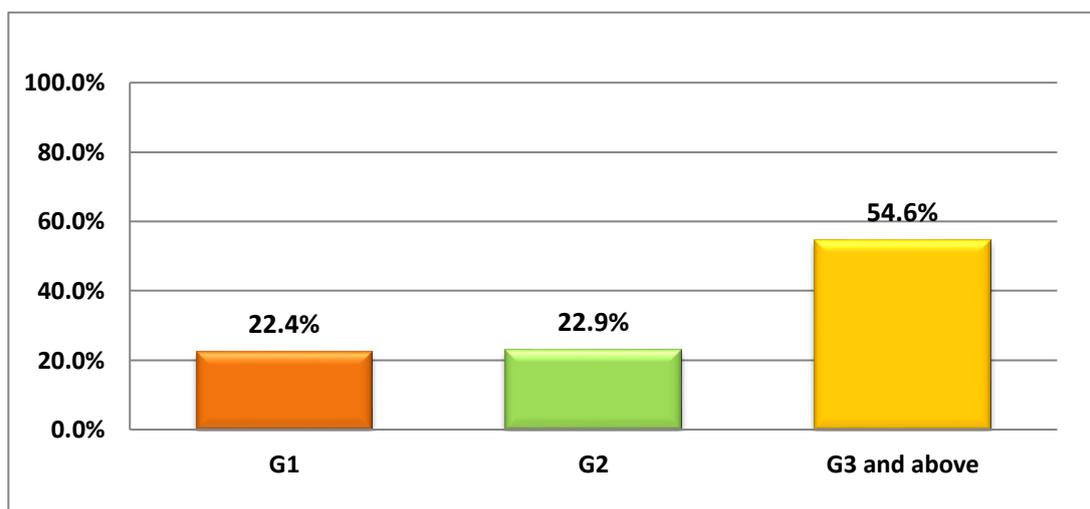
Figure(5): Distribution of the participants according to Parity

6- Gestational age:

Table (6) Distribution of the participants according to Gestational age

Gestational age	Frequency	Percent
Up to 14 weeks	3	1.5%
14 to 28 weeks	32	15.6%
28 weeks to 37 weeks	45	22%
37 weeks to 40 weeks	125	61%
Total	**205**	**100%**

The above Table present the distribution of the Gestational age in studied participation, high percent (61%) were (37 weeks to 40 weeks), while the (28 weeks to 37 weeks) percent was (22%) , and the (14 to 28 weeks) percent was (15.6%), and (Up to 14 weeks) percent was (1.5%).
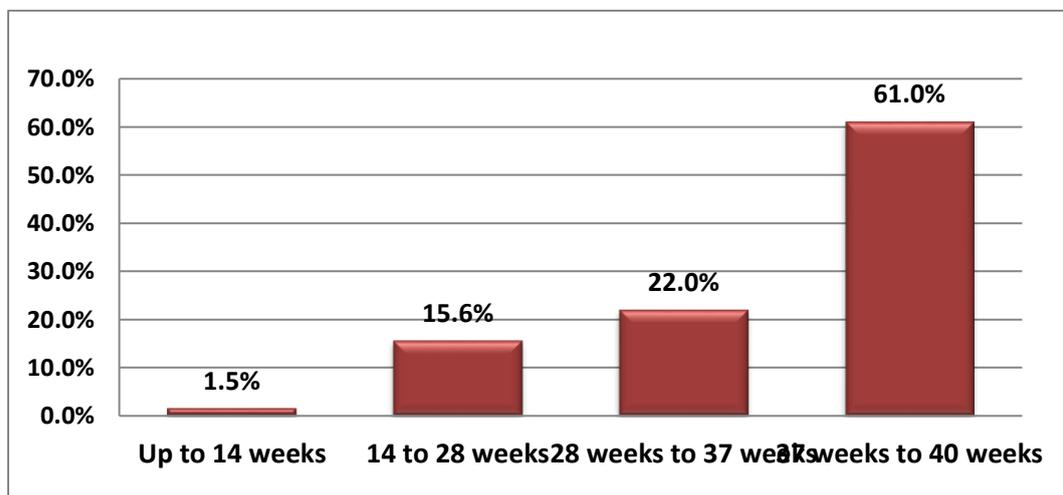
Figure(6): Distribution of the participants according to Gestational age

7- History of travel in the recent past:

Table (7) History of travel in the recent past

	Frequency	Percent
Yes	34	16.6%
No	171	83.4%
Total	**205**	**100%**

From the previous table, (83.4%) of samples there is do not had history travel in the recent past, and (16.6%) have history of travel in the recent past.
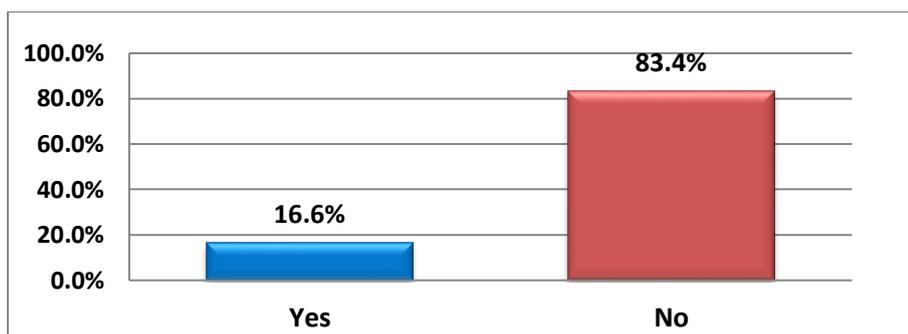
Figure(7): History of travel in the recent past

8- Presence of co-morbid conditions:

Table (8) Presence of co-morbid conditions (GDM < bronchial asthma, allergies, hypertension, tuberculosis)

	Frequency	Percent
Yes	45	22%
No	160	78%
Total	**205**	**100%**

From the previous table (78%) of samples do not get Presence of co-morbid conditions (GDM < bronchial asthma, allergies, hypertension, tuberculosis), and (22%) have get Presence of co-morbid conditions (GDM < bronchial asthma, allergies, hypertension, tuberculosis).
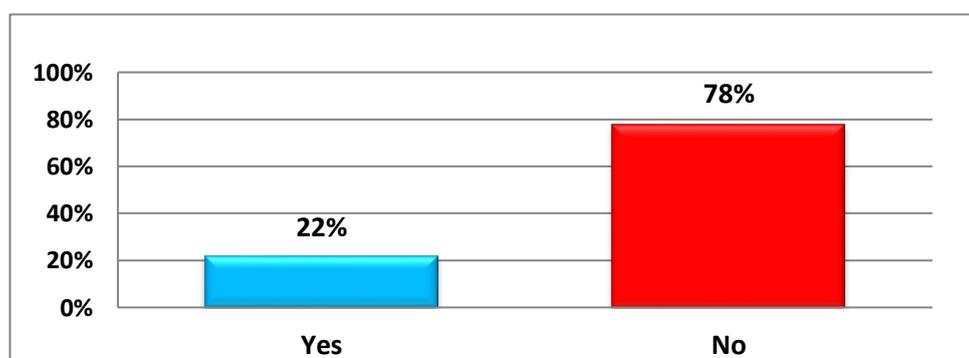
Figure(8): Presence of co-morbid conditions (GDM < bronchial asthma, allergies, hypertension, tuberculosis)

10- Latest information about Covid-19 pandemic:

Table (9) Latest information about Covid-19 pandemic

	Frequency	Percent
Audible and visual media	124	60.5%
Newspaper or social media	36	17.6%
Relatives & friends	45	22.0%
Total	**205**	**100%**

The above Table present the distribution the Latest information about Covid-19 pandemic, high percent (60.5%) were Audible and visual media, while the Relatives & friends percent was (22%), and Newspaper or social media percent was (17.6%).
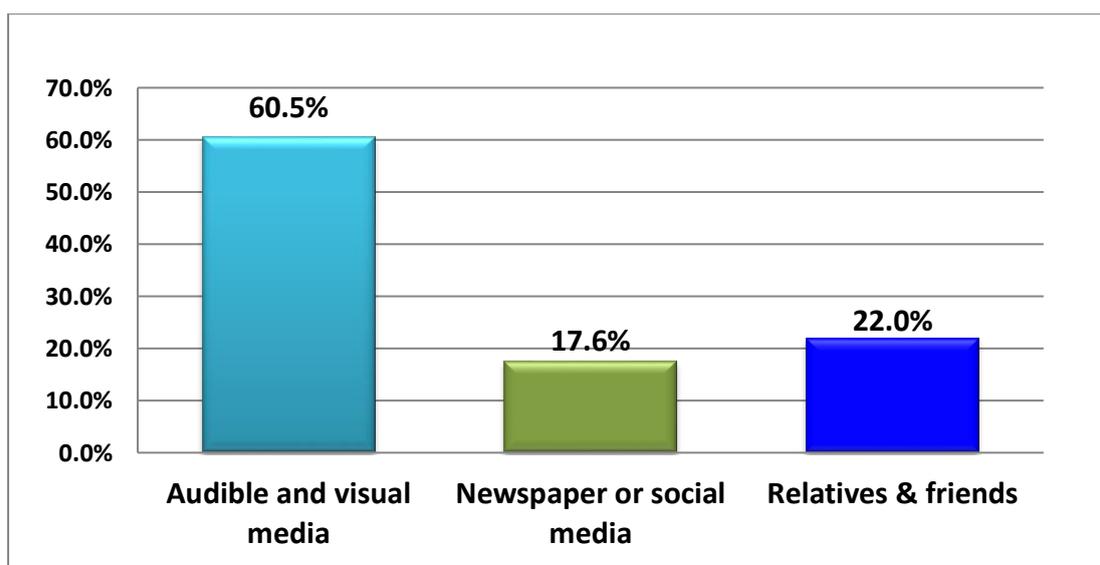
Figure(9): Latest information about Covid-19 pandemic

4.2 Knowledge of pregnant women about Covid-19:

Table (10) : Distribution of the Knowledge about Covid-19 among the participants

N	Variable	General Knowledge					
		Yes		No		I don't know	
		Freq.	%	Freq.	%	Freq.	%
1	Are you aware of ongoing COVID - 19 infection pandemic?	167	81.5%	26	12.7%	12	5.9%
2	Getting pregnant is safe during the COVID 19 pandemic?	36	17.6%	110	53.7%	59	28.8%
3	There are chances of transmission of corona virus from mother to baby during pregnancy?	84	41.0%	45	22.0%	76	37.1%
4	Visiting a health care worker for regular antenatal check-up increases the risk of transmission of corona virus?	104	50.7%	47	22.9%	54	26.3%
5	The risk of infection and complications is increased if I have complications like diabetes, asthma and anemia in this pregnancy?	156	76.1%	14	6.8%	35	17.1%
6	The main clinical symptoms of COVID - 19 are fever, fatigue, dry cough and myalgia?	171	83.4%	19	9.3%	15	7.3%
	Total	**58.4%**		**21.2%**		**20.4%**	
	Good Knowledge	**64.4%**		**Poor Knowledge**		**35.6%**	

From the previous table we found that (64.4%) of participants answered correctly about the Knowledge about Covid-19 among pregnant women was "The main clinical symptoms of COVID - 19 are fever, fatigue, dry cough and myalgia" answered Yes by 171 (83.4%), followed by " Are you aware of ongoing COVID - 19 infection pandemic?", the answered Yes 167(81.5%), followed by "The risk of infection and complications is increased if I have complications like diabetes, asthma and anemia in this pregnancy?", answered Yes 156 (76.1%), followed by "Getting pregnant is safe during the COVID 19 pandemic?", answered correctly by No 110 (53.7%), followed by "There are chances of transmission of corona virus from mother to baby during

pregnancy?", answered Yes 84 (41%). And most of the pregnant women answered wrong by Yes 104 (50.7%) for "Visiting a health care worker for regular antenatal check-up increases the risk of transmission of corona virus?".

Table (11): knowledge about spread of COVID - 19 virus

	Frequency	Percent
Spreads via respiratory droplets of infected individuals.	32	15.6%
Through contact with infected individuals	20	9.8%
Touching the infected surfaces	10	4.9%
None of the above	16	7.8%
All of the above	127	62.0%
Total	**205**	**100%**

The previous table shows that (62%) of people knew about spread of COVID - 19 virus, and (15.6%) agreed that the Spreads via respiratory droplets of infected individuals, while (9.8%) of them agreed that through contact with infected individuals, and (7.8%) answered None of the above, and only (4.9%) agreed that touching the infected surfaces.
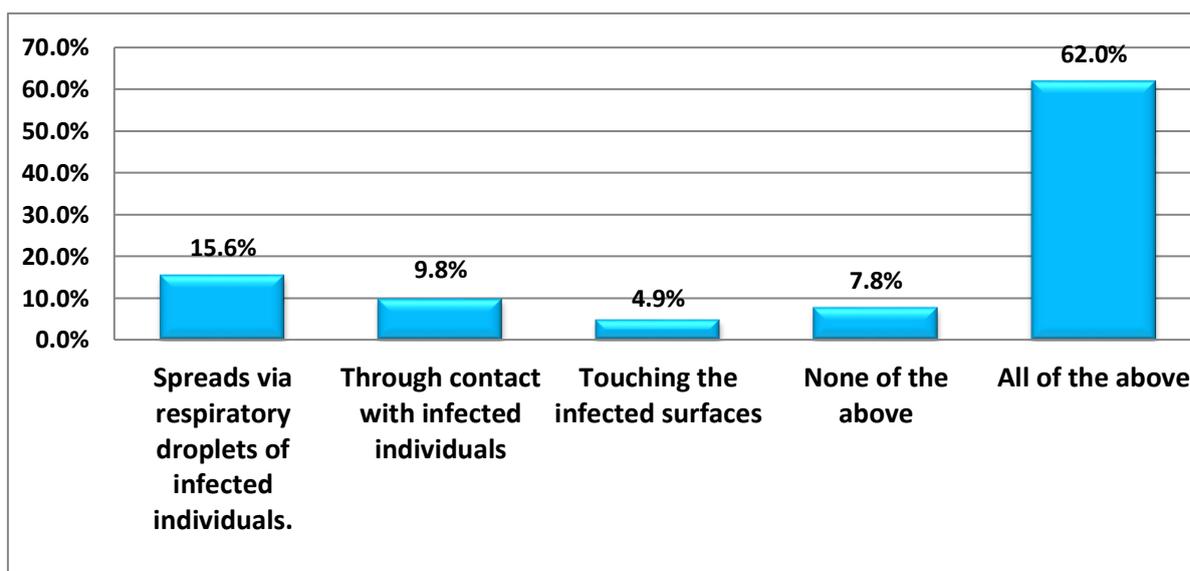
Figure(10): knowledge about spread of COVID - 19 virus

Table (12) : knowledge about the treatment for COVID 19

	Frequency	Percent
Antibiotics	32	15.6%
Vaccines	57	27.8%
Don't know	81	39.5%
No treatment	35	17.1%
Total	**205**	**100%**

From the previous table we found that (39.5%) of participants Don't know the treatment for COVID 19, and (27.8%) agreed that the treatment is Vaccines, while (17.1) answered No treatment, while (15.6%) saw the treatment is Antibiotics.
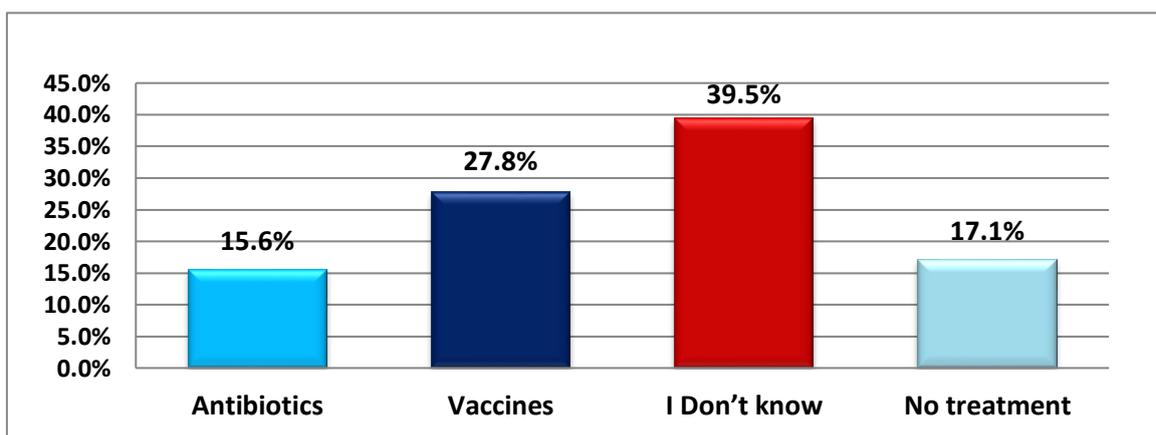
Figure(11): knowledge about the treatment for COVID - 19

Table (13) : Relation between socio-demographic characteristics of the participants and their knowledge about COVID-19 (n= 205).

Demographic Data		Level of Knowledge		P-value
		Good	**Poor**	
Age	14-17	0.5%	0.5%	.171
	18-22	9.8%	4.9%	
	23-27	22.4%	6.3%	
	28-32	16.6%	3.9%	
	33-37	18.5%	6.3%	
	38-42	7.8%	2.4%	
Geographical area	Rural	14.1%	5.9%	.016
	Urban	61.5%	18.5%	
Education	Educated	58.5%	16.1%	.000
	Not educated	17.1%	8.3%	
Occupation	Skilled	1%	1%	.458
	Student	3.9%	0.5%	
	House Wife	65.9%	21%	
	Employed	4.9%	2%	
Parity	G1	17.6%	4.9%	.796
	G2	16.1%	6.8%	
	G3 and above	42%	12.7%	
Gestational age	Up to 14 weeks	1%	0.5%	.027
	14 to 28 weeks	10.7%	4.9%	
	28 to 37 weeks	16.6%	5.4%	
	37 to 40 weeks	47.3%	13.7%	
History of travel in the recent past	Yes	13.2%	3.4%	.312
	No	62.4%	21%	
Presence of co-morbid conditions	Yes	17.6%	4.4%	.545
	No	58%	20%	
Latest information about Covid-19	Audible and visual media	42.4%	18%	.008
	Newspaper or social media	15.1%	2.4%	
	Relatives & friends	18%	3.9%	

From the previous table showed that there are differences in the knowledge about COVID19 related to the demographic differences for (Geographical area & Education & Gestational age & Latest information about Covid-19) the (P-value <0.05), as the knowledge is more in the Geographical area in Urban area (61.5%) , Knowledge also is shown to be more in Educated, also Gestational age show more knowledge in 37 to 40 weeks, Knowledge also is shown for Latest information about Covid-19 in Audible and visual media.

Table (14): level knowledge about COVID-19 among the participants.

	Frequency	Percent
Good knowledge	132	64.4%
Poor knowledge	73	35.6%
Total	**205**	**100%**
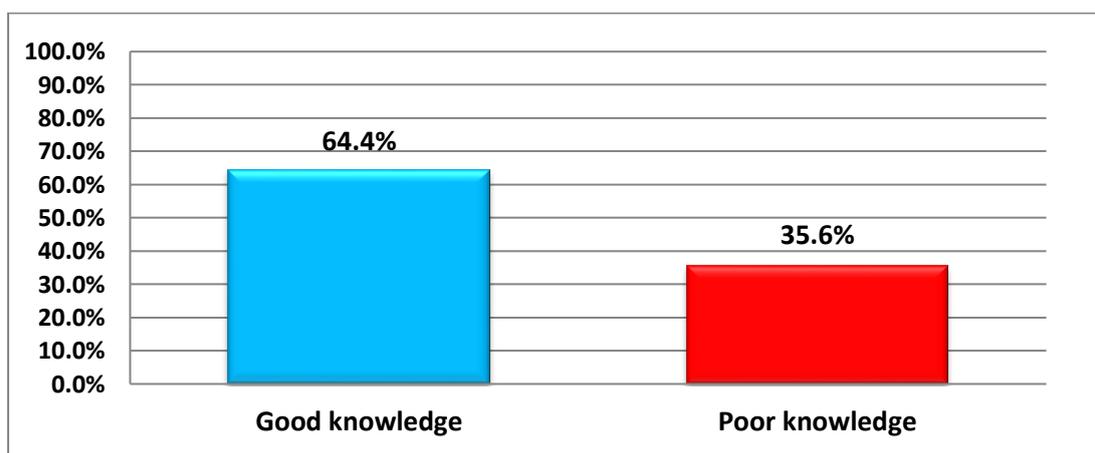
Figure(12) : level knowledge of the participants

From the previous table and figure: Percentage of knowledge of participants was Good knowledge in 64.4% and Poor knowledge in 35,6% which may be due to widespread of awareness through social media and TV/radio during the outbreak of the disease.

4.3 Attitude of pregnant women about Covid-19:

Table (15): Distribution of the Attitude about Covid-19 among the participants

N	Variable	Level Attitude					
		Yes		No		I don't know	
		Freq.	%	Freq.	%	Freq.	%
1	Social distancing is necessary during this pandemic as I am pregnant?	186	90.7%	8	3.9%	11	5.4%
2	Changes in my diet and taking additional nutritional supplements helps in developing immunity against corona virus?	188	91.7%	2	1.0%	15	7.3%
3	It is better to maintain social distancing with relatives and neighbors who have history of travel and contact history?	168	82.0%	16	7.8%	21	10.2%
4	Anxious about increased chance of getting infected by COVID 19 to the mother and baby?	158	77.1%	35	17.1%	12	5.9%
5	There can be complications in my pregnancy if I am infected with corona virus?	146	71.2%	15	7.3%	44	21.5%
6	Testing for COVID 19 is necessary for all pregnant women?	129	62.9%	33	16.1%	43	21.0%
7	Women should avoid getting pregnant during the COVID 19 pandemic?	103	50.2%	60	29.3%	42	20.5%
8	Social distancing is sufficient to control transmission of corona virus infection?	123	60.0%	54	26.3%	28	13.7%
9	I think lockdown is essential to bring down transmission of this pandemic?	154	75.1%	22	10.7%	29	14.1%
	Total	**73.4%**		**13.3%**		**13.3%**	
	Good Attitude	**73.4%**		**Poor Attitude**		**26.6%**	

From the previous table we found that (73.4%) of participants answered correctly about the Attitude of Covid-19 among pregnant women was "Changes in my diet and taking additional nutritional supplements helps in developing immunity against corona virus?" answered Yes by 188 (91.7%), followed by " Social distancing is necessary during this pandemic as I am pregnant?", the

answered Yes 186(90.7%), followed by "It is better to maintain social distancing with relatives and neighbors who have history of travel and contact history?", answered Yes 168 (82%), followed by "Anxious about increased chance of getting infected by COVID 19 to the mother and baby?", answered correctly by No 158 (77.1%), followed by "I think lockdown is essential to bring down transmission of this pandemic?", answered Yes 154 (75.1%). followed by "There can be complications in my pregnancy if I am infected with corona virus?", answered Yes 146 (71.2%). And see in table above.

Table (16) : Relation between socio-demographic characteristics of the participants and their Attitude about COVID-19 (n= 205)

Demographic Data		Level of Attitude		P-value
		Good	Poor	
Age	14-17	1%	0%	.688
	18-22	13.7%	1%	
	23-27	26.8%	2%	
	28-32	19%	1.5%	
	33-37	23.4%	1.5%	
	38-42	8.8%	1.5%	
Geographical area	Rural	16.6%	3.4%	.002
	Urban	76.1%	3.9%	
Education	Educated	71.2%	3.4%	.017
	Not educated	21.5%	3.9%	
Occupation	Skilled	1%	1%	.003
	Student	4.4%	0%	
	House Wife	80.5%	6.3%	
	Employed	6.8%	0%	
Parity	G1	21.5%	1%	.246
	G2	21%	2%	
	G3 and above	50.2%	4.4%	
Gestational age	Up to 14 weeks	1%	0.5%	.613
	14 to 28 weeks	14.6%	1%	
	28 to 37 weeks	19.5%	2.4%	
	37 to 40 weeks	57.6%	3.4%	
History of travel in the recent past	Yes	16.6%	0%	.000
	No	76.1%	7.3%	
Presence of co-morbid conditions	Yes	20.5%	1.5%	.697
	No	72.2%	5.9%	
Latest information about Covid-19	Audible and visual media	56.1%	4.4%	.235
	Newspaper or social media	15.6%	2%	
	Relatives & friends	21%	1%	

From the previous table showed that there are differences in the Attitude about COVID19 related to the demographic characteristics in relation to their (Geographical area & Education & Occupation & History of travel in the recent past) the (P-value <0.05), as the Attitude is more in the Geographical area in Urban area (76.1%), Attitude also is shown to be more in Educated (71.2%), also Occupation show more Attitude in House Wife (80.5%), Attitude also is shown for No History of travel in the recent past (76.1).

Table (17): level Attitude about COVID-19 among the participants.

	Frequency	Percent
Good Attitude	150	73.4%
Poor Attitude	55	26.6%
Total	**205**	**100%**
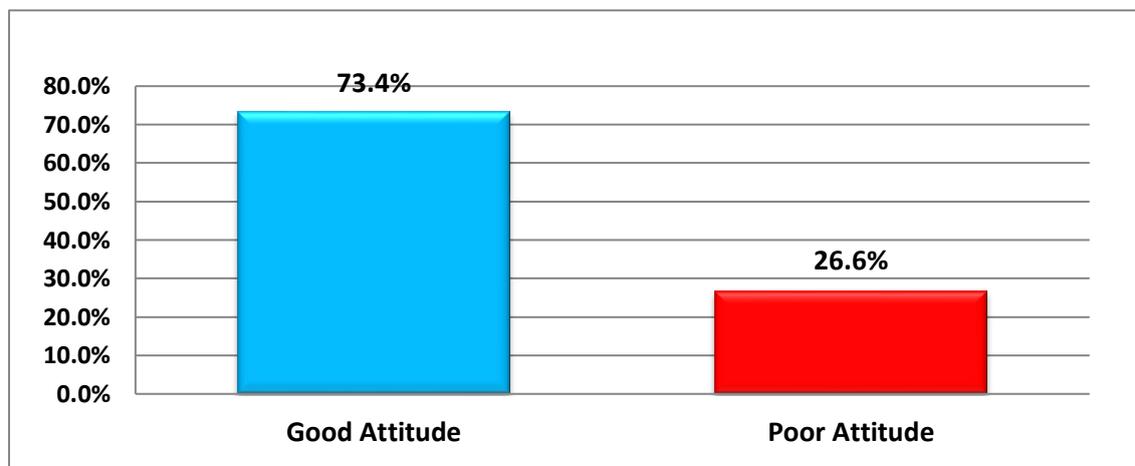
Figure(13) : level Attitude of the participants

From the previous table and figure: Percentage of Attitude of participants was Good Attitude in 73.4% and Poor Attitude in 26,6%.

4.4 Practice of pregnant women about Covid-19:

Table (18): Distribution of the Practice about Covid-19 among the participants

N	Variable	Level Practice					
		Yes		No		I don't know	
		Freq.	%	Freq.	%	Freq.	%
1	I am maintaining social distance as I am pregnant	165	80.5%	23	11.2%	17	8.3%
2	I am washing hands frequently and rubbing hands with alcohol-based sanitizer frequently to prevent covid19 infection	177	86.3%	20	9.8%	8	3.9%
3	I am staying indoors most of the time during lockdown and not visiting public gathering to prevent getting infected by COVID 19	170	82.9%	26	12.7%	9	4.4%
4	Using herbal medicines and traditional supplements is helping me prevent infection during pregnancy	129	62.9%	35	17.1%	41	20.0%
	Total	**78.2%**		**12.7%**		**9.2%**	
	Good Practice	**78.2%**		**Poor Practice**		**21.8%**	

From the previous table we found that (78.2%) of participants answered correctly about the Practice of Covid-19 among pregnant women was "I am washing hands frequently and rubbing hands with alcohol-based sanitizer frequently to prevent covid19 infection?" answered Yes by 177 (86.3%), followed by " I am staying indoors most of the time during lockdown and not visiting public gathering to prevent getting infected by COVID 19?", the answered Yes 170(82.9%), followed by " I am maintaining social distance as I am pregnant?", the answered Yes 165(80.5%), followed by " I Using herbal medicines and traditional supplements is helping me prevent infection during pregnancy?", the answered Yes 129(62.9%),

Table (19) : Relation between socio-demographic characteristics of the participants and their Practice about COVID-19 (n= 205)

Demographic Data		Level of Practice		P-value
		Good	Poor	
Age	14-17	1.%	0%	.530
	18-22	13.7%	1%	
	23-27	25.4%	3.4%	
	28-32	18.5%	2%	
	33-37	23.9%	1%	
	38-42	9.3%	1%	
Geographical area	Rural	17.1%	2.9%	.012
	Urban	74.6%	5.4%	
Education	Educated	69.3%	5.4%	.111
	Not educated	22.4%	2.9%	
Occupation	Skilled	2%	0%	.166
	Student	2.9%	1.5%	
	House Wife	80%	6.8%	
	Employed	6.8%	0%	
Parity	G1	21.5%	1%	.138
	G2	20%	2.9%	
	G3 and above	50.2%	4.4%	
Gestational age	Up to 14 weeks	1.5%	0%	.385
	14 to 28 weeks	14.6%	1%	
	28 to 37 weeks	19%	2.9%	
	37 to 40 weeks	56.6%	4.4%	
History of travel in the recent past	Yes	16.1%	0.5%	.004
	No	75.6%	7.8%	
Presence of co-morbid conditions	Yes	21%	1%	.014
	No	70.7%	7.3%	
Latest information about Covid-19	Audible and visual media	57.1%	3.4%	.490
	Newspaper or social media	14.6%	2.9%	
	Relatives & friends	20%	2%	

From the previous table showed that there are differences in the Practice about COVID19 related to the demographic characteristics in relation to their (Geographical area & History of travel in the recent past & Presence of co-morbid conditions) the (P-value <0.05), as the Practice is more in the Geographical area in Urban area (74.6%), Practice also is shown to be more in No History of travel in the recent past (75.6).

Table (20): level Practice about COVID-19 among the participants.

	Frequency	Percent
Good Practice	160	78.2%
Poor Practice	45	21.8%
Total	**205**	**100%**
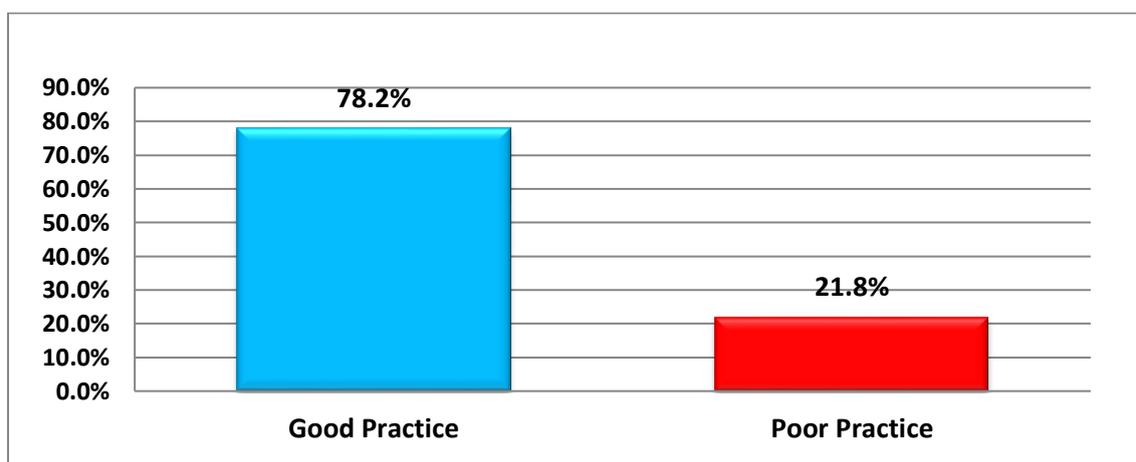
Figure(14) : level Practice of the participants

From the previous table and figure: Percentage of Practice of participants was Good Practice in 78.2% and Poor Practice in 21,8%.

Table (21) : Practice to prevent spreading the infection of COVID 19 for wearing facial mask only in public places & gatherings

Wearing facial mask only in public places & gatherings	Frequency	%
Always	53	25.9%
Most of the time	96	46.8%
Not always	37	18.0%
Never	19	9.3%
Total	**205**	**100%**

From the previous table: We can see a high level of proper practice as 46.8% of participants wearing facial mask only in public places & gatherings (Most of

the time), and 25.9% Always wearing facial mask, and (18%) Not always wearing facial mask , and (9.3%) Never wearing facial mask only in public places & gatherings.
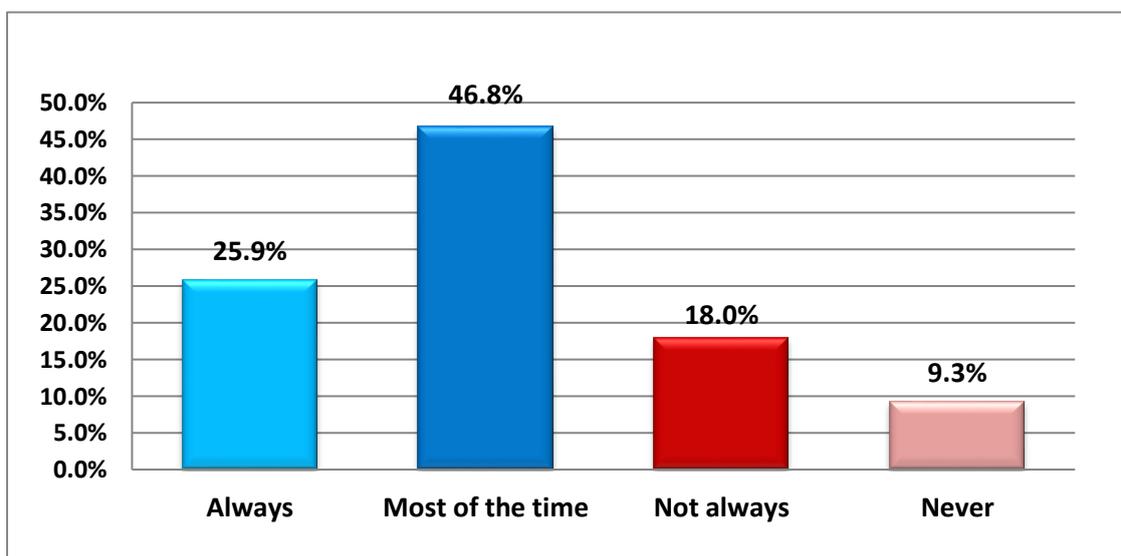
Figure(15) : Practice to prevent for wearing facial mask

Chapter 5
Discussion

5. Discussion

This chapter discusses our results and compare them to other studies' results and give possible reasons for the differences. And section is discussed in three aspects: knowledge, attitude and practice.

Regarding demographic characteristics of studied subjects, more than two thirds (74.6%) of studied subjects was educated, while more than two thirds of them were living in urban area and the majority of them (86.8%) were housewives. These findings were in the same line with Nwafor et al.(2020), who studied "Knowledge and practice of preventive measures against COVID-19 infection among pregnant women in a low-resource African setting", more than one third had secondary education and more than half reside in urban area.

5.1 Knowledge:

The result of this study shows that the overall knowledge of Corona Virus Infection among Pregnant Women Attending Antenatal care at public hospitals in Sana'a-Yemen was 64.4% correct rate. Which is less than that of Egypt with the mean knowledge score was 16.39 out of 23 with 71.26% correct rate (Ali et al., 2022).

This study showed significant differences in knowledge regarding Geographical area & Education & Gestational age & Latest information about Covid-19) the (P-value <0.05), as the knowledge is more in the Geographical area in Urban area (61.5%), Knowledge also is shown to be more in Educated, also Gestational age show more knowledge in 37 to 40 weeks, Knowledge also is shown for Latest information about Covid-19 in Audible and visual media. In contrast to a study in Nigeria where (21 - 30-year) age-group showed the higher knowledge which could be attributed to the more usage of social media in this age group; widows with 75% reported high knowledge (p. value <0,000); people in college or post graduate with 53.4% reported higher knowledge (p. value <0.001) (Olusola Peter Aduloju et al., 2021).

This study showed that the vast majority of the participants were aware about the different routes of transmission of the virus as (97%). (94%) and (90%) of them agreed that the virus can be transmitted by the contact with infected people, air droplets and contact with contaminated surfaces respectively. Which is more acceptable than the result of the same study in Nigeria (88.5%), (93%) and (85.6%) respectively. (Olusola Peter Aduloju et al., 2021).

5.2 Attitude:

The study, the odds of having good attitude of COVID 19 was (73.4%) higher among women. This finding is supported with the findings from the studies conducted in Study in Egypt 95% had a positive attitude, (Ali et al., 2022). And also supported with the findings from Aziza Ibrahim Mohamed (2020) who studied "Pregnant Women's Knowledge, Attitude and Self-Protective Measures Practice regarding Corona virus prevention: Health Educational Intervention"

When the participants in this study were asked about the existence of the coronavirus as a causative agent of COVID-19 or they thought it is only rumors and the disease is caused by another things as 5G network and sarine gas; (84%) of them did believe in coronavirus existence while (11%) of them not sure about the real existence of the virus and (5%) denied its existence. This result is more acceptable than that of a similar study in Jordon where (21.0%) did believe that 5G network had a role in the spread of the disease and (47.9%) believed that COVID-19 is part of a global conspiracy. Many misinformation was corrected and people became more aware about the virus. (89.9%) of the participants believes that the early diagnosis of the disease plays an important role in controlling and management of the disease which is more than that of a study in Nigeria and Egypt with (81%) had the same belief.

The vast majority (92%) of the participants believe in the importance of preventive measures in limiting the spread of the disease which is approach to a study in Central Nigeria (92.7%) as the different sources of information intensify on the importance of preventive measures as no curable treatment nor vaccine were proved yet.

Most of the participant thought that the authorities should enact laws in order to limit the spread of the disease as prohibition of traveling (85%), isolation of diagnosed cases in special hospitals (84.3%), closure of institutes as schools and universities and public areas (89.5%) and imposing quarantine in case of the disease spreading with the least acceptable action was about closure of the mosques (74.4%) which is more than that of Nigeria where only (72.7%) agreed with the government stay-at-home order.

5.3 Practice:

Best practices were in increase care of personal hygiene, washing hands with water and soap, avoiding kissing and hugging with (95.4%). (93.0%), (89.5%) respectively and the least practices were in avoiding going to work and using traditional medicine (64.3%), (50.3%) respectively. 49% wear mask always when they get out home and 28.5% wore it only in public and crowded places while in China (98%) wore mask when going out also its different from that In Nigeria (92.7%), (96.4%) and (82.3%) practicing social distancing/self-isolation, improved personal hygiene and using face mask respectively , In Malaysia (83.4%) avoid crowds, (87.8%) practicing proper hand hygiene but wearing of face mask was less practiced with (51.2%);in Vietnam 75.8% practiced all six measures for preventing the spread of the virus. The most common practice was washing hands frequently (98.5%), followed by wearing a face mask frequently (95.8%), covering mouth and nose when coughing or sneezing (93.1%), avoiding crowded places (92.7%), keeping a two-meter

distance from another person (90.3%), and avoid touching face (90.1%), and 81.8% of participants are of intermediate income, 10.8% of low income.

COVID-19 is pandemic disease begins on 11 March, 2020; pregnancy suppresses the immune system, making pregnant women more vulnerable to COVID-19 infection and severe sickness. Pregnant women are particularly vulnerable to infectious diseases that can cause both maternal and fetal adverse outcomes, compared to the non-pregnant counterparts. During pregnancy, women experience a series of immunological transformations that allow the immune system to tolerate and support the growing fetus while still maintaining antimicrobial defense and tissue repair Bouaziz et al. (2020), who studied "COVID-19 in pregnancy: What do we really know?" , Hence this might be the first study, conducted in our country to evaluate Knowledge, attitude, and practices among Pregnant women against COVID-19 disease during the third wave of this pandemic.

Regarding demographic characteristics of studied subjects, more than two thirds (74.6%) of studied subjects was educated, while more than two thirds of them were living in urban area and the majority of them (86.8%) were housewives. These findings were in the same line with Nwafor et al.(2020), who studied "Knowledge and practice of preventive measures against COVID-19 infection among pregnant women in a low-resource African setting", more than one third had secondary education and more than half reside in urban area.

Our study findings showed That most of women had poor knowledge about the mode of spread of infection via respiratory droplets most of them (62%) choose all of the above while more than two thirds of them (76.1%) had a good knowledge about the risk of infection and complications is increased if they have complications like diabetes, asthma and anemia in their pregnancy.

In this study, the odds of having good attitude of COVID 19 was (92.7%) higher among women. This finding is supported with the findings from the studies conducted in Aziza Ibrahim Mohamed (2020) who studied "Pregnant Women's Knowledge, Attitude and Self-Protective Measures Practice regarding Corona virus prevention: Health Educational Intervention"

In the current study more than half of the study participants had good practice (80.5%) of women were maintaining social distance and (86.3%) were practicing hand washing and also use of alcohol-based sanitizer. The findings of Supriyo Rai.(2021) who studied" Knowledge, Attitude and Practice towards the Corona Virus (COVID-19) Pandemic among the Pregnant Women" showed that (95.5 %) of women maintained social distance and practiced hand washing and also use of alcohol-based sanitizer.

Chapter 6 Conclusions and Recommendations

6.1 Conclusions

This study was conducted in June 2023 in order to To assess the knowledge, attitude and practices about COVID-19 among pregnant women; the result of this study shows the following:

- The majority of pregnant women (53.7%) thought that getting pregnant during the pandemic was not safe.

- 90.7% of pregnant women had good attitude towards the preventive measures against the infection.

- The preventive measures known by participants were washing hands frequently with soap and water or rubbing hands with alcohol-based sanitizers (86.3 %).

- The preventive of staying indoors most of the time during lockdown and not visiting public gathering to prevent getting infected by COVID 19 (82.9%).

- The preventive of using herbal medicines and traditional supplements is helping me prevent infection during pregnancy (62.9%).

- There was significant association between demographic characteristics and (Geographical area & Education & Gestational age & Latest information about Covid-19) and level of knowledge (P-value <0.05). And there were no significant association between others demographic characteristics and level of knowledge (p-value >0.05).

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- There were significant association between (Geographical area & History of travel in the recent past & Presence of co-morbid conditions) and level of Practice (p-value <0.05).

6.2 Recommendations:

For Ministry of Public Health and Population:

1. Should increase health education and counseling for pregnant women to improve the level of knowledge about COVID-19 especially its effects on pregnancy.
2. Should extend media campaigns and give instructional booklets and videos to increase the level of attitude about COVID-19 in pregnant women especially housewives, uneducated individuals and those residing in rural areas.

For Health care providers:

1. Should give more attention on educating pregnant women at any point of contact.

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Appendices

Appendix 1

Appendix-A: Informed consent and Questionnaire

Knowledge, Attitude & Practice Toward Corona Virus Infection among Pregnant Women Attending Antenatal care at public hospitals in Sana'a-Yemen

Appendix-A1: Arabic version

استبانة حول

المعارف والمواقف والممارسات تجاه عدوى فيروس كورونا بين النساء الحوامل اللاتي يترددن على مراكز رعاية ما قبل الولادة في المستشفيات العامة في صنعاء-اليمن

الموافقة الرسمية   Informed consent

الاخت/الوالدة: انا باحث من كلية الطب البشري, جامعة ٢١ سبتمبر للعلوم الطبية والتطبيقية. اقوم بعمل بحث في مجال الطب البشري ـ قسم النسائية، ونجري هذا البحث بموافقة كلية الطب البشري, جامعة ٢١ سبتمبر للعلوم الطبية والتطبيقية. ونهدف من خلال بحثنا هذا إلى التحري عن **المعارف والمواقف والممارسات تجاه عدوى فيروس كورونا بين النساء الحوامل** . وندون بعض الملاحظات في الاستبيان..

المعلومات التي سنأخذها منكى ستحاط بالسرية التامة وفقا لأخلاقيات البحث العلمي، ولن تتأثر في مهنتك أو عملك بما سوف تدلي به من معلومات..

والآن، هل ترغبي بالاستفسار عن أي شيء في البحث؟

الموافقة

هل توافقي على المشاركة في هذا البحث؟

نعم أوافق←استكمل

لا أوافق←أنهي المقابلة

التركيبة السكانية الاجتماعية		
العمر	١٤ - ١٧ سنة	
	١٨ - ٢٢ سنة	
	٢٣ - ٢٧ سنة	
	٢٨ - ٣٢ سنة	
	٣٣ - ٣٧ سنة	
	٣٨ - ٤٢ سنة	
المنطقة الجغرافية	الريف	
	المدينة	
التعليم	متعلمة	
	غير متعلمة	
المهنة	حرفي	
	طالب علم	
	ربة منزل	
	موظفة	
عدد مرات الحمل	١	
	٢	
	٣ وما فوق	
عمر الحمل	اقل من ١٤ أسبوعًا	
	١٤ إلى ٢٨ أسبوعًا	
	٢٨ أسبوعًا إلى ٣٧ أسبوعًا	
	٣٧ أسبوعًا إلى ٤٠ أسبوعًا	
تاريخ السفر في الماضي القريب	نعم	
	لا	
وجود حالات مرضية مصاحبة (سكر الحمل , الربو القصبي ، الحساسية ، ارتفاع ضغط الدم ، السل)	نعم	
	لا	
أحدث المعلومات حول جائحة كوفيد -١٩ عُرفت عن طريق	الوسائط المرئية أو المسموعة	
	جريدة أو وسائل التواصل الإجتماعي	
	الأقارب والأصدقاء	

		الأسئلة
لا	نعم	١. هل أنت على علم بجائحة عدوى COVID - 19 المستمرة؟
لا أعرف		
ينتشر عن طريق الرذاذ التنفسي للأفراد المصابين.	من خلال الاتصال مع الأفراد المصابين	٢. ما طريقة انتشار فيروس COVID 19 -؟
لمس الأسطح المصابة	لا شيء مما بالأعلى	
كل ما ورد اعلاه		
لا	نعم	٣. هل الحمل آمن أثناء جائحة كوفيد ١٩؟
لا أعرف		
لا	نعم	٤. هل هناك فرص لانتقال فيروس كورونا من الأم إلى الجنين أثناء الحمل؟
لا أعرف		
لا	نعم	٥. زيارة عاملة رعاية صحية لإجراء فحوصات منتظمة قبل الولادة تزيد من مخاطر انتقال فيروس كورونا؟
لا أعرف		
لا	نعم	٦. يزداد خطر الإصابة بالعدوى والمضاعفات إذا كنت أعاني من مضاعفات مثل السكري والربو وفقر الدم في هذا الحمل؟
لا أعرف		
لا	نعم	٧. الأعراض السريرية الرئيسية لـ كوفيد ١٩ هي الحمى والتعب والسعال الجاف وألم عضلي؟
لا أعرف		
اللقاحات	مضادات حيوية	٨. أيٌّ مما يلي هو علاج لمرض كوفيد ١٩؟
لا يوجد علاج	لا أعرف	

		الأسئلة
لا	نعم	**١. التباعد الاجتماعي ضروري خلال هذه الجائحة لأنني حامل؟**
لا أعرف		
لا	نعم	**٢. تغيير نظامي الغذائي وتناول مكملات غذائية إضافية يساعد في تطوير مناعة ضد فيروس كورونا؟**
لا أعرف		
لا	نعم	**٣. من الأفضل الحفاظ على التباعد الاجتماعي مع الأقارب والجيران الذين لديهم تاريخ سفر وتاريخ اتصال؟**
لا أعرف		
لا	نعم	**٤. هل أنت قلق من زيادة فرصة إصابة الأم والطفل بالعدوى بفيروس كوفيد ١٩؟**
لا أعرف		
لا	نعم	**٥. هل يمكن أن تحدث مضاعفات في حملي إذا أصبت بفيروس كورونا؟**
لا أعرف		
لا	نعم	**٦. اختبار COVID 19 ضروري لجميع النساء الحوامل؟**
لا أعرف		
لا	نعم	

		٧. هل يجب على النساء تجنب الحمل أثناء جائحة كوفيد ١٩؟
لا أعرف		
لا	نعم	٨. التباعد الاجتماعي كافٍ للسيطرة على انتقال عدوى فيروس كورونا؟
لا أعرف		
لا	نعم	٩. أعتقد أن حظر التجول ضروري للحد من انتقال هذا الوباء؟
لا أعرف		

المواقف		

		الأسئلة
لا	نعم	١. أحافظ على مسافة اجتماعية لأنني حامل
لا أعرف		
ابدا	معظم الأحيان	٢. لمنع انتشار عدوى COVID 19، أرتدي قناع الوجه في الأماكن العامة والتجمعات فقط
ليس دائما	دائما	
لا	نعم	٣. أقوم بغسل يدي بشكل متكرر وفرك يدي بمطهر كحولي بشكل متكرر لمنع الإصابة بفيروس كورونا
لا أعرف		
لا	نعم	٤. أبقى في المنزل معظم الوقت أثناء الحظر ولا أزور التجمعات العامة لمنع الإصابة بفيروس COVID 19
لا أعرف		
لا	نعم	٥. إن استخدام الأدوية العشبية والمكملات التقليدية يساعدني على منع الإصابة بالعدوى أثناء الحمل
لا أعرف		

الممارسات		

Appendix-A2: English version

Questionnaire : *Knowledge, Attitude & Practice Toward Corona Virus Infection among Pregnant Women Attending Antenatal care at public hospitals in Sana'a-Yemen*

Informed consent

Good morning/afternoon, Mrs. We are students [**Faculty of medicine, 21 September University of Medical & Applied Sciences**]. We are working on a project concerned with Corona Virus Infection in which you could participate/participated. [***To Assess Knowledge, Attitude & Practices Toward Corona Virus Infection among Pregnant Women Attending Antenatal care at public hospitals in Sana'a-Yemen***] and we are completing a survey among participants to know more about their knowledge, attitudes and practices to do with Corona Virus Infection. The interview will take about [**15 minutes**]. All the information we obtain will remain strictly confidential and your answers and name will never be revealed. Also, you are not obliged to answer any question you do not want to, and you may stop the interview at any time.

This is not to evaluate or criticize you, so please do not feel pressured to give a specific response and do not feel shy if you do not know the answer to a question. I am not expecting you to give a specific answer; I would like you to answer the questions honestly, telling me about what you know, how you feel, the way you live. Feel free to answer questions at your own pace.

Do you agree to participate in this interview?

Yes ___ No ___ *If yes, continue to the next question; if no, stop the interview*.

Do you have any question before we start? (*Answer questions*).

May I start now?

Social Demographics		
Age	14 - 17 years	
	18 - 22 years	
	23 - 27 years	
	28 - 32 years	
	33 - 37 years	
	38 - 42 years	
Geographical area	Rural	
	Urban	
Education	Educated	
	Not Educated	
Occupation	Skilled	
	Student	
	House Wife	
	Employed	
Parity	G1	
	G2	
	G3 and above	
Gestational age	Up to 14 weeks	
	14 to 28 weeks	
	28 weeks to 37 weeks	
	37 weeks to 40 weeks	
History of travel in the recent past	Yes	
	No	
Presence of co-morbid conditions (GDM < bronchial asthma, allergies, hypertension, tuberculosis)	Yes	
	No	
Latest information about Covid-19 pandemic	Electronic visual media	
	Newspaper	
	Relatives & friends	

Questions		
1. Are you aware of ongoing COVID - 19 infection pandemic?	Yes	No
	Don't know	
2. How do you think is the spread of COVID - 19 virus?	Spreads via respiratory droplets of infected individuals.	Through contact with infected individuals
	Touching the infected surfaces	None of the above
	All of the above	
3. Getting pregnant is safe during the Covid 19 pandemic?	Yes	No
	Don't know	
4. There are chances of transmission of corona virus from mother to baby during pregnancy?	Yes	No
	Don't know	
5. Visiting a health care worker for regular antenatal check-up increases the risk of transmission of corona virus?	Yes	No
	Don't know	
6. The risk of infection and complications is increased if I have complications like diabetes, asthma and anaemia in this pregnancy?	Yes	No
	Don't know	
7. The main clinical symptoms of COVID - 19 are fever, fatigue, dry cough and myalgia?	Yes	No
	Don't know	
8. Which of the following is the treatment for COVID 19?	Antibiotics	Vaccines
	Don't know	No treatment
Knowledge		

Questions		
1. Social distancing is necessary during this pandemic as I am pregnant?	Yes	No
	Don't know	
2. Changes in my diet and taking additional nutritional supplements helps in developing immunity against corona virus?	Yes	No
	Don't know	
3. It is better to maintain social distancing with relatives and neighbours who have history of travel and contact history?	Yes	No
	Don't know	
4. Anxious about increased chance of getting infected by Covid 19 to the mother and baby?	Yes	No
	Don't know	
5. There can be complications in my pregnancy if I am infected with corona virus?	Yes	No
	Don't know	
6. Testing for COVID 19 is necessary for all pregnant women?	Yes	No
	Don't know	
7. Women should avoid getting pregnant during the COVID 19 pandemic?	Yes	No
	Don't know	
8. Social distancing is sufficient to control transmission of corona virus infection?	Yes	No
	Don't know	
9. I think lockdown is essential to bring down transmission of this pandemic?	Yes	No
	Don't know	
Attitude		

Questions		
1. I am maintaining social distance as I am pregnant	Yes	No
	Don't know	
2. To prevent spreading the infection of COVID 19 I am wearing facial mask only in public places & gatherings	Most of the time	Most of the time
	Always	Always
3. I am washing hands frequently and rubbing hands with alcohol-based sanitizer frequently to prevent covid19 infection	Yes	No
	Don't know	
4. I am staying indoors most of the time during lockdown and not visiting public gathering to prevent getting infected by COVID 19	Yes	No
	Don't know	
5. Using herbal medicines and traditional supplements is helping me prevent infection during pregnancy	Yes	No
	Don't know	
*Practice*s		

بسم الله الرحمن الرحيم

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وزارة التعليم العالي والبحث العلمي

جامعة ٢١ سبتمبر للعلوم الطبية والتطبيقية

رئاسة الجامعة

الاستاذ . الدكتور/ امين الجنيد

المحترم

مدير عام مستشفى الكويت

الموضوع: تسهيل مهمة بحث

تهديكم رئاسة جامعة ٢١ سبتمبر للعلوم الطبية والتطبيقية أطيب تحياتها وتقديرها وإشارة إلى الموضوع أعلاه تكرموا مشكورين بالتوجيه الى من يلزم بتسهيل مهمة بحث طلاب كلية الطب البشري مستوى خامس قسم النسائية لعدد (١١) طالب المجموعة (C4b) بحسب عنوان البحث الموضح قرين اسمائهم:-

م	الاسم	عنوان البحث
١	مروان محمد عبده طاهر حميد	
٢	هشام عبدالحميد علي لطف الذيفاني	
٣	محمد خالد محمد البعداني	(Knowledge ,Attitude & practice Toward corona virus infection among pregnant women attending antenatal care at public hospitals in (Sana'a city
٤	محمد عبدالسلام الزرقة	
٥	ناجي محمد وهاس القارني	
٦	عبدالكريم عبدالله البارق	
٧	امين محمد الضبيبي	
٨	نسيم عبدالباسط الذيفاني	
٩	عبدالملك غالب سلمان	
١٠	خولة محمود الشرعبي	
١١	سندس محمد عبده الوتر	

،،، تفضلوا بقبول خالص تحياتي وعميق احترامي ،،،

استاذ.دكتور/

مجاهد علي معصار

رئيس الجامعة

27 JUL 2022

Sana'a – Alswad – Taiz st. –Near 48 Midical Compound

سنعاء – السواد – شارع تعز – جوار مجمع 48 الطبي

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Appendix-B2: Faculty and hospital approval

الجمهورية اليمنية
هيئة مستشفى الثورة العام – صنعاء
الشؤون الاكاديمية والتدريب
قسم البحوث والنشر

المحترم

الاخ /مدير ادارة العيادات الخارجية

تحية طيبة وبعد ،،،،

مرفق اليكم صورة من المذكرة الواردة إلينا من جامعة ٢١ سبتمبر كلية الطب البشرى يرجى الاطلاع والتكرم بالتعاون مع الاخوة الطلبة في تسهيل جمع البيانات للبحث بعنوان:

(Knowledge, Attitude & Practice Toward corona virus infection among pregnant women attending antenatal care at public hospital in Sana'a – City)

وذلك لمدة أسبوعيين ابتداءً من تأريخ ١٩ /١١/ ٢٠٢٢م
وتقبلوا خالص التقدير،،،

نائب المدير العام للشؤون الاكاديمية والتدريب

نائب رئيس د/محمد الشهارئ

رئيس قسم البحوث والنشر

د/عبد الرحمن الحرازي

٨٢

بسم الله الرحمن الرحيم

Republic of Yemen
Ministry of Higher Education
and Scientific Research
21 SEPTEMBER UNIVERSITY
OF MEDICAL S & APPLIEED SCIENCES
CHANCELLOR OFFICE

الجمهورية اليمنية
وزارة التعليم العالي والبحث العلمي
جامعة ٢١ سبتمبر للعلوم الطبية والتطبيقية
رئاسة الجامعة

الأستاذ الدكتور/ محمد جحاف
رئيس هيئة المستشفى الجمهوري   المحترم

الموضوع: تسهيل مهمة بحث

تهديكم رئاسة جامعة ٢١ سبتمبر للعلوم الطبية والتطبيقية أطيب تحياتها وتقديرها
وإشارة إلى الموضوع أعلاه تكرموا مشكورين بالتوجيه الى من يلزم بتسهيل مهمة بحث طلاب
كلية الطب البشري مستوى خامس قسم النسائية لعدد (١١) طالب المجموعة (C4b)
بحسب عنوان البحث الموضح قرين اسمائهم:-

م	الاسم	عنوان البحث
١	مروان محمد عبده طاهر حميد	
٢	هشام عبدالحميد علي خلف الذيفاني	
٣	محمد خالد محمد البعداني	
٤	محمد عبدالسلام الزرقة	(Knowledge ,Attitude & practice Toward corona virus infection among pregnant women attending antenatal care at public hospitals in Sana'a city)
٥	ناجي محمد وهاس القارني	
٦	عبدالله زيد عبدالله البارق	
٧	امين محمد الضبيبي	
٨	نسيم عبدالباسط الذيفاني	
٩	عبدالملك غالب سنمان	
١٠	خولة محمود الشرعبي	
١١	سندس محمد عبده الوتر	

،،، تفضلوا بقبول خالص تحياتي وعميق احترامي ،،،

أستاذ دكتور
مجاهد علي مقصار
رئيس الجامعة

2 ... 2022

Sana'a - Alward - Taiz st - Near 48 Midical Compound

صنعاء - الصراف - شارع تعز - جوار مجمع ٤٨ الطبي

بسم الله الرحمن الرحيم

Republic of Yemen
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and Scientific Research
21 SEPTEMBER UNIVERSITY
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CHANCELLOR OFFICE

الجمهورية اليمنية
وزارة التعليم العالي والبحث العلمي
جامعة ٢١ سبتمبر للعلوم الطبية و التطبيقية
رئاسة الجامعة

الدكتورة/ ماجدة الخطيب

مدير عام مستشفى السبعين

المحترم

السكرتارية

٢٠٢٢/١١/١٢

الموضوع: تسهيل مهمة بحث

تهديكم رئاسة جامعة ٢١ سبتمبر للعلوم الطبية والتطبيقية أطيب تحياتها وتقديرها وإشارة إلى الموضوع أعلاه تكرموا مشكورين بالتوجيه الى من يلزم بتسهيل مهمة بحث طلاب كلية الطب البشري مستوى خامس قسم النسائية لعدد (١١) طالب المجموعة (C4b) بحسب عنوان البحث الموضح قرين اسمائهم:-

عنوان البحث	الاسم	م
(Knowledge ,Attitude & practice Toward corona virus infection among pregnant women attending antenatal care at public hospitals in (Sana'a city	مروان محمد عبده طاهر حميد	١
	هشام عبدالحميد علي لطف الذيفاني	٢
	محمد خالد محمد البعداني	٣
	محمد عبدالسلام الزرقة	٤
	ناجي محمد وهاس الفارئي	٥
	عبدالكريم عبدالله الباري	٦
	امين محمد الخنبيبي	٧
	نسيم عبدالباسط الذيفاني	٨
	عبدالملك غالب سنان	٩
	خولة محمود الشرعبي	١٠
	سندس محمد عبده الوتر	١١

775394041
777766083

... نتقدم بقبول خالص تمنياتي وعين احترامي ...

استاذ دكتور
مجاهد علي معصار
رئيس الجامعة

الجمهورية اليمنية

وزارة التعليم العالي والبحث العلمي

جامعة ٢١ سبتمبر للعلوم الطبية والتطبيقية

كلية الطب البشري

المعارف والمواقف والممارسات تجاه عدوى فيروس كورونا بين النساء الحوامل اللاتي يترددن على مراكز رعاية ما قبل الولادة في المستشفيات العامة في صنعاء –اليمن

بحث تخرج مقدم إلى كلية الطب البشري, جامعة ٢١ سبتمبر للعلوم الطبية والتطبيقية لاستكمال متطلبات نيل درجة البكالوريوس في الطب البشري

إعداد الباحثين:

مـروان محمـد عبـده طـاهر حُميـد	هشـام عبدالحميـد علـي لطـف الـذيفاني
محمـد عبدالسـلام الزرقـة	محمـد خالـد محمـد البعـداني
عبـدالملك غالـب سـلمان	عبـدالكريم عبـدالله البـارق
امـين محمـد الضـبيبي	نـاجي محمـد محمـد وهـاس القـارني

نسيم عبدالباسط صالح الذيفاني

المشرفين:

المشرف الرئيس:

د. سلوى صالح الغميري

المشرف المشارك

د.منيرة شاهر عبدالجابر

صنعاء

١٤٤٤هـ/ ٢٠٢٣