



## Introduction

### Background of the Study

The novel COVID-19 virus is a respiratory infection that originated in Wuhan, China, and rapidly escalated into a global pandemic [1]. The virus spread internationally at an accelerated rate, affecting over 110 nations [2]. Coronaviruses are single-stranded, non-segmented, enveloped viruses that cause diseases ranging from the common cold to severe and fatal illnesses. The term "coronavirus" is derived from the Latin word corona, meaning crown or halo. It refers to the virus's characteristic spike-like projections observed under electron microscopy [3].

The exact dynamics and transmission of the virus remain under study. However, according to the WHO, COVID-19 spreads through respiratory droplets and fomites during close and unprotected contact with an infected individual [2]. The Centers for Disease Control and Prevention [4] further states that SARS-CoV-2 is transmitted via close contact (within 6 feet) through respiratory droplets released during coughing or sneezing or by touching contaminated surfaces and then touching the face [4].

Most individuals infected with COVID-19 experience mild to moderate respiratory illness and recover without specialized treatment. However, severe illness and hospitalization are more common among older adults and individuals with pre-existing conditions such as cardiovascular disease, diabetes, chronic respiratory disease, or cancer. Nonetheless, COVID-19 can cause serious complications or death in people of any age [5].

### Significance of the Study

The COVID-19 pandemic has resulted in millions of deaths worldwide. Various preventive measures have been implemented to curb the spread of the virus and reduce mortality rates. Pregnant women are considered a high-risk group for COVID-19 complications. This study aims to assess their knowledge, attitudes, and practices regarding the virus, providing valuable insights that can guide effective interventions. Understanding these factors can help healthcare policymakers and practitioners develop strategies to protect pregnant women and their unborn children from COVID-19-related risks. Given the limited data on COVID-19 infection during pregnancy, this study also contributes to filling knowledge gaps in maternal healthcare.

### Objective of the Study

To assess the knowledge, attitudes, and practices related to COVID-19 among pregnant women.

## Methodology

### Study Design

A descriptive cross-sectional and questionnaire-based study was conducted to examine participants' knowledge, attitudes, and practices regarding COVID-19 from November 2022 to December 2022.

### Study Setting

The study was conducted in antenatal care clinics at public hospitals (Al-Thawra Teaching Modern Hospital, Al-Gomhory Teaching Hospital, Al-Sabeen Teaching Hospital, and Al-Kuwait Teaching Hospitals) affiliated with the Ministry of Public Health and Population in Sana'a City. These

hospitals were selected because they are the main healthcare centers in Sana'a City where women attend for antenatal follow-up, immunization during pregnancy, and other reproductive health services. They also serve a wide variety of individuals with different socio-demographic and obstetric characteristics, and the attendance rate is high.

### Population and Sample of the Study

All pregnant women attending antenatal care during the study period were eligible to participate. The sample included 205 pregnant women.

### Sampling Method

Convenience sampling was used. Participants were recruited during the study period (two months) from the above-mentioned settings. All eligible pregnant women who attended antenatal care clinics during the study period and provided consent were included.

### Data Collection Methods and Tools

Data were collected through face-to-face interviews. A structured questionnaire was developed in Arabic to assess participants' knowledge, attitudes, and practices regarding COVID-19 preventive measures. The questionnaire was based on a review of literature and WHO guidelines on COVID-19 prevention. The tool was reviewed and validated by a team of qualified staff to ensure clarity and appropriateness for the target population.

### Statistical Analysis

Statistical Package for the Social Sciences (SPSS) software, version 26, was used for data entry and analysis. Percent and frequency were used. Frequency and percentage were used for descriptive

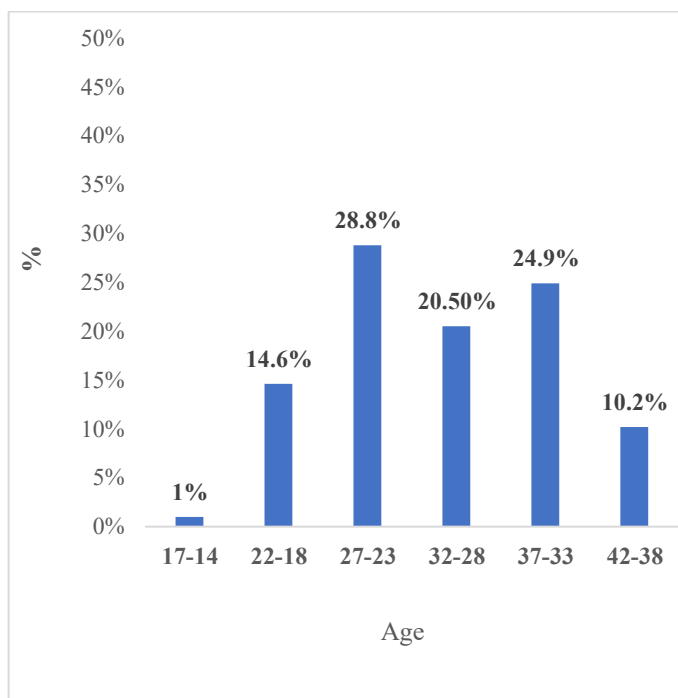
statistics. Chi-square test was applied to test the relationship among variables. P-value < 0.05 was considered significant. Scoring System: Knowledge and practice of preventive measures were obtained by choosing either "Yes" or "No", with an additional option "I don't know".

### Ethical Considerations

The study was approved by the Faculty of Medicine. A letter was sent to the hospital managers requesting permission to conduct the study. The purpose of the study was explained to all participants, and oral consent was obtained before participation.

## Results

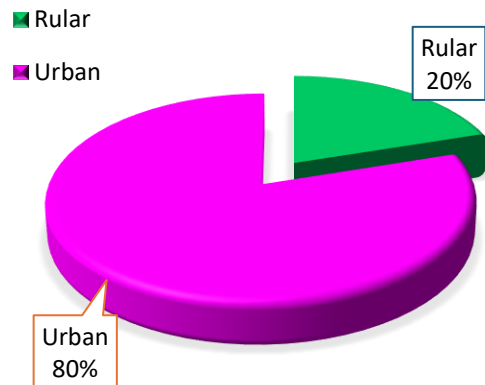
### The socio-demographic characteristics of participants



**Figure (1):** Distribution of participant by age

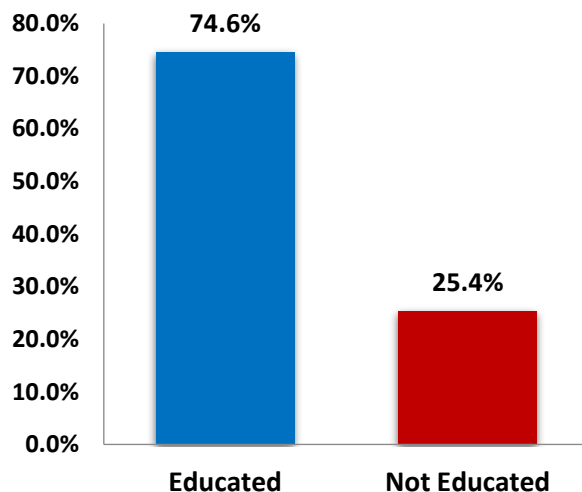
Figure 1 shows that the highest number of participants (28,8%) were between 23 - 27 years old, followed by those aged 33-37 years (24.9%). Other age groups were represented

as follows: 20.5% were aged 28-32 years, 14.6% were aged 18-22 years, 10.2% were aged 38-42 years, and 1% were aged 14-17 years.



**Figure (2):** Distribution of the participants according to geographical area

The majority of participants (80%) were from urban areas, while 20% were from rural areas, as illustrated in **Figure 2**.



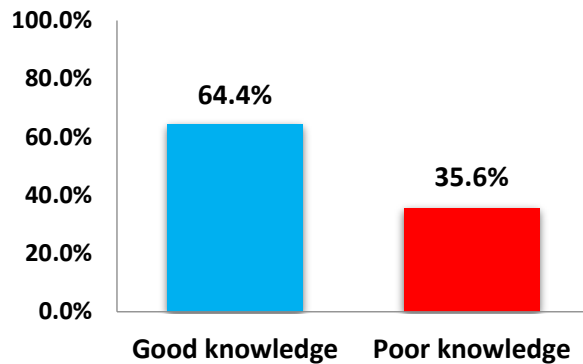
**Figure (3):** Distribution of the participants according to education level

**Figure 3** shows that the majority of participants (74.6%) were educated, while 25.4% were not educated.

**Table (1):** Distribution of the participants according to occupation, parity, and gestational age

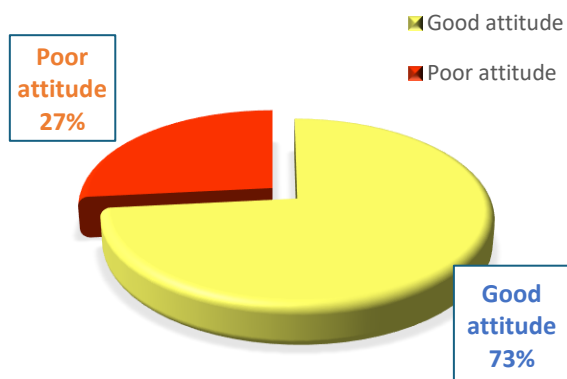
| Occupation           | Frequency  | Percent     |
|----------------------|------------|-------------|
| Skilled              | 4          | 2.0%        |
| Student              | 9          | 4.4%        |
| House Wife           | 178        | 86.8%       |
| Employed             | 14         | 6.8%        |
| <b>Total</b>         | <b>205</b> | <b>100%</b> |
| Parity               | Frequency  | Percent     |
| G1                   | 46         | 22.4%       |
| G2                   | 47         | 22.9%       |
| G3 and above         | 112        | 54.6%       |
| <b>Total</b>         | <b>205</b> | <b>100%</b> |
| 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%         |
| <b>Total</b>         | <b>205</b> | <b>100%</b> |
| Recent Travel        | Frequency  | Percent     |
| Yes                  | 34         | 16.6%       |
| No                   | 171        | 83.4%       |
| <b>Total</b>         | <b>205</b> | <b>100%</b> |

The results in Table 1 demonstrate that the majority of participants (86.8%) were (House Wife), and a few of them (2%) were (Skilled). Regarding parity, more than half of the participants (54.6%) were G3 and above, while less than a quarter of them (22.4%) were G1. Regarding the gestational age, the majority of participants (61%) were between 37 weeks and 40 weeks, while a few (1.5%) were up to 14 weeks. The majority of participants (83.4%) had not traveled recently, while only about (16.6%) one sixth of them reported recent travel.

**Participants' Knowledge Level of COVID-19**

**Figure(4):** Participants' Knowledge Level of COVID-19

Figure 4 shows that the majority of participants (64.4%) had good knowledge about COVID-19, while 35.6% of them had poor knowledge. This indicates that the awareness campaign was relatively effective.

**Participants' Attitude Towards COVID-19**

**Figure (5):** Attitude of participants towards COVID-19

**Figure5** shows that the majority of participants (73%) demonstrated a positive attitude toward preventive measures against

COVID-19, while (27%) of them showed a poor attitude.

**Participants' Level Practice Regarding COVID-19**

**Table (2):** Practice level of the participants about COVID-19

| Practice level | Frequency  | Percent     |
|----------------|------------|-------------|
| Good Practice  | 160        | 78.2%       |
| Poor Practice  | 45         | 21.8%       |
| <b>Total</b>   | <b>205</b> | <b>100%</b> |

**Table 2** demonstrates that most of the participants (78.2%) had good practices regarding preventive measures against coronavirus infection, while about 21.85% of them had poor practices.

**Discussion**

The discussion is structured around three key domains: knowledge, attitude, and practice level.

**Knowledge**

The results of this study indicate that the overall level of knowledge about COVID-19 among pregnant women attending antenatal care at public hospitals in Sana'a, Yemen, was 64.4%. This is lower than findings from Egypt, where the mean knowledge score was (16.39 out of 23), with an overall correct response rate of (71.26%) [6].

Significant differences in knowledge were observed in relation to geographical area, educational level, gestational age, and access to updated information about COVID-19 ( $P$ -value < 0.05). Knowledge levels were higher among urban residents (61.5%) and educated women. In addition, higher knowledge was observed among women in the late gestational period (37–40 weeks) and among

those who obtained information from audiovisual media.

This finding contrasts with a study conducted in Nigeria, where the highest knowledge levels were reported among women aged 21–30 years, which was attributed to greater engagement with social media. In the same Nigerian study, widowed women (75%) and women with college or postgraduate education (53.4%) demonstrated the highest knowledge levels [8].

Most participants (97%) were aware of the different transmission routes of COVID-19. Specifically, 94% reported that the virus spreads through contact with infected individuals, while 90% recognized transmission through air droplets and contaminated surfaces. These findings are slightly higher than those reported in Nigeria, where the corresponding awareness rates were 88.5%, 93%, and 85.6%, respectively [8].

### **Attitude**

This study found that (73.4%) of participants had a positive attitude toward COVID-19. This is consistent with findings from Egypt, where (95%) of participants demonstrated a positive attitude (°). Similar results were reported by Mohamed (2020), who assessed pregnant women's knowledge, attitudes, and self-protective practices regarding COVID-19 prevention.

Regarding the existence of COVID-19, (84%) of respondents believed the virus was real, (11%) were uncertain, and ( 5%) denied its existence. This result is more reassuring than findings in Jordan, where (21%) believed that the 5G network contributed to spreading the virus, and (47.9%) considered

COVID-19 part of a global conspiracy. The lower level of misinformation observed in Yemen may be attributed to improved public health communication and awareness efforts.

A large proportion of participants (89.9%) agreed that early diagnosis plays an important role in controlling and managing the disease. This figure is higher than that reported in Nigeria and Egypt, where (81%) of participants held a similar belief. Furthermore, (92%) of respondents in this study acknowledged the importance of preventive measures in limiting the spread of COVID-19, which is consistent with findings from Central Nigeria (92.7%).

Many participants believed that authorities should implement strict measures to control the spread of COVID-19. These measures included travel restrictions (85%), isolation of confirmed cases in designated hospitals (84.3%), closure of educational institutions and public places (89.5%), and quarantine in the event of an outbreak. The least supported measure was the closure of mosques (74.4%), which is slightly higher than the (72.7%) approval rate reported in Nigeria regarding stay-at-home orders.

### **Practice**

The best preventive practices reported by participants included improved personal hygiene (95.4%), frequent hand washing with soap and water (93.0%), and avoiding physical contact such as kissing and hugging (89.5%). However, adherence to other preventive behaviors was lower, with only (64.3%) reporting avoidance of work and (50.3%) reporting the use of traditional medicine.

Regarding mask use, (49%) of participants reported always wearing a mask when leaving

home, while (28.5%) wore masks only in crowded public places. These figures are considerably lower than those reported in China, where (98%) of the population adhered to mask-wearing.

In Nigeria, 92.7% practiced social distancing, (96.4%) maintained good personal hygiene, and (82.3%) used face masks. In Malaysia, (83.4%) avoided crowds and (87.8%) practiced proper hand hygiene; however, only (51.2%) consistently wore face masks. Similarly, in Vietnam, (75.8%) adhered to all six recommended preventive measures. The most common practices included frequent handwashing (98.5%), mask-wearing (95.8%), covering the mouth and nose when coughing or sneezing (93.1%), avoiding crowded places (92.7%), maintaining a two-meter distance from others (90.3%), and avoiding face-touching (90.1%).

In this study, (81.8%) of participants were from middle-income households, while (10.8%) belonged to low-income groups. Economic factors may influence adherence to preventive measures, as access to hygiene products and protective equipment may be more difficult for individuals with limited financial resources.

## Conclusions

pandemic was not safe.

Most pregnant women (90.7%) demonstrated a good attitude toward preventive measures against COVID-19 infection.

There was a statistically significant association between geographical area, history of recent travel, and presence of comorbid conditions and the level of preventive practice ( $P$ -value < 0.05).

## Recommendations

### Recommendations for the Ministry of Public Health and Population

1. The Ministry should strengthen health education and counseling programs for pregnant women to improve their knowledge about COVID-19, particularly its effects on pregnancy and maternal health.
2. The Ministry should expand media campaigns and provide instructional booklets and videos to improve attitudes toward COVID-19 prevention among pregnant women, especially housewives, uneducated women, and those living in rural areas.

### Recommendations for Health Care Providers

Health care providers should give greater attention to educating pregnant women at every point of contact during antenatal care visits, ensuring consistent delivery of accurate information and preventive guidance.

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