

## Pregnant Women's Knowledge and Practice Regarding Preventive Measures toward Coronavirus

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### Abstract

**Background:** Coronavirus disease is an emerging respiratory disease that is caused by a novel coronavirus and has shown a fatal impact on pregnant women and fetuses. Aim: the current study aimed to assess pregnant women's knowledge and practices regarding preventive measures against coronavirus. **Design:** a descriptive design was used to achieve the aim of the study. Setting: the study was conducted at outpatient antenatal clinic in Helwan general hospital in Cairo, Egypt. **Sample:** Purposive sampling was utilized in the present study to recruit 89 pregnant women. **Tools:** three tools for data collection. First, a structured interviewing questionnaire is used to assess the pregnant women's demographic characteristics as well as their obstetric history. Second Tool: assess the level of pregnant women's knowledge regarding preventive measures against the coronavirus. Third Tool: Assess pregnant women's practices regarding preventive measures against the coronavirus. **Results:** the results revealed that there was a highly statistically significant relationship between total pregnant women's knowledge, educational level, and whether they had previously been diagnosed with coronavirus before pregnancy. **Conclusion:** The study was concluded that nearby half of pregnant women had unsatisfactory knowledge toward coronavirus preventive measures and more than half of pregnant women had inadequate practice toward coronavirus preventive measures. **Recommendations:** pregnant women should be given continuous education to raising awareness about the preventive measure of coronavirus.

**Keyword:** *Coronavirus, Knowledge, Practice, Pregnant women & Preventive Measures.*

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### INTRODUCTION

The coronavirus disease is a newly emerging infectious disease and a rapidly expanding pandemic caused by a novel human coronavirus. On December 31, 2019, the China Health Authority alerted the World Health Organization (WHO) to several cases of pneumonia of unknown etiology in Wuhan City in Hubei Province in central China (Lu, Stratton, & Tang, 2020). That was identified as a new coronavirus (severe acute respiratory syndrome coronavirus 2, or SARS-CoV-2). On January 7, a novel coronavirus, originally abbreviated as 2019-nCoV by WHO, was identified from the throat swab sample of a patient (Hui et al., 2020). This pathogen was later renamed by the Coronavirus Study Group as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (Gorbalenya et al., 2020).

Increased morbidity and mortality in pregnant women, the coronavirus's cumulative effect on pregnant women is likely to be harmful to pregnant women and the developing fetus (Thorlund et al., 2020). It could predispose a developing fetus to intrauterine growth restriction (IUGR), preterm delivery with immediate and long-term complications, abortion, and stillbirth. even though vertical transmission is yet to be confirmed. Fear and anxiety associated with infection could lead to increased demand for abortion and operative deliveries (Makoni, 2020 & Vogel et al., 2020).

Coronavirus is considered a zoonotic infectious disease that can spread amongst humans or animals to humans. That believed that COVID-19 originated in animals and most cases appeared in the seafood and animal market in Wuhan (Olum et al., 2020). The virus can spread from one infected person to another person through close contact without protection. When transmitted by humans, it could lead to serious respiratory conditions. (Asadi, Bouvier, Wexler, & Ristenpart, 2020).

Preventive measures are including frequent hand washing, refraining from excessive outdoor activities unless an emergency, and avoiding infected individuals, crowded places, and public gatherings. Check the pregnant women's temperature regularly and immediately inform the experience of shortness of breath, cough, or fever (Chavez et al., 2020). Moreover, pregnant women who have a travel history or coronavirus symptoms should be kept in isolation for at least 14 days (Hu et al., 2020).

Nursing Counselling during the antenatal period and offering health education during pregnancy are important parts of ANC, especially for primigravida women. It encourages her to attend antenatal visits. It also provides her reassurance, advice, and guidance to manage the health problems of pregnancy. To ensure high-quality ANC and woman's satisfaction, health educational activities need to be individualized and more organized (Basnet et al., 2022).

### Significance of the study:

An immune-compromised state, as seen in pregnancy with its physiological changes, could predispose a pregnant woman to an increased risk of SARS-COVID-19 infection (Li et al., 2020) compared to the general population. Increased morbidity and even mortality, the cumulative effect of the coronavirus on the pregnant woman, is likely to have a detrimental effect on the pregnant woman and the developing fetus (Thorlund et al., 2020; &Chen et al., 2020). The prevalence of coronavirus in the world is 50,676,072 confirmed cases and 1,261,075 deaths. Americas is 21,842,460 confirmed cases, Europe is 13,576,687 confirmed cases, South-East Asia is 9,743,751 confirmed cases, Eastern Mediterranean is 3,368,738 confirmed cases, Africa is 1,368,904 confirmed cases, and Western Pacific is 774,791 confirmed cases. Prevalence of coronavirus in Egypt, from Jan 3 to 10 November 2020, there have been 109,422 confirmed cases of coronavirus with 6,380 deaths (World Health Organization. 2020).

### The aim of the study:

The aim of current study was to assess the pregnant women's knowledge and practice regarding preventive measures toward coronavirus. This aim was achieved through the following objectives:

- 1- Assess the pregnant women's knowledge regarding preventive measures toward coronavirus.
- 2- Assess the pregnant women's practice regarding preventive measures toward coronavirus.

### Research question:

- 1- What is the level of pregnant women's knowledge regarding preventive measures toward coronavirus?
- 2- What is the level of pregnant women's practice regarding preventive measures toward coronavirus?

## SUBJECTS AND METHODS

### Research Design:

A descriptive design was used to achieve the aim of the study.

### Setting:

The study was conducted at the antenatal clinic in Helwan General Hospital.

**Subjects (sampling):**

**Sample type:** A Purposive sampling of 89 pregnant women, didn't suffer from coronavirus was used to collect the study subjects.

**Sample size:** The estimated sample size is 89 pregnant women out from 115 pregnant women who visit at the previous mentioned setting, at confidence level 95% according to the following equation (Thompson, 2012).

$$n = \frac{N \times p(1-p)}{\left[ \left[ N-1 \times \left( d^2 \div z^2 \right) \right] + p(1-p) \right]}$$

**Which:**

n= Sample size , N= Total size, Z= 1.96 . d= Confidence level 95% , and p= 0.5.

$$n = \frac{115 \times (0.5 \times 0.5) = 28.75}{114 \times (.0025 / 3.8416) = 114 \times .000651 = 0.07421 + 0.25 = .3242} = 89$$

**Sampling technique:** Pregnant women were collected from hospital registration book in outpatient antenatal according to the inclusion criteria till reach the determined sample size.

**Tools of data collection:**

Three tools were used for data collection in the present study:

**First tool: A structured interviewing questionnaire.** This tool was adapted from (Mohamed et al., 2020) and modified by the researcher. Tool was written in Arabic language in the form of close and open-ended questions. This tool composed of two parts:

**Part I:** Pregnant women demographic data used to assess general characteristics of pregnant women consisted of ten questions as; age, residence, education level, occupation, family monthly income, diagnosis of chronic health problem, type of chronic health problem, previously diagnosed of coronavirus before pregnancy and when diagnosed before pregnancy.

**Part II:** Obstetric history of pregnant women used to assess the obstetric history of pregnant women consisted of six questions such as; gravidity, parity, number of abortion, living children number, gestational age, and regular attendance of antenatal care visit.

**Tool 2: Assessment of pregnant women's knowledge regarding preventive measures toward coronavirus:** This tool used to assess women's knowledge regarding preventive measures toward coronavirus. This tool was adapted from (Mohamed et al., 2020) and modified by the researcher after reviewing of literatures (WHO, 2020)

& (CDC, 2020). The tool was consist of 28 questions such as believed the present of coronavirus, define the coronavirus, how is coronavirus spread, symptoms of coronavirus, incubation period of coronavirus, risk for coronavirus infection and prevention of coronavirus .

**Knowledge scoring system:** The tool was consist of 28 question were measured by giving subjects responses a score of (2) for the correct answer and (1) for the incorrect answer .The total knowledge score was ranged from **28 to 56 and classified into two categories:**

- **Satisfactory** knowledge if the percentage score was equal or more 60% of the total score ( $\geq 33$  score).
- **Unsatisfactory** knowledge if the percentage score was less than 60% of the total score ( $< 33$  score).

**Tool 3: Assessment of pregnant women's Practice regarding preventive measures toward coronavirus:** This tool used to assess women's **practice regarding preventive measures toward coronavirus**. This tool was adapted from (*Mohamed et al., 2020*) and modified by the researcher after reviewing of literatures on the (**WHO, 2020**) & (**CDC, 2020**) for the sake of this study. The tool was consist of **22** question Such as pregnant women washing hands frequently with soap and water or alcohol-based sanitizers, wear face mask, maintain at least 1-2 meter distance between pregnant women and others during antenatal visit, in recent days, have pregnant women avoided gone to any crowded place, use tissues during coughing and sneezing, eating healthy food during pregnancy, sources of information of preventive measure toward coronavirus and pregnant women learned others preventive measures that learned.

**Practice scoring system:** The tool was consisting of **twenty two** questions, the items adequately done were scored "2" and the items not done were scored "1". For each point, the scores of the items were summed-up and the total practice score was ranged from 22-44 and classified into 2 categories:

- **Adequate** if the percentage score was equal or more 60% of the total score ( $\geq 26$  score).
- **Inadequate** practice was considered not done if the percent score was less 60% of the total score ( $< 26$  score).

### **Tools validity and reliability:**

The data collection tools were reviewed by a panel of three expert's professors to ensure applicability, comprehensiveness, understanding and ease of implementation of the tools. Each of the experts was asked to examine tools for content coverage, relevance, clarity, wording, length, format and overall appearance. Modifications were done according to the expert's comments and recommendations; minor modifications had been made such as rephrasing and rearrangements of some sentences such as the question of definition of corona virus the answer was complete and incomplete then modified to correct and in correct. Testing reliability of the proposed tools was done statistically by Alpha Cronbach test which revealed that each of the two tools consisted of relatively homogenous items as indicated by the moderate to high reliability of each tool, it was (0.91) for obstetric history, it was (0.93) for knowledge tool and (0.94) for self-preventive measures, (0.945).

### **Ethical consideration:**

The research approval was obtained from a scientific, ethical committee in the Faculty of Nursing, Helwan University before starting the study. The researcher was obtained verbal consent from pregnant women. The researcher clarified the aim and objectives of the study to each pregnant woman. The researcher was assured anonymity and confidentiality of subject's data. Pregnant

women were informed that allowed to choose to participate or not in the study and that they have right to withdrawal from the study at any time.

## II- Operational design:

### Pilot study:

A pilot study was carried out on 10% (9) pregnant women and was conducted to test the applicability of the tools and feasibility of the study. According to the result of the pilot study, items was corrected, modified, omitted or added. It also helped in determined the time needed for interviewing and evaluating the suitability of settings to perform the interview. All modification was done and women participated in the pilot study were excluded from the study sample.

### Field of work:

- This study was carried out at the Helwan general hospital. The data collection process took place between the beginning of January 1, 2021, and the end of June 30, 2021.
- The researcher attended the antenatal clinic in Helwan general hospital three days per week from 8.30 AM to 2.00 PM to collect data until the sample size reached the predetermined number.
- The researcher introduced herself to the physician and the nurse in the antenatal clinic.
- The researcher met pregnant women when enter the antenatal clinic before the examination.
- At beginning of the interview the researcher introduced herself to pregnant women and explained to the participants the aim of the study and then the oral consent of the women was obtained.
- The researcher interviewed each pregnant woman individually in an outpatient antenatal clinic to fill tool (I) which consisted of two parts. 1st part includes questions related to pregnant women's demographic data, 2nd part includes questions used to assess obstetric history. The time taken to complete this data was 5-10 minutes.
- Then the researcher used tool (II) their questions used to assess the level of pregnant women's knowledge regarding preventive measures against coronavirus which consisted of one part including questions related to the definition, symptoms of coronavirus, incubation period of coronavirus, risk for coronavirus infection and prevention of coronavirus. The time taken to complete this data was 10-15 minutes.
- Then the researcher used tool (III) their questions used to assess the level of pregnant women's practice regarding preventive measures toward coronavirus which consisted of one part including questions related to washing hands frequently with soap and water or alcohol-based sanitizers, do pregnant women wear face mask, do pregnant women maintain at least 1-2 meter distance between pregnant women and others during the antenatal visit, in recent days, have pregnant women avoided going to any crowded place, do pregnant women use tissues during coughing and sneezing, do pregnant women eat healthy food during pregnancy, sources of information of preventive measure toward coronavirus. The time taken to complete this data was 10-15 minutes.

### Administrative design:

Official letters, including the title and aim of the study were issued from the Faculty of Nursing Helwan University, a letter which was issued from Ministry of health approval after ethics committee and submitted to the director of Helwan General Hospital for conducting the study.

### Statistical design:

Data was analyzed using the Statistical Package for Social Science (SPSS) version 22. Qualitative data was presented as numbers and percentages. Relations between different qualitative variables were tested using Chi-

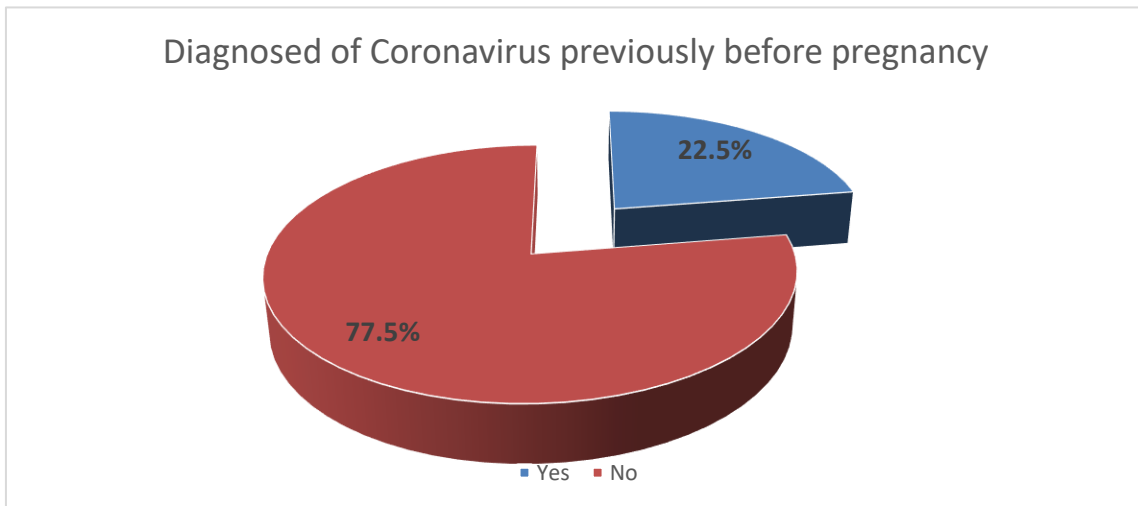
square test (X<sup>2</sup>) and Cochran's Q test. Relation between quantitative variables was tested using Pearson correlation coefficient (r). Probability (p-value) < 0.05 was considered significant and < 0.001 was considered highly significant.

## RESULTS

**Table (1): Distribution of the pregnant women according to their demographic characteristics n=89.**

Variables	No	%
<b>Age</b>		
• 18 - < 20 year	28	31.5
• 20 - < 25 year	41	46.0
• 25 - < 40 year	20	22.5
<b>Mean± SD 21.68±3.45</b>		
<b>Residence :</b>		
• Rural	80	89.9
• Urban	9	10.1
<b>Educational Level :</b>		
• Can't read and write	29	32.6
• Can read and write	53	59.6
• University	7	7.8
<b>Occupation :</b>		
• Employed	8	9.0
• Unemployed	81	91.0
<b>Family monthly income :</b>		
• Adequate	67	75.3
• Inadequate	22	24.7
<b>Chronic health problem:</b>		
• Yes	21	23.6
• No	68	76.4
<b>Chronic health problem of pregnant women n=21</b>		
• Diabetes	7	33.3
• Hypertension	12	57.1
• Renal failure	1	4.8
• Heart disease	1	4.8

**Table (1)** shows that less than half of pregnant women (46.0%) aged from 20 to less than 25 years old; with mean SD= 21.68±3.45 years old. Most of pregnant women (89.9%) are from rural area. Regarding their Level of education, more than half of pregnant women (59.6%) can read and write. The majority of pregnant women (91.0%) are unemployed; about three quarters of pregnant women (75.3%) have adequate family monthly income. In addition, less than one quarter of pregnant women (23.6%) have chronic health problem and more than half of pregnant women 12 out of 21 pregnant women have hypertension.



**Figure (1):** Distribution of the pregnant women according to their diagnosed of coronavirus previously before pregnancy (n=89).

**Figure (1)** represents that less than one quarter of them (22.5%) diagnosed of coronavirus previously before pregnancy while more than three quarters of pregnant women (77.5%) were not.

**Table (2):** Distribution of the pregnant women according to their obstetric history (n=89).

Obstetric history	No	%
<b>Gravidity</b>		
• 1-2	62	69.7
• 3-4	19	21.3
• 5-7	8	9.0
<b>Mean± SD 2.35±1.28</b>		
<b>Parity</b>		
• Zero	21	23.6
• 1-2	58	65.2
• 3-4	10	11.2
<b>Mean± SD 1.15±0.96</b>		
<b>Number of abortion</b>		
• Zero	77	86.5
• 1	5	5.6
• 2	7	7.9
<b>Mean± SD 0.21±0.57</b>		
<b>Number of living children</b>		
• Zero	21	23.6
• 1-2	58	65.2
• 3-4	10	11.2
<b>Mean± SD 1.15±0.96</b>		
<b>Gestational age</b>		
• 10-<20 weeks	42	47.2
• 20-<30 weeks	36	40.4
• 30-<40 weeks	11	12.4
<b>Mean± SD 20.96±5.69</b>		
<b>Regular attendance of antenatal care visits</b>		
• Yes	83	93.3
• No	6	6.7

**Table (2)** illustrates that more than two thirds of the pregnant women's regarding the gravidity (69.7%) have from 1 to 2. Concerning parity, nearly two thirds of them (65.2%) have from 1 to 2. Most of them (86.5%) haven't abortion. Nearly two thirds of them (65.2%) have from 1 to 2 living children. As regard gestational age, less than half of them (40.4%) have from 20 to less than 30 weeks. Moreover, the majority of them (93.3%) attend antenatal care visits regularly.

**Table (3):** Distribution of the pregnant women's knowledge regarding coronavirus (n=89).

Knowledge related to define and spread of coronavirus		No	%
Believed the present of Coronavirus	Correct	57	64.0
	Incorrect	32	35.9
Definition the Coronavirus	Correct	29	32.6
	Incorrect	60	67.4
<b>How is Coronavirus spread</b>			
Direct transmission during coughing from infected person	Correct	63	70.8
	Incorrect	26	29.2
Touching contaminated surfaces with coronavirus	Correct	46	51.7
	Incorrect	43	48.3
Contact with infected animals	Correct	49	55.1
	Incorrect	40	44.9
Close contact with an infected person	Correct	52	58.4
	Incorrect	37	41.6
Through eating infected animal products (e.g., meat, milk)	Correct	55	61.8
	Incorrect	34	38.2
Through vertical transmission from pregnant women to fetus	Correct	65	73.0
	Incorrect	24	27.0

\*Significant at  $p < 0.05$ .

\*\*Highly significant at  $p < 0.01$ .

**Table (3)** represents knowledge about define and spread of coronavirus among the pregnant women. The table clarified that, evidence, nearly one third of them (32.6%) have correct knowledge about "Define the Coronavirus".



**Table (4):** Distribution of the pregnant women’s knowledge regarding preventive measures toward coronavirus (n=89).

Knowledge related to preventive measures toward coronavirus		No	%
Incubation period of coronavirus	1–3 days	27	30.3
	1–14 days	62	69.7
<b>Risk for Coronavirus infection</b>			
Old aged persons	Correct	42	47.2
	Incorrect	47	52.8
Pregnant women	Correct	50	56.2
	Incorrect	39	43.8
Individuals with cancer, diabetes, chronic respiratory diseases	Correct	48	53.9
	Incorrect	41	46.1
<b>Prevention of coronavirus</b>			
Wash hands with water and soap	Correct	66	74.2
	Incorrect	23	28.8
Avoid touching the eyes and nose with contaminated hands	Correct	40	44.9
	Incorrect	49	55.1
Avoid contacts with infected people	Correct	37	41.6
	Incorrect	52	58.4
Using face masks	Correct	72	80.9
	Incorrect	17	19.1
Maintaining social distance	Correct	41	46.1
	Incorrect	48	53.9
Maintaining self-quarantine	Correct	36	40.4
	Incorrect	53	59.6

\*Significant at p <0.05. \*\*Highly significant at p <0.01. Not significant at p>0.05

**Table (4)** displays preventive measures toward coronavirus among the pregnant women at. The risk for coronavirus infection, more than half of them (56.2%) mention pregnant women. Concerning prevention of coronavirus, about two fifth of them (40.4%) report Maintaining self-quarantine .

**Table (5):** Distribution of the pregnant women’s practice regarding preventive measures toward coronavirus (n=89).

Items		No	%
Pregnant women maintain at least 1-2 meter distance when tr with others during antenatal visit	Done	35	39.3
	Not Done	54	60.7
Pregnant women avoid touching eyes, nose and mouth with contaminated hands	Done	30	33.7
	Not Done	59	66.3
Pregnant women stay at home when fell with symptoms like	Done	45	50.6
	Not Done	44	49.4
In recent days, have pregnant women avoided gone to any crowded place	Done	39	43.8
	Not Done	50	56.2
Pregnant women use tissues during coughing and sneezing	Done	48	53.9
	Not Done	41	46.1
Pregnant women eat healthy food during pregnancy	Done	65	73.0
	Not Done	24	27.0
Pregnant women obey all government rules related to preven measures of pregnant women toward the coronavirus	Done	42	47.2
	Not Done	47	52.8
Pregnant women learn others preventive measures that pregn women learned	Done	21	23.6
	Not Done	68	76.4

*Statistically significant at p<0.01. r Pearson correlation*

**Table (5)** indicates that there is less than one quarter of them (23.6%) mention "Pregnant women learn others preventive measures that you learned".

## DISCUSSION

The result of the present study revealed that less than half of pregnant women aged from 20 to less than 25 years old; with mean SD= 21.68±3.45 years old. This result is similar to the result of a study performed by **Sabry et al., (2021)** entitled "Effect of Whatsapp educational program reminder on pregnant women’s knowledge, attitude, and practice regarding the -19 covid 19 pandemic," stated that more than half of

women aged 25 to < 30 years with a mean age of  $26.97 \pm 2.76$  year The researcher think that this result might be due to this age group is considered the most age of marriage and pregnancy.

Regarding the residence of the studied pregnant women, the current study revealed that most pregnant women were from the rural area. This result is in accordance with **Mohamed et al., (2020)** in their study entitled "Pregnant women's knowledge, attitude and self-protective measures practice regarding coronavirus prevention: health education program" who revealed that more than two-thirds of the studied pregnant women lived in the rural area and didn't work. The result is in agreement with the study achieved by **Nwafor et al., (2020)** entitled "knowledge and practice of preventive measures against COVID-19 infection among pregnant women in a low-resource African setting" who found that more than half of the studied subjects reside in the urban area. This result may be due to a lack of health services in the rural area and pregnant women come to the general hospitals to obtain their health services.

Related to the educational level of the studied pregnant women, it was found that more than half of the studied pregnant women can read and write. The present study is consistent with **Hoque et al., (2021)** who studied "knowledge, attitudes, and practices towards COVID-19 of pregnant women at a primary health care facility in South Africa" and reported that the majority of the respondents had low education (can read and write only). But, this result is different from **Ayele et al., (2021)** who studied "Knowledge and practice to prevent COVID-19 and its associated factors among pregnant women in Debre Tabor Town Northwest Ethiopia, a community-based cross-sectional study" and showed that near to half of the studied pregnant women had a high level of education (college and above). This finding may be due to most pregnant women being from rural areas and the culture of rural areas do not concern with the education of females.

Concerning family monthly income, the finding of the current study revealed that three-quarters of the studied pregnant women had adequate family monthly income. This result is supported by a study done by **Yazdi et al., (2020)** entitled "Latent class analysis of knowledge, attitude, and practice of a population-based sample of Iranian pregnant women toward COVID-19" and found that more than two-thirds of pregnant women had sufficient income. In the contrast, **Kasemy et al., (2020)** in a study entitled "knowledge, attitude and practice toward COVID-19 among Egyptian" demonstrated that near to half of the participants had not enough income.

In the present study, less than one-quarter of the studied pregnant women had chronic health problems and more than half of them had hypertension. This result is approved with a study performed by **Maharlouei et al. (2020)** entitled "Knowledge and attitude regarding COVID-19 among pregnant women in Southwestern Iran in the early period of its outbreak: a cross-sectional study" who found that the majority of pregnant women had a chronic disease. This finding is un similar to a study done by **Kumbeni et al., 2021** who studied "Knowledge and preventive practices towards COVID-19 among pregnant women seeking antenatal services in Northern Ghan" which represented that most of the studied women had no chronic diseases.

Regarding the studied pregnant women according to their diagnoses of coronavirus previously before pregnancy, the present study revealed that less than one-quarter of them were diagnosed with coronavirus previously before pregnancy while more than three-quarters of pregnant women were not. This result is in

accordance with a study carried out by **Kunno et al., (2022)** entitled "Knowledge, attitudes, and practices related to the COVID-19 pandemic among pregnant women in Bangkok, Thailand" and revealed that the majority of pregnant women didn't expose to COVID 19 before pregnancy. From the researcher's point of view, this result may be because most of the pregnant women had degrees of worry and fear of becoming infected and may try to save their health away from personal interactions during this period.

Concerning the obstetric history of the studied pregnant women, the findings of the current study revealed that more than two-thirds of the pregnant women's gravidity had from one to two. Concerning parity, nearly two-thirds of them had from one to two. Most of them hadn't had abortions. Nearly two-thirds of them had from one to two living children. As regards gestational age, less than half of them had from twenty to less than thirty weeks. Moreover, the majority of them attended antenatal care visits regularly. These results are supported by a study done by **Besho et al., (2021)** entitled "Knowledge, attitude and practice toward coronavirus infection among pregnant women attending antenatal care at public hospitals in three wollega zones, Ethiopia" which demonstrated that more than two third of the participants were multigravidas and near to half of them were multiparas. More than three-fourths of the participants had antenatal care (ANC) follow-up in their current pregnancies.

These results are supported with a study done by **Besho et al., (2021)** which entitled "Knowledge, attitude and practice toward corona virus infection among pregnant women attending antenatal care at public hospitals in three wollega zones, Ethiopia" who demonstrated that more than two third of the participants were multigravidas and near to half of them were multiparas. More than three-fourth of the participants had antenatal care (ANC) follow-up in their current pregnancies.

Concerning knowledge about definition and spread of coronavirus among the pregnant women evidence, nearly one third of them had correct knowledge about "Define the Coronavirus".

These results agree with **Bekele et al., (2021)** at a study entitled "The knowledge and practice towards COVID-19 pandemic prevention among residents of Ethiopia. An online cross-sectional study" who indicated that the vast majority of study sample knowing that COVID 19 is a viral and infectious disease. These findings may be due to the health education program implementation succeeding in increasing the studied pregnant women's knowledge.

In relation to knowledge of the studied pregnant women about preventive measures toward coronavirus risk for Coronavirus infection, more than half of them mentioned pregnant women. Concerning prevention of coronavirus, about two fifth of them reported maintaining self-quarantine.

On the same line, these finding agree with a survey by **Zhong et al., (2020)** conducted in China about "Knowledge, attitudes, and practices towards COVID-19 among Chinese residents during the rapid rise period of the COVID-19 outbreak" which found that the majority of the pregnant women had acceptable levels of knowledge about COVID-19 as its risk groups and prevention methods post educational program.

Also, these results agree with a study done by **Clements, (2020)** in the United States, about "Knowledge and behaviors toward COVID-19 among US residents during the early days of the pandemic" which revealed that the majority of the pregnant women had acceptable levels of knowledge of COVID-19 post educational program. These results may explain that the health education program was effective in improving level of the studied pregnant women level of information about COVID-19.

As regard to practice regarding preventive measures toward coronavirus regarding washing hands and wear face mask among the studied pregnant women, the present study found that regarding washing hands, more than half of them mentioned, "After treating with others in hospital". Concerning wear facemask, more than one third of them reported "Treat with others outside the home".

These results are similar with the results of a study performed by **Hanon & Ali (2022)** which entitled "Effectiveness of Instructional Program on Women Practices about Prevention of Covid 19 in Kirkuk City" who showed that there was highly statistical significance difference between both study and control group regarding hand washing & mask wearing which more than three quarters of the study group had highly satisfactory practices post educational implementation compared to pre-educational implementation.

Additionally, these findings agree with **Madappuram & Kamel (2020)** at their study entitled "Covid19 and Pregnancy" who stated that the greatest tool to prevent COVID- 19 infection in pregnant women is social distancing and maintaining hygiene. However, these findings disagree with **Nwafor et al., (2020)** who carried out a study entitled "Pregnant women's knowledge and practice of preventive measures against COVID-19 in a low-resource African setting" and found that the minority of the participants practiced frequent hand washing with soap and water and only more than one quarter of them used facemask in public.

## CONCLUSION

Based on the findings of the study concluded that nearby half of pregnant women had unsatisfactory knowledge toward coronavirus preventive measures and more than half of pregnant women had inadequate practice toward coronavirus preventive measures.

## RECOMMENDATION

In the light of the finding of this study, the following recommendations are suggested;

- Pregnant women should be given health education to raise their awareness about the preventive measure of coronavirus.
- Health education programs to improve coronavirus knowledge are helpful for encouraging an optimistic attitudes and maintaining safe practices.

## REFERENCES

**Apanga, P. A., & Kumbeni, M. T. (2021).** Adherence to COVID-19 preventive measures and associated factors among pregnant women in Ghana. *Tropical Medicine & International Health*, 26(6), 656-663.

**Asadi, S., Bouvier, N., Wexler, A. S., & Ristenpart, W. D. (2020).** The coronavirus pandemic and aerosols: Does COVID-19 transmit via expiratory particles? *Aerosol science and technology: the journal of the American Association for Aerosol Research*, 0(0), 1 <https://doi.org/10.1080/02786826.2020.1749229>

**Ayele, A. D., Mihretie, G. N., Belay, H. G., Teffera, A. G., Kassa, B. G., & Amsalu, B. T. (2021).** Knowledge and practice to prevent COVID-19 and its associated factors among pregnant women in Debre Tabor Town Northwest Ethiopia, a community-based cross-sectional study. *BMC pregnancy and childbirth*, 21(1), 1-12.

**Basnet, B., Chapagain, P., Subedi, S., Dahal, T., Neupane, S., Khanal, R., ... & Sundar Budhathoki, S. (2022).** Experiences of nurses providing maternity care in a public Health, 2(5), e0000322.

**Besho, M., Tsegaye, R., Yilma, M. T., Kasaye, H. K., Tolossa, T., Hiko, N., ... & Wakuma, B. (2021).** Knowledge, attitude and practice toward corona virus infection among pregnant women attending antenatal care at public hospitals in three wollega zones, ethiopia. *International Journal of General Medicine*, 14, 3563.

**Centers for Disease Control and Prevention (CDC). (2020).** CDC updates COVID-19 transmission webpage to clarify information about types of spread 2020; Available at <https://www.cdc.gov/media/releases/2020/s0522-cdc-updates-covid-transmission.html>. Chavez, S., Long, B., Koyfman, A., & Liang, S. Y. (2020). Coronavirus Disease (COVID-19): A primer for emergency physicians. *The American journal of emergency medicine*.

**Hoque, A. M., Alam, A. M., Hoque, M., Hoque, M. E., & Van Hal, G. (2021).** Knowledge, attitudes, and practices towards COVID-19 of pregnant women at a primary health care facility in South Africa. *European Journal of Medical and Health Sciences*, 3(1), 50-55.

**Hu, J., Danielli, M., Thomas, R. C., Melford, S. E., Gillies, C. L., Scott, D. A., & Tan, B. K. (2020).** COVID-19: women with diabetes and hypertension during pregnancy. *British Journal of Midwifery*, 28(11), 800-801.

**Hui, D. S., Azhar, E. I., Madani, T. A., Ntoumi, F., Kock, R., Dar, O., ... & Petersen, E. (2020).** The continuing 2019-nCoV epidemic threat of novel coronaviruses to global health—The latest 2019 novel coronavirus outbreak in Wuhan, China. *International journal of infectious diseases*, 91, 264-266.

**Kamal, D., Thakur, V. D., Swain, S. K., & Vikneshram, C. R. (2020).** Knowledge, attitude, and practice toward COVID-19 among pregnant women in a tertiary care hospital during the COVID-19 outbreak. *Journal of Marine Medical Society*, 22(3), 66.

**Kasemy, Z. A., Bahbah, W. A., Zewain, S. K., Haggag, M. G., Alkalash, S. H., Zahran, E., & Desouky, D. E. (2020).** Knowledge, attitude and practice toward COVID-19 among Egyptians. *Journal of epidemiology and global health*, 10(4), 378.

**Kumbeni, M. T., Apanga, P. A., Yeboah, E. O., & Lettor, I. B. K. (2021).** Knowledge and preventive practices towards COVID-19 among pregnant women seeking antenatal services in Northern Ghana. *Plos one*, 16(6), e0253446.

**Kunno, J., Yubonpunt, P., Supawattanabodee, B., Sumanasrethakul, C., & Wiriyasirivaj, B. (2022).** Knowledge, attitudes, and practices related to the COVID-19 pandemic among pregnant women in Bangkok, Thailand. *BMC pregnancy and childbirth*, 22(1), 1-11.

**Li, Q., Guan, X., Wu, P., Wang, X., Zhou, L., Tong, Y., ... & Xing, X. (2020).** Early transmission dynamics in Wuhan, China, of novel coronavirus-infected pneumonia. *New England Journal of Medicine*.

**Lu, H., Stratton, C. W., & Tang, Y. W. (2020).** Outbreak of pneumonia of unknown etiology in Wuhan, China: The mystery and the miracle. *Journal of medical virology*, 92(4), 401.

**Maharlouei, N., Asadi, N., Bazrafshan, K., Roozmeh, S., Rezaianzadeh, A., Zahed-Roozegar, M. H., ... & Lankarani, K. B. (2020).** Knowledge and attitude regarding COVID-19 among pregnant women in Southwestern Iran in the early period of its outbreak: a cross-sectional study. *The American journal of tropical medicine and hygiene*, 103(6), 2368.

**Makoni, M. (2020).** Africa prepares for coronavirus. *The Lancet*, 395(10223), 483.

**Metwally, H. M. S., & Desouky, A. M. M. (2020).** Knowledge, practice and attitudes of preventive measures against coronavirus infection among pregnant women in Egypt. *Saudi Journal of Nursing and Health Care*. doi, 10(6)123-876.

**Mohamed, A. I., Elsayed, D. M. S., Abosree, T. H., & Eltohamy, N. A. E. (2020).** Pregnant Women's Knowledge, Attitude and Self-Protective Measures Practice regarding Corona virus prevention: Health Educational Intervention. *Egyptian Journal of Health Care*, 11(4), 260-278.



**Nwafor, J. I., Anukwu, J. K., Anozie, B. O., Ikeotunye, A. C., & Okedo-Alex, I. N. (2020).** Pregnant women's knowledge and practice of preventive measures against COVID-19 in a low-resource African setting. *Int J Gynaecol Obstet*, 150(1), 121-123.

**Olum, Ronald, Gaudencia Chekwech, Godfrey Wekha, Dianah Rhoda Nassozi, and Felix Bongomin. "Coronavirus disease-2020: knowledge, attitude, and practices of health care workers at Makerere University Teaching Hospitals, Uganda." *Frontiers in public health* 8 (2020): 181.**

**Sabry, M, A, F., Mohamed, A, A., Ghanem, A, M, N., Saad Abd El-aty, N., & Ahmed, A, N. (2021).** Effect of WhatsApp Educational Program Reminder on Pregnant Women's Knowledge, Attitude and Practice Regarding COVID-19 pandemic. *Egyptian Journal of Health Care*, 12(3), 116-130.

**Steven K. Thompson., (2012):** Sampling' 3<sup>rd</sup> ed, John Wiley & Sons, p59-60.

**Thorlund, K., Dron, L., Park, J., Hsu, G., Forrest, J. I., & Mills, E. J. (2020).** A real-time dashboard of clinical trials for COVID-19. *The Lancet Digital Health*, 2(6), e286-e287.

**Thorlund, K., Dron, L., Park, J., Hsu, G., Forrest, J. I., & Mills, E. J. (2020).** A real-time dashboard of clinical trials for COVID-19. *The Lancet Digital Health*, 2(6), e286-e287.

**WHO , 2020.** Novel Coronavirus (COVID-19). Geneva, Switzerland: World Health Organization; Available at: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019>. Accessed May 2, 2020. [Google Scholar]

**World Health Organization. (2020).** Coronavirus disease ( COVID-19): weekly epidemiological, update

**Yazdi, M., Bemanalizadeh, M., Mohebpour, F., Goli, P., Daniali, S. S., & Kelishadi, R. (2022).** Latent class analysis of knowledge, attitude, and practice of a population-based sample of Iranian pregnant women toward COVID-19. *Advanced Biomedical Research*, 11,52.