

## Pregnant Women's Knowledge Regarding Telemedicine as Antenatal Care Strategy during Corona Pandemic

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### Abstract

**Background:** A COVID-19 pandemic is emerging infections and a horrible disease has been shown to have a fatal impact on pregnant women and their fetuses. Telemedicine has become vital to ensure safe and effective health for maternal and fetal conditions. **Aim:** assess pregnant women's knowledge regarding telemedicine to be used as antenatal care strategy during corona pandemic. **Research Design:** A descriptive exploratory design was utilized to conduct this study. **Setting:** The study was conducted in the Ante Natal Outpatient Clinic at Ain Shams University Maternity Hospital. **Sample:** Convenient sample consisted of 368 women from the previous mentioned setting. **Tools:** tool was used; structured interviewing questionnaire was used to assess general characteristics, medical and family history, obstetric history, and pregnant women's knowledge regarding telemedicine. **Result:** the current study revealed that 53.3% of studied sample had good knowledge about telemedicine. **Conclusion:** The present study was concluded that about half of pregnant women had satisfactory knowledge regarding telemedicine. Moreover, there was a high statistical significant relation between studied sample knowledge and their educational level with p value <0.001, also there is significance relation between knowledge and family income with p-value 0.010. **Recommendation:** Awareness programs should be developed up to raise women's knowledge regarding telemedicine services & Application of instructional guideline to healthcare providers to improve Obstetric services access via telemedicine after COVID-19 **Further researches:** evaluate the effect of educational programs regard telemedicine in reducing maternal mortality and morbidity among pregnant women during COVID19.

**Key words:** Telemedicine, Antenatal care, knowledge.

### Introduction

Corona virus pandemic has been declared by the World Health Organization after facing many countries of the world with a sudden significant increase in hospitalizations for pneumonia and multi organ disease. According to world health organization; the incidence rate of covid19 in Egypt from January 2020 to June 2022 have been 514,008 confirmed cases with 24,720 deaths, and a total 88,052,405 vaccine doses have been administered. Globally; at June 2022, there have been 535,863,950 confirmed cases with 6,314,972 deaths, and a total 11,902,271,619 vaccine doses have been administered. (WHO, 2022)

Corona viruses are a large family of viruses that cause illness ranging from the

common cold to more severe diseases. Symptoms of COVID-19 are variable, such as headache, nasal congestion, rhinorrhea, cough, muscle pain, sore throat, fever, loss of appetite, diarrhea, and breathing difficulties. COVID-19 pandemic affected the health care services across the world. This effect also includes maternal and child health. (WHO, 2021).

Due to the COVID-19 pandemic, a large proportion of health care resources have been diverted from routine care delivery to adapt with the pandemic. This diversion of resources may lead to the disruption of other essential care services, which affect the continuum of care, i.e., follow-up visits and medication supplies, etc.... Moreover, service

utilization by the pregnant women may also decline due to unavailability, fear of infection and constrained access. These factors can adversely affect the most vulnerable segment of the population, as pregnant women. **(Kotlar, et al., 2021)**

During pregnancy, women undergo many physiological changes in all body organs. According to center of disease control and prevention (CDC), pregnant women with COVID-19 are more likely to experience adverse health outcomes than non-pregnant women, so pregnant women should follow preventive measures to reduce exposure to viral infections as social distancing. **(CDC 2020)**

A broad range of pregnancy-related services could be offered via telemedicine. Consultation with specialists could be for addressing complaints, regular antenatal checkup, and to provide home monitoring for conditions like diabetes and hypertension **(Bush et al., 2017)**.

According to World Health Organization telemedicine is “The delivery of healthcare services, where distance is a critical factor, by all healthcare professionals using information and communication technologies for the exchange of valid information about diagnosis, treatment, prevention of disease, injuries, research, evaluation, and for the continuing education of healthcare providers, all in the interests of advancing the health of individuals and their communities **(WHO, 2010)**

Telemedicine is used in many medical fields such as dermatology, behavioral health, cardiology, also in antenatal care. Antenatal care (ANC) is the care provided by skilled healthcare professionals to women during pregnancy. It is essential for protecting the health of women and their fetus. It includes risk identification, screening and prevention, management of pregnancy-related diseases, health education and promotion. Global guidelines recommend frequent medical care visits during the antenatal period to decrease the risk of maternal mortality **(Tunçalp et al., 2017)**.

Pregnant women knowledge about telemedicine is an important component for the success of telemedicine. However, there are various factors that affect how pregnant women perceive telemedicine service. Technical training and clear guidelines are necessary to improve knowledge about telemedicine. In order to ensure adequate care, maintaining home quarantine, pregnant women were included in a multidisciplinary tele-assistance network. **(Hassibian, et al., 2016)**

The nurse can play a crucial role among pregnant women during global pandemic acting as key drivers of health care since nurse play multidisciplinary roles regarding pregnant women's care, education and counseling through telemedicine. Nurses play different roles in telehealth. Nurses can use of technology to conduct telehealth sessions in homes, at doctor's offices, and in clinics and hospitals. Mainly, any place where the proper technology is available is a suitable place for telehealth nursing. **(Rutledge, et al., 2021)**

#### **Justification of the study:**

COVID-19, the disease caused by a new corona virus, spread rapidly around the globe and is a pandemic, according to the World Health Organization. **(WHO, 2020)**. The impact of COVID-19 could be greater in vulnerable populations as among the pregnant women. The Prevalence of COVID-19 among the pregnant women worldwide is about 10% of all pregnant women admitted to hospital with COVID-19, while 73% of the pregnant women with COVID-19 were asymptomatic. **(WHO Collaborating Centre for Global Women's Health 2020)**.

Telemedicine using for antenatal care health services could be a useful, alternative option for pregnant women in need of basic antenatal care and health consultation. It could reduce the unnecessary hospital visits and limit potential risks for infection among this vulnerable group during the COVID-19 pandemic **(Weigel, et al., 2020)**.

For women at higher risk of being affected (e.g. pregnant women), telemedicine

could provide convenient access to routine care without the risk of exposure in a congested hospital or in affected medical practice waiting area. Telemedicine is an ideal method for delivering health care services during corona pandemic, and acting as a key factor in slowing the transmission of a virus among social distancing which decreasing person-to-person contact (PHE 2020).

Using telemedicine for antenatal care and health services could be a useful alternative option for pregnant women in need of basic antenatal care and health consultation. It could reduce unnecessary hospital visits and limit potential risks for infection among this vulnerable group during the COVID-19 pandemic. So pregnant women knowledge about telemedicine is an important component for the success of telemedicine, so the current study aimed to assess pregnant women knowledge regard telemedicine usage in antenatal care (Huailiang et al., 2020).

#### **Aim of the study:**

To assess pregnant women's knowledge regarding telemedicine to be used as antenatal care strategy during corona pandemic.

#### **Research questions:**

- 1- Are pregnant women's had knowledge that telemedicine used as alternative strategy to traditional health care services?
- 2- What are the barriers that affect pregnant women acquire knowledge regard telemedicine?

#### **Subjects and Methods**

##### **Technical design**

##### **Research Design:**

A descriptive exploratory design was utilized to conduct this study.

##### **Setting:**

This study was conducted in the Ante Natal Outpatient Clinic at Ain Shams University Maternity Hospital.

##### **Subject (sampling):**

**Sample Type:** convenient sample was used.

##### **Sample size& technique:**

Study subjects include a representative sample of total pregnant women in outpatient clinical units' attendance rate (N=8640) / year at Ain Shams University Maternity Hospital; according to the flow rate of the pregnant women who were visited the antenatal clinic during the period 2019-2020. Based on sample size equation 368 women was participated in the study.

The sample size was calculated by adjusting the power of the test to 80% and the confidence interval to 95% with margin of error accepted adjusted to 5% and a known total population of 368 women using the following equation:

- Type I error ( $\alpha$ ) = 0.05
- Type II error (B) = 0.2
- With power of test 0.80

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

$$368 = \frac{8640 \times 0.5(1-0.5)}{\left[ \left[ 8640-1 \times (0.05^2 \div 1.96^2) \right] + 0.5(1-0.5) \right]}$$

N= Community size

z= Class standard corresponding to the level of significance equal to 0.95 and 1.96

d= the error rate is equal to 0.05

p= Ratio provides a neutral property = 0.50

**• Data collection tools: Two tools were used:**

##### **Tool I: A structured Interviewing Questionnaire schedule:**

The researcher designed the questionnaire in a simple Arabic language after reviewing the recent and related literature to assess pregnant women's knowledge regarding telemedicine as antenatal care during corona virus pandemic. It divides into five parts:

- **Part I:** assessed women's general characteristics including five questions regarding Age, Level of education, marital status, Employment status, and family income from Q 1 to Q 5.
- **Part II:** assessed obstetric history. It consists of questions about Gravida, Parity, Previous abortion, causes of abortion, and previous pregnancy complication from Q 6 to Q 10.
- **Part III:** assessed present pregnancy history. It consists of questions regarding Gestational age, present complain during pregnancy (Q 11 & Q12)
- **Part IV:** assessed medical and family history. (Q 13 & Q14).
- **Part V:** assessed pregnant women knowledge about telemedicine as antenatal care during corona virus pandemic. It consists of questions about meaning of telemedicine, advantages & disadvantages, source of information, fields of telemedicine, communication techniques of telemedicine, barriers of telemedicine, and previous training program from Q 15 to 24.

❖ **Scoring system for evaluating women's knowledge was developed as the following:**

- This subsection consisted of 10 items about telemedicine which was used to assess knowledge. Each item was scored with a 2-point scale with scores of 1-2 (2=satisfied, 1=un satisfied). The overall score could range from a minimum of 1 to a maximum of 20. The overall level of knowledge was assessed by summing scores for all responses, and then a percentage score was calculated. This percentage score was categorized into satisfactory= (>75%) and unsatisfactory= (<=75%).

#### **Validity and reliability:**

Tools were revised and evaluated for feasibility and content validity by five experts from the Faculty of Nursing Ain Shams University in the Maternity-Gynecological Nursing Department, their comments were considered.

Reliability was done by Cronbach's Alpha coefficient test which revealed  $r = 0.8022$ .

#### **Ethical Considerations:**

The ethical research considerations in this study include the following:

- Ethical approval was obtained from the Scientific Research Ethical Committee in the Faculty of Nursing at Ain Shams University before starting the study.
- In addition, the researcher was clarifying the objective and aim of the study to women that was included in the study.
- Oral consent was obtained from each participant prior to data collection.
- They were assured that anonymity and confidentiality would be guaranteed with no harm.
- The right of women to withdraw from the study at any time.

#### **Administrative Design:**

An official permission was obtained from the director of the Ain Shams University Maternity Hospitals in which the study was conducted as a letter was sent from the Faculty of Nursing-Ain Shams University explaining the aim of the study to obtain the permission for conducting this study.

#### **Operational Design:**

The Operational design includes preparatory phase, pilot study and fieldwork.

#### **The Preparatory Phase:**

It included reviewing of the current local and international related literature using books, articles and scientific magazines to develop tools for data collection.

#### **Pilot Study:**

A pilot study was carried out on 10% (36 women), selected regarding previous mentioned criteria and the period of study within one month. It was aimed to evaluate the simplicity and clarity of the tools, help in the estimation of the time needed to fill the questionnaire and also determine obstacles facing data collection. No modification was needed and the pilot sample wasn't excluded.

**Field Work:**

Through this phase the researcher had attend Ante Natal Outpatient Clinic at Ain Shams University Maternity Hospital from 1 December 2021 to 1 June 2022, 2days /week from 10 am to 1pm until predetermined sample size collected. The researcher started to introduce herself & explain the aim of the study to the women & take oral consent from her. The average numbers of women interviewing/day were 8-10 women/day using tool to carry out the research in which a structured interviewing questionnaire used to assess pregnant women knowledge regarding telemedicine as antenatal strategy during corona virus pandemic with range time 10 minutes & the questionnaire filled by the study women except uneducated women. The researcher repeated previous steps until finished the duration of data collection.

**Statistical Design:**

Recorded data were analyzed using the statistical package for social sciences, version 22.0 (SPSS Inc., Chicago, Illinois, USA). Quantitative data were expressed as mean± standard deviation (SD). Qualitative data were expressed as frequency and percentage.

**The following tests were done:**

- Chi-square ( $\chi^2$ ) test of significance was used in order to compare proportions between qualitative parameters.
- Pearson's correlation coefficient (r) test was used to assess the degree of association between two sets of variables
- The confidence interval was set to 95% and the margin of error accepted was set to 5%. So, the p-value was considered significant as the following:
  - Probability (P-value)
  - P-value <0.05 was considered significant.
  - P-value <0.001 was considered as highly significant.

- P-value >0.05 was considered insignificant.

**Results:**

**Table (1)** revealed that (57.9%) among studied sample aged between 20-30 years while (42.2%) aged between 31-40 years with mean  $29.21 \pm 6.72$ . Concerning educational level (60.6%) among studied sample had intermediate qualification while (11.4%) was illiterate. In relation to marital status (93.5%) of studied women are married, moreover (66.3%) are working, and (84.8%) have enough family income.

**Table (2)** indicates that 45.1% of the study samples were gravida 3. As regards their parity, 50.8% of the study samples were primipara. Concerning abortion, 76.4% of the study sample had no previous abortion. Moreover 72.4% had complications during previous pregnancy, and the dominant complication was gestational hypertension that represents 43.6%. In relation to gestational age 42.7% of studied sample between 14-26 weeks, while 88.3% had problems with pregnancy, and the most dominant problem was nausea and vomiting that represents 36.3%.

**Table (3):** show that 53.3% of studied sample had satisfactory level of knowledge about telemedicine.

**Figure (1):** show that 29.3%, 17.4% of the studied samples their barriers that reduce knowledge about telemedicine services were lack of education, guidance, and training.

**Table (4)** revealed that there is a high statistical significant relation between studied sample knowledge and their educational level with p value <0.001, also there is significance relation between knowledge and family income with p-value 0.010.

**Table (1):** Number and percentage distribution of the studied pregnant women's during corona pandemic according to their socio-demographic data (N=368).

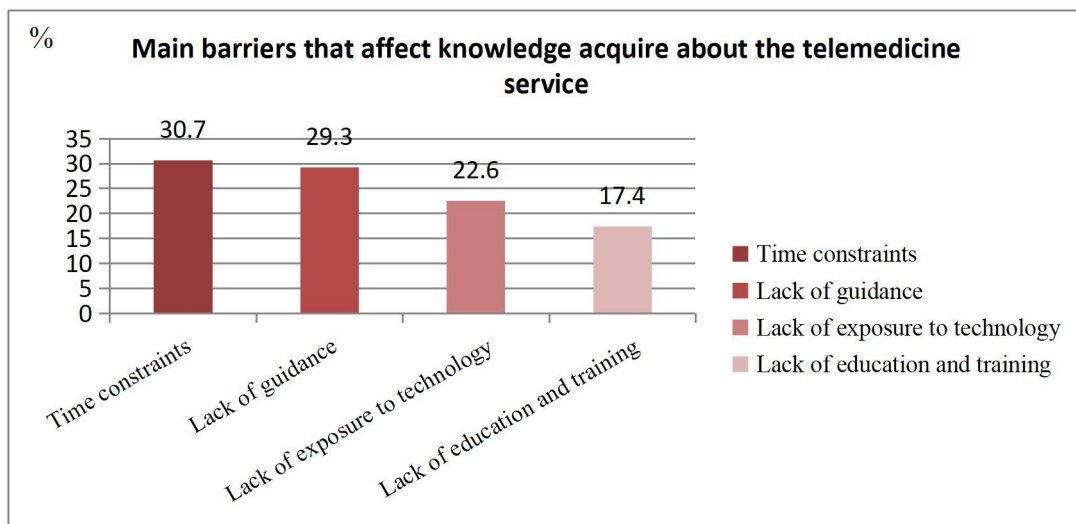
Socio-demographic data	No.	%
<b>Age (years)</b>		
20-30 years	213	57.9
>30 - 40 years	155	42.1
—		
$\bar{X} \pm SD$		29.21±6.72
<b>Education level</b>		
Illiterate	42	11.4
Intermediate qualification	223	60.6
High qualification	103	28.0
<b>Marital status</b>		
Married	344	93.5
A widow	15	4.1
Divorced	9	2.4
<b>Occupation</b>		
Worker	244	66.3
A housewife	124	33.7
<b>Family income</b>		
Enough	312	84.8
Not enough	56	15.2
Enough and overflowing	0	0.0

**Table (2):** Number and percentage distribution of the studied pregnant women during corona pandemic according to their pregnancy and birth history (N=368).

Items	No.	%
<b>Pregnancy and birth history</b>		
<b>Gravida</b>		
Primi gravida	38	10.3
2 <sup>nd</sup> gravida	143	38.9
3 <sup>rd</sup> gravida	166	45.1
More than three	21	5.7
<b>Para</b>		
Primi parous	187	50.8
2 <sup>nd</sup> parous	119	32.3
3 <sup>rd</sup> parous	9	2.4
>3 <sup>rd</sup>	53	14.4
<b>Previous abortion</b>		
Yes	87	23.6
No	281	76.4
<b>If found, what is the cause of abortion (n=87)</b>		
Chromosomal abnormalities	15	17.2
Hormonal irregularities	23	26.4
Environmental hazard	10	11.5
Uterine abnormalities	12	13.8
Others	27	31.0
<b>Complications during your previous pregnancy</b>		
Yes	101	27.4
No	267	72.6
<b>If you suffer, what are these complications (n=101)</b>		
Gestational diabetes	6	5.9
Gestational hypertension	44	43.6
Cardiac disease	2	2.0
Chest disease	42	41.6
Immunological disorder	2	2.0
Others	5	5.0
<b>Present pregnancy history</b>		
<b>Gestational age (wks)</b>		
1-13 weeks	99	26.9
14-26 weeks	157	42.7
27-40 weeks	112	30.4
<b>Are there any problems associated with the current pregnancy?</b>		
Yes	325	88.3
No	43	11.7
<b>If you find, remember it (n=325)</b>		
Nausea and vomiting	118	36.3
Heart burn	44	13.5
Headache	38	11.7
Dyspnea	11	3.4
Orthostatic hypotension	63	19.4
Varicose vein and edema	51	15.7

**Table (3):** Number and percentage distribution of the studied pregnant women during corona pandemic according to their total knowledge level about the telemedicine service (N=368).

Level of total knowledge for pregnant women about telemedicine service	No.	%
Satisfactory >75%	196	53.3
Un satisfactory ≤75%	172	46.7
Total	368	100.0



**Figure (1):** Number and percentage distribution of the studied pregnant women’s according to the main barriers that reduce knowledge about the telemedicine service (N=368).

**Table (4):** Relation between level of total knowledge for pregnant women using the telemedicine service according to their socio-demographic data during corona pandemic (N=368).

Socio-Demographic data	Level of total knowledge				Chi-square test	
	Satisfied (n=172)		Un satisfied (n=196)		x2	p-value
	No.	%	No.	%		
<b>Age (years)</b>						
20-30 years	108	62.8%	105	53.6%	3.194	0.074
31-40 years	64	37.2%	91	46.4%		
<b>Educational level</b>					40.507	<0.001**
Illiterate	39	22.7%	3	1.5%		
Intermediate qualification	91	52.9%	132	67.3%		
High qualification	42	24.4%	61	31.1%		
<b>Social status</b>					2.568	0.277
Married	164	95.3%	180	91.8%		
A widow	6	3.5%	9	4.6%		
Divorced	2	1.2%	7	3.6%		
<b>Occupation</b>					0.204	0.651
Worker	112	65.1%	132	67.3%		
A housewife	60	34.9%	64	32.7%		
<b>Family income</b>					6.591	0.010*
Enough	137	79.7%	175	89.3%		
Not enough	35	20.3%	21	10.7%		

**Discussion**

COVID-19 pandemic is emerging infections and a horrible disease has been shown to have a fatal impact on pregnant women and their fetuses. Telehealth program via SMS messages and mobile applications play vital role to ensure safe and effective health for maternal and fetal conditions. During COVID-19, telemedicine shown to be a feasible means of delivering healthcare services, maintaining physical distancing and effectively reducing the risk of virus transmission. Telemedicine applications were vital in supporting public health precautions, reducing risk while maintaining high standards of care. (Wang et al., 2020).

Based on this critical issue, the present study was conducted to assess pregnant women awareness regarding telemedicine as antenatal care strategy during corona pandemic. The researcher analyzes the available data for studied sample through the following;

Regarding general characteristics, the result of the present study revealed that slightly more than half of women were between 20-30 years old with a mean age of  $29.21 \pm 6.72$ . Concerning marital status, the majority of them were married. At the same time, about three fifths of them were intermediate education. Adding to about two third of them was worker and about four fifths of them had enough income.

The present study findings were partially agreeing with (Merga et al., 2020), who carried out a study to assess the knowledge, attitude and practice towards COVID-19 among pregnant women attending antenatal clinics & reported that the mean age of cases was  $25.46 \pm 4.67$  while nearly half of them were intermediate education, also the majority of them are married and worked.

Regarding obstetric history, the current study showed that more than two fifths of the study sample was third gravida, and about half of them were primi-para, while about three quarters of them had no previous abortion. Moreover, about one fifth of them had

complications during previous pregnancy, and the dominant complication was gestational hypertension that represents about two fifths of them. In relation to gestational age about two fifths of studied sample between 14-26 weeks, while the majority had problems with pregnancy, and the dominant problem was nausea and vomiting that represents one third of them.

The previous findings were on the contrary with (Abd El-wahab, S., et al., 2022), who carried out a study to investigate Impact of Psycho-Educational Nursing Intervention about Covid-19 on the Pregnant Woman's Knowledge, Anxiety, Depression, and Protective Practices and reported that nearly less than three fourths of the study sample was primi-gravida, and the majority of them were primi-para, while the most of them had no previous abortion. Moreover, the majority had no complications during previous pregnancy. In relation to gestational age about three-fourths of studied sample in the third trimester.

As regards study sample knowledge about telemedicine, the current study carried out among pregnant women and pointed out that more than half of pregnant women had satisfactory level of knowledge regard the meaning of telemedicine, communication techniques and fields of telemedicine, and about half of them were oriented with advantages and disadvantages of telemedicine services, this result may be due to WHO recommendations to reduce numbers of traditional prenatal visits to avoid exposure of pregnant woman and health workers to infected persons with the Corona virus and merge it with virtual prenatal visits, so many health care providers diversion to telemedicine in follow up the pregnant women through providing information about antenatal care and pregnancy guidelines through communication via SMS message, also the majority of study sample were intermediate and highly educated so there is capability to learn and acceptance of new models of care.

The previous findings agreed with (Sukumaran, A., et al., 2020), who carried out a study to assess Protective Behavior against COVID 19 and Telemedicine Use among the Pregnant Women during Pandemic Period and



reported that about half of study sample had good level of knowledge regard telemedicine and usage in antenatal care.

Regarding barriers that reduce knowledge about telemedicine service, the current study revealed that about three quarter of study sample reported lack of guidance, education and training as a barrier while about one third of study sample reported time constraints as a barrier, this result may be due to lack of training program on how to use telemedicine and this result in inability of clients to access to equipment and connectivity, difficulty downloading software, so needs to increase training session duration and frequency and more practical exposure would help them to gain more experience.

These findings were on the contrary with (Allie et al., 2022) who carried out a study on Prenatal telemedicine during COVID-19: patterns of use and barriers to access and reported that two fifth of barriers related to poor phone or internet connection.

In addition, the current study revealed that there is a high statistical significant relation between studied sample knowledge and their educational level, also there is significance relation between knowledge and family income. This may be due to most of study sample had intermediate and high qualification so they able to deal with technological devices, also the majority of them had enough family income, so the assisted devices could be available and ability for receiving training on technology.

This finding agreed with (Anees, 2021) who carried a study to assess Socio-demographic factors affecting telemedicine access that reported there is high statistical significance between age, educational level and family income.

## Conclusion

**Based on the results of the study, it is concluded that:** The current study's findings answered the present study's questions and aim, which stated that about half of pregnant women had satisfactory level of knowledge regarding

telemedicine.

## Recommendations

**In light of the findings of this study, the following recommendations are suggested:**

Awareness programs should be developed up to raise women's knowledge regarding telemedicine services & Application of instructional guideline to healthcare providers to improve Obstetric services access via telemedicine after COVID-19.

**Further researches:** evaluate the effect of educational programs on telemedicine in reducing maternal mortality and morbidity among pregnant women during COVID19.

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