

Antenatal Care Services: Improving Maternal and Neonatal Outcomes in Makkah Region at KSA

Ola Mousa^{1,*}, Aysha Ahmad², Hanadi Makawi²

1. Assistant Professor, Faculty of Nursing, Minia University, Egypt.
Corresponding Author e-mail: olaessam1977@yahoo.com
2. Clinical instructor, Hera General Hospital, Makkah, Saudi Arabia
3. Staff nurse, Hera General Hospital, Makkah, Saudi Arabia

Abstract:

Enhancing the health and wellness of mothers and newborns requires prenatal care in KSA, most expectant mothers make at least one visit. The utilization and coverage of regular prenatal care interventions have been the primary focus of quality-of-care assessments since the focused antenatal care services were put into place. This study aims to assess the quality of antenatal care provision from a holistic perspective in a rural district in Saudi Arabia Structure, process, and outcome components of quality are explored. Results show that routine ANC services perform inconsistently, which is partially explained by a lack of funding. Appropriate history-taking, consideration for the client's welfare, a basic physical examination, and sufficient counseling and education were also found to be areas of poor performance. To improve the quality of ANC, more focus must be placed on the process of providing care beyond coverage, including response-based services, which must be evaluated by locally established standards.

Keywords: Antenatal Care, Quality, Health Services, Public Health.

Introduction

"The care provided by skilled healthcare professionals to pregnant women to ensure the best health conditions for both mother and baby during pregnancy" is the definition of antenatal care (Wali et al., 2022). The World Health Organization (WHO) defined Antenatal care (ANC) as an umbrella that offers medical procedures provided by skilled birth attendants to pregnant women. These medical procedures are done to ensure the best health outcomes for both mother and unborn fetus during pregnancy and postpartum A critical link in the continuum of care for mothers and children is antenatal care (ANC) (Seidu et al., 2022). Worldwide, maternal health is regarded as a public health indicator. Prenatal and postnatal care is vital in Saudi Arabia, where 99.4% of pregnancies are attended by a healthcare professional (WHO, 2019).

Prenatal care's major objectives are to guarantee a healthy baby's birth, preserve the mother's health, and reduce difficulties. Maternal mortality and morbidity are major challenges in many countries. Perinatally-related deaths account for half of all maternal deaths. The study has demonstrated that optimal utilization of healthcare resources, encompassing maternity and postnatal care, can enhance the outcomes for both mothers and infants (WHO, 2019). There is an increased risk of morbidity and mortality during pregnancy and childbirth for both women and their unborn children (Hug et al., 2019). According to estimates from throughout the world, the maternal mortality ratio (MMR) Similar, data indicates that the global under-five death rate decreased from 75 per 1,000 live births in 2000 to 38 per 1,000 live births in 2019 (WHO, 2019).

According to estimates, issues during pregnancy and childbirth claim the lives of over 800 women worldwide each day. Low- and middle-income countries (LMICs) account for 99% of maternal mortality (WHO, 2014). High-impact interventions, such as antenatal care visits (ANCs), can prevent or lessen severe unfavorable outcomes, such as perinatal mortality, as well as maternal and perinatal

morbidity. Pregnant women receive preventative treatments, are checked for and treated for problems, and receive counseling on important health initiatives during routine ANC visits (WHO, 2019). However, increasing the use of quality ANC and guaranteeing its availability has long been problematic in many LMICs with persistently high MMR and NMR, where the health systems are brittle and weak (WHO, 2019).

The technical interventions provided during ANC, including iron supplementation, screening and treatment for HIV and other STDs, intermittent prevention and treatment for malaria, and tetanus toxoid immunization, are successful in lowering neonatal mortality (Peven et al., 2020). ANC visits also encourage women to attend postnatal care and have safe deliveries. An increased likelihood of giving birth in a medical facility is associated with a woman's ANC visits (James et al., 2021). According to Saudi Arabia's current ANC policy, low-risk women must have four visits: one before 16 weeks, three more between 20 and 24 weeks, 28 and 32 weeks, and 36 and 40 weeks (MOH, 2019).

Strengthening the World Health Organization's (WHO) planned continuum of reproductive, maternity, neonatal, and child health care (RMNCH) services is essential to achieving the full benefits of critical initiatives aimed at preventing mother and child mortality. To address the significant burden of maternal and child mortality from unintended pregnancies; high rates of undernutrition; frequent infectious and noncommunicable diseases; and high rates of maternal, neonatal, and child mortality and stillbirths, RMNCH must remain a priority (Black et al., 2016). However, it has become widely recognized that although ANC by itself is insufficient to lower morbidity and mortality, it is still a crucial element in enhancing the health and well-being of mothers and newborns. According to Ambreen, & Shah, one of the key elements that enable women to comprehend their health and rights and to seek out appropriate medical care is health-related knowledge. There are regional differences in the understanding and attitudes of expectant

mothers regarding the advantages of ANC services. Antenatal care seeks to identify and treat pregnancy-related issues as well as keep track of the mother's and baby's health. This study emphasized how critical it is to raise the standard of prenatal care provided in KSA hospitals, particularly during COVID-19. Strategies including boosting visits, ultrasound attendance, and virtual clinic access should be taken into consideration to accomplish this. The hospital can improve care and advance the health of mothers and fetuses by putting these suggestions into practice.

Telehealth in antenatal care services

The terms "telemedicine," "telehealth," and "mobile health" are interchangeable and refer to the delivery of healthcare services through the use of technology and its applications. It can involve phone conversations, online visits, and mobile medical treatment. The majority of people own mobile phones, which is an advantage that can be exploited to provide health services (Peahl et al., 2020). Pregnant women can learn how to self-monitor their pregnancy and receive prenatal or postnatal care over the phone or via video call. Telehealth visits can take the role of many perinatal services, including asking about current health, fetal activity, health education and counseling, breastfeeding, mental health screening, and even vital sign monitoring via a home blood pressure monitor. According to a study done in the USA, telehealth can take the place of some in-person visits as a potentially convenient and perfect method of providing healthcare. Moreover, it guarantees care continuity (de Mooij et al., 2018).

There are two types of telehealth in prenatal care: distant and real-time monitoring. Pregnant women and their doctors engage in phone calls or video chats as part of "real-time" telehealth, which is intended to supplement some (but not all) in-person consultations (Peahl et al., 2020). Remote monitoring refers to the substitution of technology for certain physical tests, such as some fetal monitoring and investigations, that take place during clinic visits. Monitoring blood pressure and fetal heart rate (with a home Doppler) are the most basic sorts. Additionally, increasingly sophisticated remote monitoring methods are employed in place of investigations. Examples include "at-home" cardiocograph monitoring and the recently developed "tele-ultrasound" technology, which takes the role of in-person ultrasound assessment (de Mooij et al., 2018).

Telehealth monitoring

The consultation can also be conducted virtually if we choose to incorporate remote monitoring technology in place of a face-to-face assessment. Using wearable or portable equipment allows for remote monitoring. It has been demonstrated that remote monitoring of a variety of measures, including blood pressure, fetal heart rate, and fetal growth (measured with a tape measure), is just as accurate as the healthcare provider's in-clinic assessment.

Monitoring the fetal heart rate by Doppler, or fetal heart rate patterns by cardiotocography, may also be performed remotely. Porter et al. illustrated the usage of heartbeat, a portable fetal Doppler that allows mothers to locate and measure their baby's heartbeat and send real-time data to medical professionals. The tool guides women in using it using a smartphone interface. Data from these devices were shown by Porter et al. to be comparable to information recorded in clinics.

Tele-ultrasound ultrasound tests can now be performed remotely via emerging technologies. Previously employed in distant places, tele-ultrasound technology allowed novice sonographers to be monitored from a distance. Trials investigating self-operated tele-ultrasound have been conducted recently; in this approach, women do ultrasounds on themselves at home and send the results to their healthcare team. Hadar et al. conducted an observational study on tele-ultrasound lately, giving women self-operated equipment to measure the biophysical characteristics of their fetuses. The biophysical profile consists of ultrasound-captured data such as fetal tone, respiration, movement, and amniotic fluid volume. Numerous unfavorable perinatal outcomes are strongly correlated with an aberrant biophysical profile, indicating that a low score indicates poor fetal health.

Advantages of maternity telehealth-care

There are few studies on the cost-effectiveness of antenatal telehealth. The current study, however, has usually been encouraging. A cost analysis of Van den Heuvel et al.'s trial, which used remote monitoring and a digital health platform to reduce in-person prenatal visits for women at higher risk of preeclampsia, was carried out. Comparing their telemedicine concept to traditional prenatal care, they discovered that there was an average savings of 19.7%. With high levels of personal and professional satisfaction and cost-effectiveness, maternity telehealth can enhance access to care and lessen pregnancy stress without compromising the results.

According to one study, patients' satisfaction with the quality of visits received is more significant than the quantity of visits (Peahl et al., 2020). The women indicated that they would be open to receiving care in a variety of ways, such as by using phone health and scheduling visits at different times (de Mooij et al., 2018). Become More Flexible patients plan their medical visits taking into account a variety of factors, such as childcare, work schedule, and travel time. In their hectic lives, telehealth provides much-needed flexibility. Using a laptop to attend an appointment in between tasks can save a significant amount of time. In the event of an emergency, patients can also modify their appointments online and reschedule them at a later time without adding to your clinic's already high no-show rate interest (Peahl et al., 2020).

Reduced stress, telemedicine allows patients to receive care from the comfort of their own homes by removing the need for travel and cutting down on waiting room time. Those with chronic health concerns or limited mobility may find that this convenience greatly lessens the stress and anxiety that are sometimes connected with obtaining medical assistance. Clinics in remote areas are actively assisting telehealth in giving patients living in the country the finest care possible. Boost Healthcare Access both patients and doctors benefit from virtual appointments. Firstly, patients find it easy to schedule the appointment around their own errands and work hours. By scheduling more appointments each day and avoiding lines, clinics can increase their revenue stream interest (Peahl et al., 2020).

Analysis has indicated that internet-based prenatal services offer numerous benefits, and implementing such initiatives is imperative in the context of Saudi Vision 2030. To provide women in the prenatal stage with safe, culturally appropriate healthcare, this protocol attempts to use technology and telecommunication to deliver structurally organized, safe, high-quality, evidence-based patient care

through technology and physician experience in the mother's and her child's best interest (Pehl et al., 2020).

To provide preventative, promotive, and rehabilitative health services and optimize maternal health care, low-risk pregnant or postnatal women should get clinical care visits through telehealth and telemedicine antenatal care programs. Without sacrificing the fetal or mother outcome, maternity telehealth can enhance the early referral of high-risk pregnancies to secondary care, preserve maternal satisfaction, and better utilize resources for low-risk pregnancies (Wali et al., 2022). Through instructional programs, consultations, and fast access visits, this protocol can lower the number of needless visits, lower the cost of the services, and give moms the confidence to take charge of their health care. It is anticipated to offer a framework for antenatal care in the future that incorporates telehealth into standard, low-risk prenatal and postnatal treatment without endangering the safety, satisfaction, or outcomes of the mother or fetus (Wali et al., 2022).

Disadvantages of Telehealth

Expensive apparatus, Oftentimes, the software required to arrange video conversations and send files is highly costly. For instance, you probably won't be able to afford the additional gear upfront if you require an on-premise solution. Limited Face-to-Face Communication and the absence of in-person engagement in telehealth is one of its most well-known drawbacks. Video conferences and online meetings are two ways that telehealth enables doctors and patients to interact (WHO, 2019). For physicians and patients, televisions are not always sufficient. Limited Access: For telehealth to be effective, telecommunications equipment is needed. To fully profit from telehealth, though, a lot of patients must have access to laptops, smartphones, and tablets. Furthermore, it may be difficult for some patients—especially older adults—to participate in telehealth sessions because they lack familiarity with or comfort with technology (Wali et al., 2022).

Health service delivery

According to the experts, creative strategies in ANC should try to raise the standard of care delivery for health services along the continuum. It is considered essential to provide and guarantee care that is safe, high-quality, and accessible in a variety of settings and over time. Experts concurred that greater focus should be placed on putting into practice a care model that necessitates a thorough comprehension of the user's perspective, being inclusive, and working to lower the difficult obstacles to care. Furthermore, it was recognized that mental health services must be incorporated into all facets of health, especially in antenatal care, where data indicates that improved mental health outcomes for moms and their infants are associated with increased funding for mental health services.

As a result, focus was placed on creating counseling packages and educating the public about maternal and newborn health. These initiatives should better balance the population's health demands with the resources at hand, including cash, medical professionals, and medication. The delivery of high-quality ANC is enhanced by improved health facility preparedness. Women used higher-quality ANC services and higher-quality structural inputs in KSAs when they were in health facilities. Improved facility preparedness is characterized by the availability of ANC guidelines and procedures, central electricity supply, information, service

organization, community health planning, patient reception, and interpersonal communication (Khatrri et al., 2022).

Service delivery approaches

The quality of ANC services is also improved by the application of creative strategies. For instance, home visits, community engagement, partnership with local government clinics, and gestational matched and stable group ANC method, and home visiting all enhanced the quality of ANC treatments (Wali et al., 2022). Community Health Workers' (CHWs') and midwives' training and task shifting increased the use of health treatments (such as vaccine consumption, early breastfeeding adoption, decreased hospital stay and referral rates) and increased ANC visits (Harsha Bangura et al., 2020). By improving consumer knowledge, health promotion, and timely access to ANC material, the use of digital tools helps address demand-side factors (Wali et al., 2022).

Effective communications

The provision of ANC services depends on communication between suppliers and users. Improved interpersonal and communication skills of providers were associated with improved service delivery processes, confidentiality, privacy, and interpersonal relationships, as well as perceived higher-quality services. Effective tools, incentives, and feedback mechanisms are used in training and continuing education to help clinicians become better communicators (Wali et al., 2022). However, factors related to health workforce ineffective communication that affected the quality of care during pregnancy included a lack of interaction between providers, a failure to explain procedures, a poor connection between preventive information and procedures, a lack of respect for clients, provider behavior and attitude, a lack of privacy, and unequal treatment of clients (Albert et al., 2020). Poor knowledge of pregnancy difficulties, ignorance of tests and medications, the impression of subpar care for complicated pregnancies in public hospitals, and the high cost and quality of care at private hospitals were demand-side variables contributing to ineffective communication (Alyahya et al., 2019).

Challenges

A significant issue that the experts brought up regarding the difficulties in delivering ANC is that women's knowledge of the benefits of early ANC is reportedly limited. It has been proposed that the rate of literacy and educational attainment of women are related to this lack of comprehension. It has been demonstrated that one of the main factors influencing a woman's likelihood of attending an ANC is her increased educational attainment (WHO, 2019).

Building awareness among rural women about the advantages of excellent antenatal care requires programs to support health education among pregnant moms with low levels of education. To achieve this, it's critical to enhance the work that CHWs already do, as they are capable of connecting vulnerable populations with healthcare practitioners and providing pertinent health education (Alyahya et al., 2019).

Clients' satisfaction

A vital component of the social quality of ANC services is client happiness. Research revealed several issues, chiefly related to the health systems' supply side.

These included counseling on laboratory (test) services, supplementing commodities (like iron), learning about fetal movement and warning signs, planning a pregnancy, respectful maternity care, individualized care for mothers and fetuses based on individual needs, functional patient-provider relationships, acknowledging the need for social context of clients and culturally sensitive care, procedures being explained, consent being sought, questions being encouraged, confidentiality, and positive interpersonal interactions (Alyahya et al., 2019).

Antenatal care services

The government of Saudi Arabia has made massive expenditures to improve the health of mothers and children by extending antenatal care services and prioritizing maternal healthcare. To guarantee that expectant mothers receive proper and sufficient care, especially in light of the COVID-19 epidemic, it is imperative to assess the caliber of prenatal care services provided in Saudi Arabia. This study sought to fill this knowledge gap by assessing the prenatal care services provided by MAKKAH Hospitals, one of Saudi Arabia's biggest tertiary care facilities. Additionally, the study will examine data for expectant mothers during the COVID-19 epidemic and suggest methods to raise the standard of the hospital's prenatal care offerings. It is anticipated that the results of this study will enhance maternal healthcare in Saudi Arabia and provide light on the difficulties pregnant women encounter.

Antenatal screening

Prenatal screening has grown in popularity as one of the most common procedures for monitoring pregnancy in recent years and has generated a lot of discussion in bioethics circles. This essay will address the benefits of prenatal screening as well as the real and possible issues it may raise. A family history for genetic risks, population screening for carriers of common recessively inherited diseases, and screening for sporadic conditions impacting the fetus (infections, chromosomal disorders, deformities, and maternal diabetes) are all included in the ANS.

Screening for high-risk pregnancy

Our highly qualified medical professionals in the Makkah region provide a thorough assessment of fetal growth, mother health, obstetric problems, and genetics to ascertain whether you are at risk for a high-risk pregnancy. Expert physicians in Makkah use the latest cutting-edge methods and tools for antenatal testing to identify high-risk pregnancies early on. Pregnancy tests with a high-risk factor could be (an antenatal fetal heart rate test is another name for the nonstress test, To diagnose fetal cardiac problems, fetal echocardiograms are performed (in collaboration with the Division of Pediatric Cardiology)

Doppler ultrasonography is a noninvasive ultrasound technique used to evaluate fetal blood flow, Amniocentesis is the process of examining amniotic fluid to look for signs of genetic abnormalities and chromosomal diseases, and Testing for blood-related disorders using fetal blood samples taken from the fetus or umbilical cord.

Our maternal-fetal medicine (MFM) specialists, also referred to as perinatologists, provide the most integrated healthcare in the Makkah region by treating high-risk pregnancies through a multidisciplinary team approach. To address your specific pregnancy health needs, we provide

individualized care and access to a comprehensive network of KSA specialists. This includes regular follow-ups with your ob-gyn, examinations by a perinatologist, a specialist in maternal-fetal medicine, Ultrasound technology advancements, and assessment in obstetrics regular tracking of the development and growth of the fetus, medication, Vital measures at home caring Ob/Gyns and MFM physicians providing supportive care; coordinated specialized care services, including specialist referrals.

Healthcare Promotion services

Belongs to any effort that seeks to improve the health of a nation or community. It involves educating people about their health so they may take charge of their lives and make the necessary lifestyle changes to improve their health. This study session's primary goal is to help you in your capacity as a health educator for expectant mothers during antenatal care visits. Health promotion activities, however, encompass a wide range of social and environmental interventions that improve health and well-being in populations as well as individuals. In addition to disease prevention—actions done to stop a disease from spreading—health promotion also includes health screening, which is the routine examination of people to determine whether they are at risk of getting a health issue. Relationships among illness prevention, health education, health promotion, and health screening.

A wide range of services aimed at promoting health and preventing disease have their primary entry point in antenatal care. Discussing significant concerns affecting a woman's health and pregnancy with her healthcare professional is vital. In the antenatal period, you can support the health of the women under her care as well as the antenatal and postpartum health of their children by teaching mothers about the advantages of a healthy diet, enough sleep, proper hygiene, family planning, exclusive breastfeeding, immunization, and other disease prevention strategies. The aim was to increase women's awareness of these issues so they may make more educated decisions that will impact the course of their pregnancy, but you should never lose sight of the challenges some women may have in changing their habits.

Prevention services

Pregnancy is an ideal opportunity to encourage positive behavior change. Pregnancy-related preventive health counseling is not always offered, and the prevalence varies greatly according to the health behavior. According to this study, to encourage positive behavior both before and during the special opportunity that pregnancy presents, more tactics are required. The World Health Organization states that counseling and education are key components of ANC. The following statement was posed to participants to assess the degree of preventive counseling offered: "Did a doctor, nurse, midwife, or other healthcare professional talk with you about any of the things listed below during any of your antenatal care visits?" Included in the responses were the dangers of alcohol and tobacco use, prescription drug usage, illicit drug use, breastfeeding, proper weight gain, nutrition and diet, and seat belt use.

Standards of the hospitals' and health centers' disease prevention service delivery were based on a selection of preventative actions for common chronic non-communicable diseases. Healthcare providers were expected to monitor blood pressure, screen for cancer, screen for diabetes, check for cigarette smoking and provide counseling, assess patients for

alcohol abuse, monitor elevated cholesterol, and assess HIV infection risks as part of their preventive screening activities. Patients who received four or more of the seven preventive services were considered to be receiving "optimal" disease prevention services; those who received one to three services were deemed to be receiving "sub-optimal" preventive care; and those who received none of the services were deemed to be "not provided" with disease prevention services.

Curative/Rehabilitative Services

Curative care during antenatal refers to health services whose main goal is to treat an illness and lessen its severity, relieve symptoms, or prevent complications that could endanger life or normal function. Rehabilitative care during antenatal refers to services whose goal is to stabilize, improve, or restore impaired body functions and structures, make up for their absence or loss, enhance activities and participation, and prevent impairments, medical complications, and risks. This study emphasized how critical it is to raise the standard of prenatal care provided in KSA hospitals, particularly during COVID-19. Strategies including boosting visits, ultrasound attendance, and virtual clinic access should be taken into consideration to accomplish this. The hospital can improve care and advance the health of mothers and fetuses by putting these suggestions into practice.

Conclusion

The quality of antenatal services that are available and put into practice by local governments determines how effective ANC services are experts emphasized how it can be challenging to guarantee the quality of care in both public and private ANC clinics due to inadequate regulatory procedures or a lack of ability to implement regulations. The chance to exchange experiences regarding difficulties in providing care for mothers and newborns in various settings and to generate ideas for creative solutions was provided by expert consultation. Overall, the incident supported the theory that vulnerable communities bear a disproportionate share of the burden of poor maternal health, morbidity, and mortality. Prioritizing high-quality, egalitarian, and evidence-based maternal health services that address developing issues and cater to local needs is imperative. Better maternal health services can be achieved primarily through investments in building health systems, which include data and surveillance systems, facility capacity, and a trained health workforce.

References:

1. Albert, J.S., Younas, A. and Victor, G. (2020) 'Quality of antenatal care services in a developing country: A cross-sectional survey', *Creative Nursing*, 26(1), pp. 25–34. doi:10.1891/1078-4535.26.1.e25.
2. Alyahya, M.S. et al. (2019) 'The quality of maternal-fetal and newborn care services in Jordan: A qualitative focus group study', *BMC Health Services Research*, 19(1). doi:10.1186/s12913-019-4232-9
3. Black, R.E. et al. (2016) 'Reproductive, maternal, newborn, and child health: An overview', *Disease Control Priorities*, Third Edition (Volume 2): Reproductive, Maternal, Newborn, and Child Health, pp. 1–23. doi:10.1596/978-1-4648-0348-2_ch1.
4. De Mooij MJ, Hodny RL, O'Neil DA, et al.: OB nest: reimagining low-risk prenatal care. *Mayo Clin Proc.* 2018, 93:458-66. doi:10.1016/j.mayocp.2018.01.022.
5. Hadar E, Wolff L, Tenenbaum-Gavish K, Eisner M, Shmueli A, Barbash-Hazan S, Bergel R, Shmuel E, Hourri O, Dollinger S, et al. Mobile self-operated home ultrasound system for remote fetal assessment during pregnancy. *Telemed e-Health.* 2021;28(1):93–101.
6. Harsha Bangura, A. et al. (2020) 'Measuring fidelity, feasibility, costs: An implementation evaluation of a cluster-controlled trial of group Antenatal Care in rural Nepal', *Reproductive Health*, 17(1). doi:10.1186/s12978-019-0840-4.
7. Hug, L. et al. (2019) 'National, regional, and global levels and trends in neonatal mortality between 1990 and 2017, with scenario-based projections to 2030: A systematic analysis', *The Lancet Global Health*, 7(6). doi:10.1016/s2214-109x(19)30163-9.
8. James, K.S. et al. (2021) 'Sequential impact of components of maternal and child health care services on the continuum of care in India', *Journal of Biosocial Science*, 54(3), pp. 450–472. doi:10.1017/s002193202100016x.
9. Khatri, R.B., Durham, J. and Assefa, Y. (2022) 'Investigation of technical quality of antenatal and perinatal services in a nationally representative sample of health facilities in Nepal', *Archives of Public Health*, 80(1). doi:10.1186/s13690-022-00917-z
10. Peahl, A.F., Smith, R.D. and Moniz, M.H. (2020) 'Prenatal care redesign: Creating Flexible Maternity Care models through virtual care', *American Journal of Obstetrics and Gynecology*, 223(3). doi:10.1016/j.ajog.2020.05.029.
11. Peven, K. et al. (2020) 'Evaluating implementation strategies for essential newborn care interventions in low- and low middle-income countries: A systematic review', *Health Policy and Planning*, 35(Supplement_2), pp. ii47–ii65. doi:10.1093/heapol/czaa122.
12. Porter P, Muirhead F, Brisbane J, Schneider B, Choveaux J, Bear N, Carson J, Jones K, Silva D, Neppe C. Accuracy, clinical utility, and usability of a wireless self-guided fetal heart rate monitor. *Obstet Gynecol.* 2021;137(4):673–81.
13. Saudi Vision 2030. (2016). Accessed: May 17, 2022: https://vision2030.gov.sa/sites/default/files/report/Saudi_Vision2030_EN_2017.Pdf
14. Seidu, A.-A. et al. (2022) 'Continuum of care for maternal, newborn, and child health in 17 sub-saharan African countries', *BMC Health Services Research*, 22(1). doi:10.1186/s12913-022-08693-w.
15. Shafiqat, T., Fayaz, S., Rahim, R., & Saima, S. (2015). Knowledge and awareness regarding antenatal care and delivery among pregnant women. *Journal of Medical Sciences*, 23(2), 88-91.
16. The International Telecommunication Union: statistics of individual using the internet . Accessed: January 9, 2023: <https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx>.
17. van den Heuvel JFM, van Lieshout C, Franx A, Frederix G, Bekker MN. SAFE@HOME: cost analysis of a new care pathway including a digital health platform for women at increased risk of preeclampsia. *Pregnancy Hypertens.* 2021;24:118–23.
18. Wali, R., Alhakami, A. and Alsafari, N. (2022) 'Evaluating the level of patient satisfaction with telehealth antenatal care during the COVID-19 pandemic at king Abdul-Aziz Medical City, primary health care center, specialized polyclinic', *Women's Health*, 18, p. 17455057221104659. doi:10.1177/17455057221104659.
19. World Health Organization. Maternal mortality: evidence brief. In: Geneva: World Health Organization; 2019
20. World Health Organization. Maternal mortality: fact sheet: to improve maternal health, barriers that limit access to quality maternal health services must be identified and addressed at all levels of the health system. In: Geneva: World Health Organization; 2014.