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FACTORS AFFECTING THE COMPLIANCE AND UTILISATION OF ANTENATAL CARE (ANC) IN BOTH HIGH INCOME COUNTRIES AND LOW-MIDDLE INCOME COUNTRIES: A SYSTEMATIC REVIEW

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ABSTRACT

Background: *Every pregnancy has its own risk related to unwanted complication. ANC or antenatal care is a program to help the improvement of both pregnancy experience and ensure the health of a baby. ANC itself has been practiced since 100 years ago, a heritage process from the European community, which facilitates pregnant women during the pregnancy to have 12 visitations to nearby health facility. However, reasoning behind such intervention was unknown. As time goes by, many researches, evaluation, and review have been done regarding the content of visitations, amount of attendance each pregnant women need to do during pregnancy period, and further outcome of ANC program. This review is done to clarify ANC program throughout countries with high, middle and low income in the world and gather knowledge from such experience.*

Methods: *Review was done by using databases such as PubMed, Springerlink, and proquest with keyword factors related to utilization of ANC as intervention and mother's compliance, years of publication and PRISMA method.*

Results*: Out of all 33 articles obtained, 12 articles were chosen as other article did not comply to the selection criteria such as year of publication and the content. Variations among different countries in such studies occurred in factors such as the program itself, subject compliance towards the study, and the number of attendees. Furthermore, technologies such as instant messages and internet was also utilized in some programs. Among many factors related to the utilized and compliance of pregnant mother, each country policies, lifestyle, education level, and family incomes played a major role in such differentiation. Furthermore, perception of mother towards the program will also affect her motivation.*

Conclusion: *Although the implementation of ANC in many countries still varies, there were many positive evidences to support the utilization of ANC. Surrounding communities could implement the program if it is suitable to the individuals. Monitoring and evaluation of such program also need to be done.*

Keywords*: ANC, compliance, utilization, attendance, content.*

INTRODUCTION

Maternal mortality and morbidity in pregnant women have always been a challenge faced by low and middle-income countries (LMICs) [1]. Numerous statistics obtained regarding Maternal Mortality Ratio (MMR) are also desolating. In 2005, MMR of Ghana showed 319/100.000 live births, 578/100.000

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in Tanzania (2004), and even worse in Rwanda (2000) with 1071/100.000 MMR [1,2,3]. Anemia and hemorrhage are the two main causes of death during pregnancy [1]. Antenatal care (ANC) is a practice which aims in improving maternal outcome, as well to reduce the rate of morbidity of mothers and babies [2,4]. In 2003, World Health Organization (WHO) recommended a minimum of four visitations of antenatal care (ANC), with the first visit ranging before the 16th week of pregnancy [4]. The guidelines also include daily routine care for women and babies to additional care (including neonatal care) for severe disease and complication experienced by women and babies [5]. ANC emphasizes on screening, diagnosis, and preventive measurement [6]. Some countries, such as China, Malaysia, and Vietnam have implemented these guidelines which also supported by theirMinistry of Health (MoH) [7,8,9].

As a developed country, China, Malaysia, and Vietnam have their own local protocols to ensure the equal ANC service to the rural area. However, there are still no evident in the comparison of health care service in urban and rural area. The proper ANC services are currently offered by high-income countries, such as the UK [10]. These are yet delivered to LMICs due to the low education level received, medical staff shortage, lack of supporting devices, access to the nearest health care facility, to low economic income [1,3]. Countries in the Saharan area of Africa (e.g. Tanzania, Rwanda, Ghana, Kenya, Malawi, Zanzibar) and Bangladesh are among those having such problems. In 2016, WHO issued a Focused ANC model which recommended a minimum of eight ANC visitations and ultrasound examination before the gestational week [2]. With the updated protocol, it is expected that all countries provide better neonatal care to women. To overcome the update in LMICs, mobile applications such as Mobile Health (mHealth) (e.g. Bliss4Midwives device (B4M) and Short Message Service or SMS) were introduced.

The review aims to interpret different ANC services in both high-income countries and low-middle income countries, and the breakthrough to develop their programs.

METHODS

This review was conducted based on PRISMA Protocol (Preferred Reporting Items for Systematic Review and Meta-Analysis Protocol).

Search strategy

The literature search was done through the online database from PubMed, SpringerLink and ProQuest for research articles published from 2007 to 2019 by using the keywords related to the utilisation of ANC as intervention and mother's compliance. Research studies, clinical trial studies, observational studies, and systematic reviews were further analyzed for treatment classification and assessment. Twelve articles were then obtained from the total of 33 studies as the other studies did not comply to the selection criteria.

Inclusion criteria

The eligible criteria included the research conducted in the targeted group countries, with the outcomes ofANC utilisation, where all research methods were applied, and were written in English.

Exclusion criteria

The authors excluded non-full paper studies while the years of publication were restricted between 2007 and 2019.
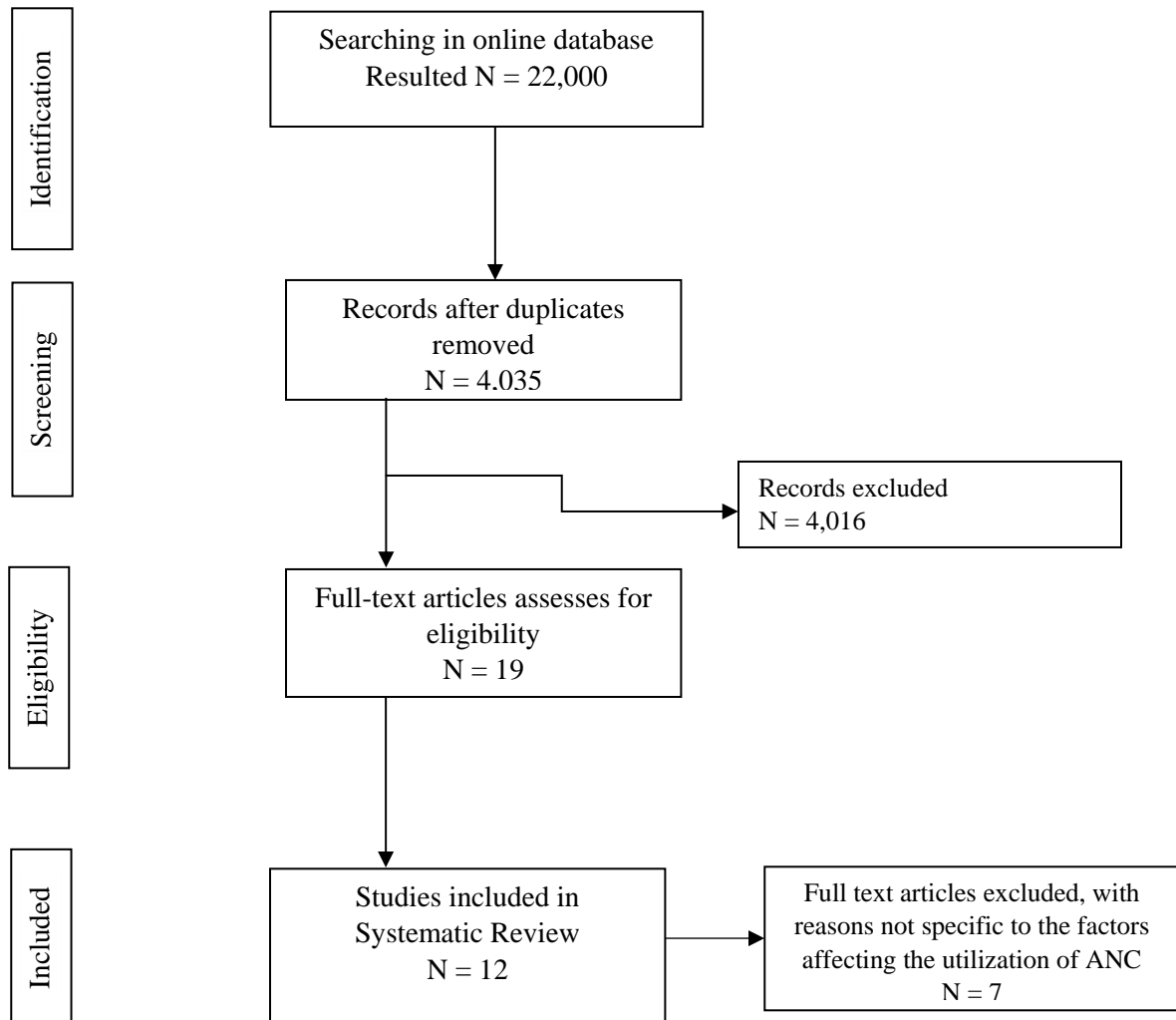
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Figure 1. PRISMA – Protocol Search Result

RESULTS

Total studies obtained by using the keywords "ANC" and "utilization" reached 22,000 articles (Table 1). After removing duplicates and filtering out the remaining studies to fit the inclusion and exclusion criteria, 12 studies were selected for the systematic review.

Table 1. Summary of articles used in the paper

No	Title and Author	Year	Place	Design	Variable	Summary
1	Pregnant Women's Experiences with an Integrated Diagnostic and Decision Support Device for Antenatal Care in Ghana; BMC Pregnancy and Childbirth, Abejrinde et al.	2018	Ghana	Qualitative method	ANC observation, service utilisation, intervention	The intervention of ANC with integrated diagnostic and clinical support decision support system tagged "Bliss4MidWifes(B4M)" enhance women engagement and trust in health worker skills. There is need for further inquiry into how these interventions influence maternal health service utilisation and women's expectation of pregnancy care
2	Factors Affecting the Utilisation of Antenatal Care among Pregnant Woman: A Literature Review. J Preg Neonatal Med, Ali et al.	2018	-	Literature review	ANC, factors affecting utilisation of ANC	Factors like maternal age, number of living children, education, socioeconomic status, previous bad obstetrical history, support from spouse, quality of care and distance from health care facility are significantly associated with use of antenatal care.
3	A Comparison between Antenatal Care Quality in Public and Private Sector in Rural Hebei, China. Croat Med J, Chen et al.	2013	China	Cross sectional survey	Quality of ANC, health facility, private and public sector	The quality of ANC in Hebei was poorer than required by China's National and World Health Organization norms. Public sector performed better than the private sector. Utilisation and quality of care of ANC services varied.
4	Alternative versus Standard Packages of Antenatal Care for Low-Risk Pregnancy; Cochrane; Dowswell et al.	2011	-	Systematic Review	Number of ANC visit, high-middle-low income countries, pregnancy outcome, perinatal mortality	Reduced visit programs of ANC are associated with an increase in perinatal mortality compared to standard care. Women prefer the standard visits schedule. Where the standard number of visits is low, visits should not be reduced without close monitoring of fetal and neonatal outcome
5	Incremental Cost and Health Gains of the 2016 WHO Antenatal Care Recommendations	2019	Rwanda	Intervention study, cohort	ANC, WHO recommendation, effectiveness, cost-effective,	Implementing the new WHO ANC recommendation in Rwanda would likely be very cost- effective. Expert elicitation combined with other data can

No	Title and Author	Year	Place	Design	Variable	Summary
	for Rwanda: Results from Expert Elicitation; Health Res Policy Syst; Hitimana et al.				decision making	provide an affordable source of locally relevant evidence for health policy decisions in low-resource settings.
6	Determinants of Frequency and Contents of Antenatal Care Visits in Bangladesh: Assessing the Extent of Compliance with the WHO Recommendations; PloSOne; Islam M et al.	2018	Bangladesh	Descriptive, inferential and multivariate	ANC visits, compliance, WHO recommendations	An unsatisfactory level of coverage and content of ANC visits have been observed in Bangladesh. Further investigation is required to identify the causes of under-utilisation of ANC services.
7	Mobile Phones Improve Antenatal Care Attendance in Zanzibar: A Cluster Randomized Controlled Trial; Lund S et al; BMC Pregnancy and Childbirth	2014	Zanzibar	Cluster randomized control trial	ANC, mobile phone, quality of care	The mobile phone intervention significantly increased the proportion of women receiving the recommended four antenatal care visits during pregnancy and there was a trend towards improved quality of care with more women receiving preventive health services, more women attending ANC late in pregnancy and more women with antepartum complications identified and referred.
8	Factors Affecting Antenatal Care Attendance: Results from Qualitative Studies inGhana, Kenya, and Malawi; Pell et al., PlosOne	2012	Sub Saharan Africa	Qualitative research	ANC, level of attendance	In these socially and culturally diverse sites, the findings suggest the "supply" side factors have an important influence on ANC attendance : the design of ANC and particularly how ANC deals with the needs and concern of women during the first trimester has implications for timing of initiation
9	Factors Affecting Satisfaction on Antenatal Care Services in Sarawak, Malaysia: Evidence	2016	Sarawak, Malaysia	Cross sectional study	ANC, levels of satisfaction, compliance	High levels of satisfaction among women with the ANC services will increase the compliance of antenatal visits during pregnancy. The research

No	Title and Author	Year	Place	Design	Variable	Summary
	from A Cross Sectional Study; Rahmad Md, Ngadan D, Arif M; Springerplus					shows that overall the studied women were satisfied with the antenatal care services. The finding recommends the community-based and language-specific interventions should be implemented to sustain the satisfaction of maternal care.
10	Urban-rural Disparities in Antenatal Care Utilisation: AStudy of Two Cohorts of Pregnant Women in Vietnam; Toan K Tran, Chuc TK Nguyen, Hinh D Nguyen et al. BMC Health Services Research	2011	Vietnam	Cohort	ANC, utilisation, rural and urban area	Almost all women reported some use of ANC. The average number of visits was much lower in the rural setting (4.4) than in the urban (7.7). The large disparity in ANC adequacy between the two settings suggests special attention for the ANC programme in rural areas focusing on its content. Revision and enforcement of the national guidelines to improve the behaviour and practice of both users and providers are necessary.
11	The Effects of a Household Conditional Cash Transfer Programme on Coverage and Quality of Antenatal Care: A Secondary Analysis on Indonesia's Pilot Programme; Margaret Triyana, Anuraj H Shankar; BMJ Open	2017	Indonesia	Cluster randomised control trial	ANC, coverage, program	The CCT (Conditional Cash Transfer) programme was associated with improved ANC component coverage index. The CCT programme improved ANC coverage for women, but midwives did not improve ANC quality. Enhanced ANC utilisation may not be sufficient to improve health outcomes, and steps to improve ANC quality are essential for programme impact.
12	Assessing the Extent of Adherence to The Recommended Antenatal Care Content in Malaysia: Room for Improvement; Yeoh P et al; PLOS one	2015	Malaysia	Retrospective cohort study	ANC, adherence, content	Around half of the women had < 80% of recommended ANC content documented. Health education had the lowest mean score, at around 35%. The low-risk pregnancies had a higher ANC content score than the high-risk pregnancies (78% vs 75%; p = 0.002). The smallest clinics

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No	Title and Author	Year	Place	Design	Variable	Summary
						had a higher ANC content score than the bigger clinics. Inadequate ANC content was associated with higher prevalence of preterm birth.

From various studies, mixed evidence for association between age and utilisation of ANC were found. Some studies shown that women with young age utilize more ANC services. This finding is supported by the study in Bangladesh that showed that the use of ANC was more prevalent in the age group of <20 and 20-34 years old [6]. Furthermore, study in Tanzania also indicated that there are more pregnant women in the age group of 20-34 years old that utilized ANC [3]. On the contrary, the study in Vietnam found that there were less pregnant women in the age group of <20 and 20-24 used ANC, whereas more in pregnant women in the age group of 25-29 and 30-34 used the service [8].

Other factor that affect the utilisation of ANC is subject's education as educated women have more awareness of the existence and benefits come from ANC services and thus will tend to attend the ANC services. Study in Bangladesh shows that the highest used of ANC is shown in women with higher than secondary education and the utilisation of ANC is significantly lower in mother with no education at all. Husband's education was also take part in the utilisation of ANC as the study in Bangladesh shows that higher education of husband means higher use of ANC [6]. Furthermore, socio-economic status also becomes one of the hindering factors as financial difficulties affect how much money they can afford for the services. Women in a family of higher income are more likely to use ANC and vice versa. Similar study in Bangladesh shows that family with poor wealth index are more likely to not utilize ANC compared to family that is considered rich in the wealth index [6]. Moreover, the study conducted by Dowswell et al., (2014) indicates that women in higher-income countries received higher-level of education, hence they have deeper understanding regarding pregnancy and thus utilize ANC more [10]. Mass media exposure will also increase the utilisation of ANC as mass media is one of the source of information and thus can raise awareness of how much it benefits the mother and the baby. The study in Bangladesh also suggested that once a week mass media exposure of ANC would increase the frequency of ANC [6].

Place of residence is another factor that will affect the use as it will directly affect how many services available in the living areas and also the distance to the health facilities available. As study in Bangladesh shown, parents living in the urban area, 11.2 % of people had ≥8 ANC visit compared to in rural area which is only 4.3% [6]. This study is supported by study in Vietnam, which showed that 77.2% of women living in rural area had at least 3 visits compared to 97.2% of women living in rural area had the same number of visits. Furthermore, only 20.3% compared to 81.1% of women in rural area and urban area respectively receive all of the core ANC services. Moreover, the women in rural area only used ANC at commune health centers and private clinics while women in urban area visited public hospitals [8]. The further clinic to the residence of pregnant women will also affect the utilisation of ANC as shown in study in Malaysia. The lower the time needed to reach nearest clinic, the higher the number of visit is as it is stated as most respondent only travel for less than 15 minutes to reach the nearest clinic [11]. As other study found, study in Tanzania found that lower distance to facility means higher utilisation of ANC [3].

In both Zanzibar and Ghana, the two countries of East and West Africa, utilized Mobile Health (mHealth) application is used for online-interface maternal care as an intervention [1,4]. Short Messaging Service (SMS) was introduced as a platform to inform health status of pregnancy obtained after ANC

service received form the health care. The application of the following intervention as study shown increased the utilisation of ANC in Zanzibar. Furthermore, the study also shows that 44% of the women connected with the SMS received more ANC visits. The SMS sent does not merely provide information regarding the last visit in health care, but it also reminds women the timeline for the next visit. The trend shown in the study implicates that more women are being identified of complication and disease and hence treated. 72% of women in intervention group received tetanus shot, whereas only 56% of the women in the control group (non-wired women). Preventive malaria treatment was also received by 65% of the women connected to the SMS, compared to 52% in the control group. Out of 1,331 women, 59% of them felt that the SMS influenced them to seek more care and 71% of them gained more knowledge from the educational SMS [4].

Ghana uses Bliss4Midwives (B4M) device as a preface to overcome shortage of healthcare staff. B4M acts as a non-invasive care which screens pre-eclampsia, anemia, and gestational diabetes. It uses infrared sensor from a finger clip which enable it to read hemoglobin level, urinary protein and glucose level. B4M is perceived to be able to detect the health problems, also it saves time and cost compared to the treatment received in the hospital. However, the test results took longer time than expected, hence making the women impatient. Results also varies in different facility where one out of four health facility must spent more than 2 hours to complete the test, while facility which equipped with its own laboratory gain more benefits in time-efficiency. On the other hand, the reaction between women varies from scared, relax, to trust. Some also felt that they did not feel like doing anything in the health care due to the machine work. The intervention here has more function in creating awareness to seek more care [1]. Both SMS and B4M system still need improvement from application itself, health care attendee, cost-benefits, and education for the women.

Despite the numerous benefits, the satisfactory level and effectiveness of ANC also depends on the healthcare givers[12]. As shown in the study in rural area in Hebei, China, the women have received at least one ANC service (98%) during the pregnancy period, with 80% of them got at least four visits and while 54% received five visits. Observation from both public and private health care service, the quality of ANC services was rated to be adequately low as the attendees did less tests and gave insufficient information that they should have get. Pregnant women did not receive much information about birth and breastfeeding advices, furthermore to the preventive action of diseases that they may had. This is not in accordance with the guidelines given from Ministry of Health (MoH) of China and World Health Organization (WHO) norm [13].

Malaysia is one of the countries that constantly assess their ANC treatment, with the guideline from their MoH. Four important aspects contributing to the quality of ANC include physical examination (PE), health screening (HS), case management (CM), and health education (HE). The scoresare categorized into inadequate (≤79%) and adequate (≥80%), with PE, HS, and CM scores ranging from 84 to 85%, while HE had the lowest score of 35%. Thesefigures are evaluated from the number of pregnant womenvisits, medical examinations, doctor recommendations, to daily workload of nursing staffs. The score did not reach adequate mainly because the doctors focus on one high-risk procedure, but did not pay attention to other small possible factors. High-risk pregnancy still requires standard care, added with extra test from the doctors.

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DISCUSSION

Thekey findings from this research are important in explaining the factors affecting the compliance and utilisation of Antenatal Care (ANC) in both high-income countries and low to middle-income countries. There are some concerns about ANC when discussing about its utilisation, such as how many visits is sufficient, the limitation of sufficient visit, what kind of content needs to be inserted in the ANC program, what kind of innovation that can be optimized the ANC and its outcome.

This study has the limitation of how we can overcome many kinds of global ANC variations. The way to overcome this limitation is by identifying all variations and try to recommend the proper and acceptable one for each country.

CONCLUSION

Although ANC has many beneficial effects for pregnant women, general public compliance and interest are still low due to some factors such as age of women, education of both/either husband and wife, financial state, media exposure, place of residence, and distance to healthcare facility, and so forth. Improving the aforementioned factors will be one of the ways to increase ANC awareness. Furthermore, some other suggessful programs, such as mHealth and B4M could also be implemented in certain countries with the goal of increasing ANC awareness.Nevertheless, further improvement must be made to the system. The assessment such as the one in Malaysia should also be done in other countries to continuously provide a better ANC care for everyone.

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