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Maternal and Child Health Handbook Utilization, Quantity and Quality of Antenatal Services, and Maternal Emergency Rates in Padang City in 2022

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Abstract

This study analyzed the relationship between the utilization of the Indonesian Ministry of Health's Maternal and Child Health Handbook and the quantity and quality of antenatal care to maternal emergency levels. This study applied mixed methods with a consecutive sampling technique and included 108 mothers undergoing maternal emergencies at a central general hospital (quantitative) and eight mothers, seven midwives, and five cadres at primary health cares (qualitative) as informants. The result showed a relationship between the utilization of the Maternal and Child Health Care Handbook (p-value = 0.043), the quantity of antenatal care (p-value < 0.001), the quality of antenatal care (p-value = 0.044) and the maternal emergency level. Not all mothers understood the benefits of the Maternal and Child Health Handbook. Most did not read it, and some mothers perceived that it could prevent emergency cases for them. The mothers were satisfied with the quality of the antenatal care services received. Maternal emergency cases are still quite high; hence, it is necessary to increase the use of Maternal and Child Health Handbook and the quantity and quality of antenatal care.

Keywords: antenatal care, Maternal and Child Health Handbook, maternal emergency

Introduction

Maternal mortality rate (MMR) is an indicator to assess a country's level of welfare, health status and quality of life. Based on the World Health Organization (WHO) data, in 2017, the global MMR was approximately 295,000.¹ Indonesia, having 177 maternal deaths per 100,000 live births, ranked fourth among Asia Pacific countries with the highest estimated MMR.² The 2020 Indonesia Health Profile shows an increase in maternal deaths compared to that in 2019. The MMR was 4.6% in 2020 and 4.2% in 2019.³

An increase in maternal deaths also occurred in West Sumatra Province, Indonesia. There were 116 and 125 cases of maternal mortality in 2019 and 2020, respectively.³ Maternal emergencies can cause maternal deaths. A maternal or obstetric emergency is a life-threatening condition that, if not treated immediately, will result in the death of the mother and fetus.⁴ Obstetric emergencies occur due to unmanaged pregnancy, childbirth, and puerperium complications.⁵ Based on data from the 2020 Padang City Health Profile, approximately 20% of pregnant women suffer from complications, but only 61.3% of them are treated according to standards.⁶

One of the efforts to prevent obstetric emergency cases and accelerate the decline in MMR was to conduct antenatal care (ANC) examinations on time and according to standards.⁷ The ANC is recorded in the Maternal and Child Health (MCH) Handbook, an integrated home-based record that supports sustainable care.⁸ The MCH Handbook contains examination standards, health information and danger signs for pregnancy, childbirth, postpartum period, infants and children.⁹ Based on the Regulation of Minister of Health Number 4 of 2019, by quantity standards, antenatal services should include at least four visits during pregnancy (K4); furthermore, the quality of ANC should meet the 10 T criteria (weigh and measure body height, measure blood pressure, determine nutritional status value, measure the height of the uterine fundus, determine the presentation of the fetus and the calculation of the fetal heart rate, screen for tetanus toxoid status, provide blood supplement tablets, perform laboratory tests, manage cases, conduct dialogue/counseling).¹⁰

The standard 10 T criteria involve the patients' records; examination; management; information, education, and communication (IEC); and documentation of

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ANC services. The 2020 Padang City Health Profile showed an increase in first visits for prenatal care in the first trimester (K1) and fourth visits for prenatal care in the third trimester (K4) compared to those in 2019. The K1 coverage was 94.1% in 2019 and 107.4% in 2020. K4 achievement was 90.5% in 2019 and 94.4% in 2020.⁶ The number of K1 and K4 visits increased, but a decrease in MMR did not follow.

The central general hospital was a Grade A national referral hospital. Based on an initial survey at the Comprehensive Emergency Obstetric and Neonatal Care (CEmONC) of the central general hospital in Padang City in 2021, which obtained secondary data, there were 1,360 cases of pregnancy and childbirth complications, including COVID-19 (12.3%), preeclampsia (9.04%), premature rupture of membranes (7.57%), placenta previa (6.69%) and anemia (6.54%).¹¹ The assessment of pregnancy complications and emergency obstetric cases is an evaluation of the quality of ANC at primary health cares (PHCs).¹¹

Approximately 92.6% of labor complication cases in mothers with a record of ANC examinations were not carried out according to standards.¹² ANC examinations performed less than four times during pregnancy are associated with a risk of maternal death due to obstetric bleeding (p-value = 0.003).¹³ Measuring the quality of ANC is an essential step towards improving the welfare of mothers, children, and the country.¹⁴

The ANC examinations are recorded in the MCH Handbook to ensure the continuity of care and empower mothers and families to maintain their health.⁹ In a previous study, the use of the MCH Handbook influenced pregnant women's attitudes about complications of pregnancy and childbirth (p-value = 0.027).¹⁵ Another study also stated that using the MCH Handbook increased pregnant women's healthy behaviors (p-value = 0.01).¹⁶

The ANC quality assessment is essential for improving maternal and child health. ANC focuses on promotive and preventive efforts, early detection, and management of complications, as stated in the MCH Handbook. The number of visits and inspection service coverage per year, according to the 10 T criteria in Padang City has increased.⁶ However, maternal morbidity and mortality also increased. Therefore, this study aimed to analyze the relationship of MCH Handbook utilization and the quantity and quality of ANC to maternal emergency level.

Method

This study involved a mixed method with a sequential explanatory design, which combined quantitative and qualitative methods. In the first phase, quantitative study was carried out using a cross-sectional design at the Central General Hospital in Padang City. The population in the study comprised maternal emergency cases that

entered Comprehensive Emergency Obstetric and Neonatal Care (CEmONC) of the Central General Hospital in Padang City between May and July 2022. The sample in this study was part of the population that met predetermined inclusion and exclusion criteria. The inclusion criteria were that the mother was willing to be a respondent, could communicate verbally and had an MCH Handbook. The exclusion criteria were having a gestational age that was less than the third trimester and having never had their pregnancy checked at a health facility.

The sample size was determined using the Lemeshow formula for one population.¹⁷ Based on the sample formula, the number of samples in this study was 97 respondents, and 10% of the total sample calculation was added to avoid possible dropouts. The sample size of this study was 108 respondents included using a consecutive sampling technique.

The dependent variable in this study was maternal emergency level. Maternal emergencies were obstetric cases that, if not treated immediately, would result in the death of the mother and fetus.⁴ Cases of maternal emergency were assessed through triage and the patients' medical records at the central general hospital. The central general hospital in Padang implemented the Australian Triage System (ATS) with modifications. Every patient in the emergency room was treated using ATS with this modification. The ATS was modified into three groups: patients with ATS categories 1 and 2 were combined into first-priority patients with a red color code, and patients with ATS categories 3 and 4 were combined into second-priority patients with a yellow color code.

The independent variables in this study were MCH Handbook utilization, the quantity of ANC (at least six visits for prenatal care up to the third trimester (K6)), and the quality of the ANC. MCH Handbook utilization was assessed from three aspects: as a medium for recording ANC (documentation), behavioral change and self-monitoring.¹⁷ It was assessed using a questionnaire and was considered effective if the score was $\geq 80\%$ and ineffective if the score was $< 80\%$.

The standard quantity of ANC visits was at least six: two in the first trimester, one in the second trimester, and three in the third trimester or more than three if with competent midwives to render ANC services according to the standard.^{10,19} The quantities of ANC visits were determined from the records in the MCH Handbook. The measurement results were considered insufficient if the number of ANC visits was less than six times and sufficient if it was more than six times. The quality of ANC was the services the mother received by the 10 T criteria.^{7,20,21} The quality of ANC was assessed using a questionnaire. ANC quality was interpreted to be good and not good if the score was $\geq 80\%$ and $< 80\%$, respective-

ly.²¹

The questionnaire used a Guttman scale, “yes” or “no,” to assess the utilization of the MCH Handbook and the quality of the ANC. The Guttman scale measures behavior with firm and consistent answers and an even number of questions.²² The questionnaire used to assess the MCH Handbook utilization contained three aspects: as a medium for recording ANC (documentation), behavioral change, and self-monitoring.¹⁷ The questionnaire used to assess the quality of ANC contained standard 10 T criteria in record, examination, management, IEC and documentation of ANC services.^{7,20,21}

The validity and reliability test of the questionnaire was conducted in December 2021 with 35 respondents who were not the sample in this study. First, a preliminary survey permit was applied, and the validity and reliability of the questionnaire were tested. Second, the purpose of the survey was explained, and each respondent’s consent to test the validity and reliability of the questionnaire was obtained. The respondents filled out the questionnaire, and the data were processed and tested for the validity and reliability of the questionnaire using IBM SPSS version 21 (free version). The number of questions were 26 for the assessment of MCH Handbook utilization and 34 for ANC quality assessment. The questionnaire for the utilization of the MCH Handbook was reliable (Spearman–Brown, 0.851>0.344), and the quality of ANC was reliable (Spearman–Brown, 0.884>0.344).

Quantitative data were analyzed using free version of IBM SPSS 21. A descriptive analysis was performed to determine the distribution of the frequency of MCH Handbook utilization, the quantity of ANC, the quality of ANC and the level of maternal emergencies. Chi-square was used to determine the relationship between the independent variables (MCH Handbook utilization, quantity of ANC and the quality of ANC) with the dependent variable (maternal emergency level), with the significance level set at p-value<0.05.

In the second stage (qualitative study), the case study method was used to clarify the quantitative study results. The data were proven again, strengthened, deepened, and

expanded with qualitative methods. Qualitative study data were collected from July to August 2022 in seven PHCs of Padang City: Ulak Karang, Padang Pasir, Air Dingin, Andalas, Rawang, Kurangi and Lapai PHCs.

The informants in the qualitative study included eight mothers, seven midwives and five cadres. The determination of informants was done purposively and selected based on specific considerations.²³ Qualitative data were collected through in-depth interviews, and the questions involved MCH Handbook utilization and the quality of ANC. This qualitative study used thematic analysis, an analytical method for grouping and interconnecting certain theme codes or characteristics. The grouping of each theme characterizes, and the main step of thematic analysis determines the viewpoint of the phenomenon being analysed.²⁴ In this study, data sources were triangulated.²³ All recruited respondents agreed to sign a written informed consent form before data collection.

Results

The respondents were all maternal emergency cases that entered CEMONC in the central general hospital in Padang City. Table 1 shows that almost half of the research respondents did not use the MCH Handbook effectively. Table 2 presents the frequency distribution of maternal emergency levels according to each independent variable and its relationship. The results showed that a

Table 1. Frequency Distribution of Maternal and Child Health Handbook Utilization, Quantity and Quality of Antenatal Care and Maternal Emergency at the Central General Hospital in 2022

Variable	Category	n	%
MCH Handbook utilization	Ineffective	47	43.5
	Effective	61	56.5
Quantity of the ANC	Not enough	29	26.9
	Enough	79	73.1
Quality of the ANC	Not good	20	18.5
	Good	88	81.5
Maternal emergency level	Red	12	11.1
	Yellow	96	88.9

Notes: MCH = Maternal and Child Health, ANC = Antenatal Care

Table 2. Relationship of the Distribution of Maternal and Child Health Handbook Utilisation and the Quantity and Quality of Antenatal Care with Maternal Emergency Level at the Central General Hospital in 2022

Variable	Category	Maternal Emergency Level (%)		p-value	POR	95% CI
		Red	Yellow			
MCH Handbook utilization	Ineffective	19.1	80.9	0.043	4.579	1.165–18.005
	Effective	4.9	95.2			
Quantity of ANC	Not enough	31	69	0.000	11.400	2.821–46.063
	Enough	3.8	96.2			
Quality of ANC	Not good	25	75	0.044	3.857	1.080–13.776
	Good	8	92			

Notes: MCH = Maternal and Child Health, ANC = Antenatal Care, POR = Prevalence Odds Ratio, CI = Confidence Interval

significant relationship existed between MCH Handbook utilization and the maternal emergency level (p-value <0.05). Furthermore, mothers who did not use the MCH Handbook effectively had 4.579 times the chance of being in the red triage emergency level compared to mothers who used the MCH Handbook effectively (prevalence odds (POR) = 4.579).

There was a significant relationship between the quantity of ANC and maternal emergency level (p-value <0.05). Mothers who made ANC visits <6 times had 11.4 times chance of being in the red triage emergency level compared to mothers who made ANC visits six times (POR = 11.4). A significant relationship between the quality of ANC and the maternal emergency level (p-value <0.05). Furthermore, mothers who received poor ANC quality had 3.857 times the likelihood of being in the red triage emergency level compared to mothers who received good ANC quality (POR = 3.857).

The quantitative study results (stage 1) provided information on the relationship between MCH Handbook utilization, the quantity and quality of ANC, and the maternal emergency level at the central general hospital. There was a significant relationship between the quantity of ANC and maternal emergency levels. Hence, the qualitative study (stage 2) aimed to deepen, strengthen, and clarify information from quantitative research results regarding the relationship of MCH Handbook utilization and the quality of the ANC to the maternal emergency level at the central general hospital.

In-depth interviews were conducted with mothers in maternal emergency cases, and triangulation was carried out with midwives and cadres. Qualitative study on MCH Handbook utilization produced the following themes: explanations from midwives, mothers' awareness of reading the MCH Handbook and mothers' perception of the MCH Handbook. The quality of ANC produced a theme of mothers' perceptions of the quality of ANC.

Maternal and Child Health Handbook Utilization

a. Explanation from Midwives

Some mothers said that they did not get an explanation from midwives regarding MCH Handbook utilization. One of the mothers said that the midwives informed her to read the MCH Handbook at home and brought it to every pregnancy checkup.

"They only gave (the MCH Handbook) and told me to read it but did not explain the function." [Mother 4]

In the in-depth interviews with the midwives, they said that some forgot to explain the MCH Handbook's function because there was no time.

"... Our weakness was that some of us often forgot to explain its (MCH Handbook) function." [Midwife 4]

The cadres also said the same concern. The conclusion of the in-depth interviews with the respondents (mothers,

midwives, and cadres) was that some mothers did not get an explanation about the benefits of the MCH Handbook.

b. Mothers' Awareness of Reading the Maternal and Child Health Handbook

There were three aspects in MCH Handbook utilization: a medium for recording ANC (documentation), behavioral change and self-monitoring. An in-depth examination regarding mothers' awareness of reading the MCH Handbook was conducted to assess MCH Handbook utilization.

"I do not read (MCH Handbook) books because my pregnancy felt safe." [Mother 3]

The midwives and cadres also provided the same information.

"Many pregnant women do not read the MCH Handbook because they view pregnancy checks as routine. Pregnant women consider the MCH Handbook only as a complement. When they got home, sometimes they had not given birth yet, but the handbooks had been damaged. If pregnant women feel they need the MCH Handbook, they will maintain it" [Midwife 3]

"Pregnant women were busy, so they rarely read the MCH Handbook..." [Cadre 3]

After in-depth interviews with mothers, midwives, and cadres, it could be concluded that mothers' awareness of reading the MCH Handbook was still lacking. Mothers thought their pregnancy was going well, did not have time to read the MCH Handbook and were busy doing housework.

c. Mothers' Perception of the Maternal and Child Health Handbook

The informants perceived that the MCH Handbook, if explained by health providers and read by mothers, could prevent maternal emergency cases. The following were an excerpt from the results of the in-depth interviews with mothers:

"Yes, there was, maybe there was an explanation in the MCH Handbook, but that's because it was not read and not explained by the midwives...." [Mother 3]

"Yes, if from the beginning, the midwives had explained the benefits of the MCH Handbook....." [Mother 5]

Similarly, the midwives and cadres stated the following:

"Yes, it is possible. If we do it according to the procedure (MCH Handbook utilization), we can detect early symptoms and signs of pregnancy complications" [Midwife 1]

"Yes, there are instructions in the MCH Handbook, like having a seizure during pregnancy. What is it again..., they are all in the MCH Handbook. Pregnant women have to read that. There's enough information in that MCH Handbook." [Cadre 3]

The interview with the informant concluded that using the MCH Handbook was related to emergency cases; reading it and following the procedures would allow the early detection of mothers' emergencies.

Quality of Antenatal Care

The in-depth interviews with mothers with maternal emergency cases showed that they were satisfied with the ANC services. The midwives and cadres also stated the same, indicating that the overall quality of ANC was good and satisfying.

"Satisfied, seizures came suddenly....." [Women 1]

"The quality of ANC 10T can detect complications if the solution was found immediately." [Midwife 2]

The results of the interviews with cadres as informants showed that the quality of the ANC examination was good, with the support of sophisticated tools. In conclusion, the in-depth interviews showed that the mothers were generally satisfied with the ANC examination services they received.

Discussion

Relationship between Maternal and Child Health Handbook Utilization and Maternal Emergency Levels

Maternal emergencies can develop due to complications that are not correctly identified, monitored, or managed and are largely preventable.²⁵ The MCH Handbook can increase knowledge of complications in pregnancy to prevent maternal emergencies. A study conducted at the largest hospital in Bhutan showed a significant association between mothers reading maternal and child health handbooks and knowledge of obstetric danger signs (p-value = 0.043).²⁶ Yanagisawa, *et al.*, stated that pregnant women in Cambodia who used the MCH Handbook experienced increased knowledge of danger signs during pregnancy, such as swelling, persistent vomiting and convulsions.²⁷

This study also showed that mothers did not read the MCH Handbook because they were busy taking care of the household. Tamang, *et al.*, stated that 66% of pregnant women did not read the MCH Handbook as a source of information on obstetric danger signs.²⁶ The current study revealed that MCH Handbook utilization was related to mothers' behaviors. Ainiyah, *et al.*, stated that there was a relationship between the use of the MCH Handbook and the healthy behaviors of pregnant women.¹⁵

The results of the qualitative study in this study suggested that explanations of the MCH Handbook and its function were lacking. Green analyzed how a person's health behavior is influenced by two main factors: behavioral and non-behavioural causes. Behavior is formed from three aspects: the presupposing factor (maternal knowledge), the enabling factor (availability of time) and

the reinforcing factor (provider behavior).²⁸ The use of the MCH Handbook can be supported by the driving factors that manifest in midwives' attitudes and behaviors in providing ANC services to shape community behavior.¹⁵

There is a need for cooperation between mothers and midwives in using the MCH Handbook to detect complications that end in maternal emergency cases early. Midwives who provide MCH services must facilitate the understanding and application of the MCH Handbook by mothers.²⁹ Clear communication is a crucial component of any interaction between midwives and patients and needs to be consciously considered effective.³⁰

Relationship between Quantity of Antenatal Care and Maternal Emergency Level

Mothers who had ANC visits had a reduced incidence of maternal emergencies compared to those without a history of ANC visits.³¹ Similarly, the optimal number of ANC visits would prevent the occurrence of maternal emergencies.³² The number of ANC visits recommended by the WHO was eight: one contact in the first trimester, two in the second trimester, and five in the third trimester.⁷ The latest policies in Indonesia regarding the minimum number of ANC visits are contained in the 2020 MCH Handbook and the Indonesian Ministry of Health Regulation No. 21 of 2021, stating that ANC visits should be made at least six times (K6): two in the first trimester, one in the second trimester, and three in the third trimester.¹⁹

As recommended, the standard number of ANC visits would detect complications early and obtain appropriate and timely services.^{31,32} There was a difference in the incidence of complications between mothers who had complete and incomplete ANC visits.³³ The number of ANC visits was significantly related to the mother's knowledge of danger signs during pregnancy. Mothers who visited the ANC clinic four times were 11 times more likely to know about the danger signs during pregnancy than mothers who only made one visit.³⁴ There was a relationship between pregnant compliance in carrying out ANC examinations and the ability to detect complications early.³⁵

One of the barriers to accessing and utilizing ANC was the economic factor. Mothers with better economic status make more ANC visits than mothers with lower economic status.³⁶ Routine examinations during ANC aim to detect and intervene if complications are found in pregnancy to prevent maternal emergencies.³⁷ The first ANC visit provides an important opportunity for the midwife to teach mothers to recognise the danger signs of complications during pregnancy, labor and delivery and encourage them to plan a clean and safe delivery.³³ In the range of midwifery services, ANC is an essential part

of health services, including health promotion, screening, diagnosis and disease prevention.⁷

Relationship between the Quality of Antenatal Care and Maternal Emergency Level

Maternal emergency cases can occur due to undetected complications. Antenatal check-ups can help pregnant women prepare for childbirth and obtain information on childbirth complications and the benefits of giving birth with trained midwives. Antenatal check-ups carried out by trained personnel enable the detection of problems faced by pregnant women who require special services.³⁸ The incidence of complications differs between midwives who provide ANC services according to standards and midwives who offer ANC services that do not meet standards.³⁹

The WHO recommends five principles (nutrition in pregnancy, maternal and fetal assessment, preventive measures, interventions for managing physiological symptoms in pregnancy and health system-level interventions) in ANC to improve the utilization and quality of ANC.⁷ This enables health providers to identify risk factors and provide appropriate care.²¹ This is in line with the recommendation from the Indonesian Ministry of Health that quality antenatal services include record taking, examination, follow-up, recording of examination results and IEC.¹⁹

The results of the qualitative study in this study showed that the participants reported being satisfied with their received ANC examinations. These results are similar to those of Hussein and Worku, stating that more than half of the respondents were satisfied with the ANC services.⁴⁰ Ensuring the quality of ANC services requires infrastructure, trained medical personnel, infection control facilities, diagnostic equipment, consumables, essential medicines, and proper policy enforcement.⁴⁰

Strengths and Limitations

The results of this study complemented previous studies on MCH Handbook utilization and the quantity and quality of ANC at the maternal emergency level. This was the first study to analyze the relationship between MCH Handbook utilization and the quantity and quality of ANC and the level of maternal emergencies. The results showed that the relationship was statistically significant.

A qualitative study clarified and deepened the results of a quantitative analysis. This study showed that MCH Handbook utilization was still ineffective. The quantity and quality of ANC were quite good, but they could not detect early cases of maternal emergencies. The results of the qualitative study showed that not all the mothers received an explanation regarding the benefits of the MCH Handbook from midwives, mothers' awareness of reading the MCH Handbook and mothers' perception of

the MCH Handbook. The mothers stated that they were satisfied with the quality of the ANC received, even though they could not detect early cases of maternal emergencies. This was a source of evaluation for the improvement of ANC services.

However, this study has several limitations: no data were available regarding the midwives' understanding of the quality of the ANC; the variable quality ANC was assessed based on the 10 T criteria, so it could not reveal the process of implementing ANC; and qualitative data were collected via in-depth interviews only.

Conclusion

MCH Handbook utilization remains underutilized, and although the quantity and quality of ANCs are reasonably good, they cannot detect obstetric complications early. Not all the midwives explained how the MCH Handbook should be utilized, and most mothers do not read their MCH Handbooks. The mothers are satisfied with ANC services despite the inability to identify early obstetric complications that ultimately lead to maternal emergencies. Midwives should consistently explain the benefits of the MCH Handbook and improve their competence in quality ANC services to detect complications and prevent maternal emergencies with the support of professional organizations and the health office. For further study, the understanding of midwives about the quality of ANC can be assessed, and the process of implementing ANC can be evaluated.

Abbreviations

MMR: Maternal Mortality Rate; WHO: World Health Organization; ANC: Antenatal Care; MCH: Maternal and Child Health; IEC: Information, Education, and Communication; CEmONC: Comprehensive Emergency Obstetric and Neonatal Care; ATS: Australian Triage System; PHC: Primary Health Care; POR: Prevalence Odds Ratio; CI: Confidence Interval.

Ethics Approval and Consent to Participate

This study passed the research ethics review by the Research Ethics Committee of the Faculty of Medicine, Andalas University, with license number No.707/UN/16.2/KEP-FK/2022. This study also passed an ethical review by the Ethics Committee of the Central General Hospital in Padang City, with license number LB/02/02/5.7.163/2022. Informed consent was obtained from the participants.

Competing Interest

The authors declare that there is no significant competing financial, professional, or personal interest that might have affected the performance or presentation of the work described in this manuscript.

Availability of Data and Materials

The data and materials in this study are available to the corresponding author upon request.

Authors' Contribution

Conceptualization: RAN, YW; study design: RAN, JS; writing—original draft: RAN; framework: RAN, YW; data interpretation: JS, RAN; editing: RAN.

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