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The Sociodemographic Factors and Accessibility in Utilizing the Maternal and Child Health Handbook for Monitoring Under-Five Children in North Sumatera

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A B S T R A C T

Utilization of the Maternal and Child Health (MCH) Handbook plays a crucial role in monitoring the health and development of children under five years of age; however, its uptake remains suboptimal. According to the 2023 Indonesian Health Survey (SKI), MCH Handbook utilization for under-five growth monitoring in North Sumatra Province was only 67.9%, below the national average of 74.4%. This study aimed to analyze the influence of sociodemographic factors and healthcare accessibility on MCH Handbook utilization for under-five child monitoring in North Sumatra Province. A cross-sectional design was employed using secondary data from the 2023 SKI. The study sample comprised 4,164 under-five children who owned or had previously owned an MCH Handbook in North Sumatra. Data were analyzed through univariate frequency distribution, bivariate chi-square testing, and multivariate multiple logistic regression using the backward stepwise (likelihood ratio) method. The multivariate analysis demonstrated that health insurance ownership (AOR = 1.389; 95% CI = 1.215–1.587), maternal education (AOR = 1.326; 95% CI = 1.107–1.588), maternal age (AOR = 1.163; 95% CI = 1.009–1.339), and maternal employment (AOR = 1.161; 95% CI = 1.007–1.338) were significant positive predictors of MCH Handbook utilization, while longer travel time to health facilities (AOR = 0.690; 95% CI = 0.503–0.946) was inversely associated. Area classification was not statistically significant. These findings underscore the need for sustained health education targeting mothers, maintenance of universal health insurance coverage, and strengthening of community-based health services particularly posyandu to optimize MCH Handbook utilization in North Sumatra.

1. Introduction

The burden of child undernutrition remains a significant public health challenge in Indonesia, manifesting as a triple burden comprising undernutrition, overnutrition, and micronutrient deficiency [1], [2]. National data indicate that among children under five years, the prevalence of stunting stands at 19.8%, wasting at 7.7%, and overweight at 14.4%, while micronutrient deficiencies including anemia (31%), iron deficiency (16%), and vitamin D deficiency (39%) are also prevalent [3], [4], [5], [6]. Addressing these conditions requires systematic monitoring of child growth and development, a function that Indonesia has institutionalized through the Maternal and Child Health (MCH) Handbook (Buku Kesehatan Ibu dan Anak/Buku KIA).

The MCH Handbook was first piloted in Indonesia in 1994 through a program initiated by the Japan International Cooperation Agency (JICA) in Salatiga, Central Java [7]. The handbook serves as the country's only designated home-based health record for maternal, neonatal, and child health [8], with its contents

periodically updated to reflect current clinical guidelines [9]. For children aged 0–59 months, the MCH Handbook contains growth charts, immunization records, nutritional guidance, developmental monitoring tools, and danger sign indicators, enabling both healthcare providers and mothers to track child health over time [10].

Despite this comprehensive framework, MCH Handbook utilization for under-five child monitoring remains suboptimal. The 2023 Indonesian Health Survey (Survei Kesehatan Indonesia/SKI 2023) reported that, nationally, only 74.4% of eligible children had their handbooks actively utilized. North Sumatra Province recorded an even lower figure of 67.9% [3], representing a critical shortfall that may compromise early detection of growth faltering, developmental delays, and nutritional deficiencies. MCH Handbook utilization encompasses both independent maternal recording and documentation by healthcare providers during facility encounters; therefore, factors that influence both maternal health-seeking behavior and healthcare access are relevant determinants.

The determinants of MCH Handbook utilization are conceptually grounded in two complementary theoretical frameworks. Green and Kreuter's PRECEDE-PROCEED model posits that health behavior is shaped by predisposing factors (individual characteristics such as age, educational attainment, and employment status), enabling factors (such as health insurance ownership, geographic accessibility, and transportation costs), and reinforcing factors [11]. This is complemented by Andersen's Behavioral Model of Health Services Use, which positions healthcare accessibility including financial access through insurance and geographic access through proximity to services as a fundamental determinant of health service utilization [12], [13]. Together, these frameworks provide a theoretically rigorous basis for simultaneously examining sociodemographic and accessibility-related predictors within a single analytical model.

Prior studies have documented associations between individual sociodemographic characteristics including maternal age, educational attainment, and employment status and MCH Handbook utilization [14], [15], [16], [17], [18], [19]. However, research that simultaneously integrates sociodemographic and healthcare accessibility variables (including health insurance, travel time, and transportation cost) within a unified analytical framework is limited. Furthermore, the role of area classification (urban vs. rural residence) as a dimension of socioeconomic context has rarely been examined alongside accessibility indicators. This research gap is particularly relevant in the Indonesian context, given the substantial geographic and socioeconomic heterogeneity across provinces.

Given the suboptimal MCH Handbook utilization rates in North Sumatra Province and the gaps in existing evidence, this study aimed to analyze the simultaneous influence of sociodemographic factors and healthcare accessibility on MCH Handbook utilization for under-five child monitoring in North Sumatra Province, using secondary data from the 2023 SKI.

2. Research Method

2.1. Study Design and Data Source

This study employed a quantitative, cross-sectional design utilizing secondary data from the 2023 Indonesian Health Survey (Survei Kesehatan Indonesia/SKI 2023), a nationally representative household survey conducted by the Indonesian Ministry of Health. The SKI 2023 used a stratified multistage cluster sampling methodology to ensure representativeness at both national and provincial levels. The present analysis was restricted to the North Sumatra Province subsample.

2.2. Study Population and Sampling

The target population comprised children under five years of age (0–59 months) residing in North Sumatra Province whose households currently owned or had previously owned an MCH Handbook. This restriction was applied because MCH Handbook utilization as a health behavior can only be meaningfully assessed in households where ownership has occurred. Cases with incomplete data for any study variable were excluded through listwise deletion. Following these inclusion and exclusion criteria, the final analytical sample comprised 4,164 children.

2.3. Variables

The dependent variable was MCH Handbook utilization, operationally defined as the active use of the handbook for child growth and development monitoring among households that owned or had previously owned one, as recorded in the SKI 2023 questionnaire. Handbook utilization encompasses both independent maternal recording and documentation by healthcare providers during facility-based encounters.

Independent variables were categorized into two domains. Sociodemographic variables included:

1. Maternal age, categorized as productive (20–35 years) or non-productive (<20 or >35 years) in accordance with national reference standards [12];
2. Maternal educational attainment, classified as high (completion of junior high school or above) or low (less than junior high school);
3. Maternal employment status, categorized as employed or unemployed; and
4. Area of residence, designated as urban or rural following official administrative classifications.

Healthcare accessibility variables included:

1. Health insurance ownership, encompassing both National Health Insurance (Jaminan Kesehatan Nasional/JKN) and any other health insurance scheme, dichotomized as insured or uninsured;
2. Travel time to the nearest health facility, dichotomized as short (≤30 minutes) or long (>30 minutes) consistent with established accessibility thresholds in the Indonesian context [13]; and
3. Transportation cost to the nearest health facility, categorized as affordable or not affordable based on respondent self-assessment.

2.4. Statistical Analysis

Data analysis was conducted in three sequential stages. First, univariate analysis employed frequency distributions to characterize the study population with respect to all study variables. Second, bivariate analysis used the Pearson chi-square test to examine associations between each independent variable and MCH Handbook utilization; variables with p-values <0.25 were considered eligible for inclusion in the multivariate model, in accordance with standard model-building criteria. Third, multivariate analysis was performed using multiple logistic regression with the backward stepwise (likelihood ratio) method to identify independent predictors of MCH Handbook utilization while controlling for confounding. Results are reported as Adjusted Odds Ratios (AOR) with 95% Confidence Intervals (CI) and corresponding p-values. The significance threshold was set at $p < 0.05$. Transportation cost was excluded from the multivariate model because its bivariate p-value (0.436) exceeded the 0.25 inclusion threshold. All analyses were performed using SPSS version 26.

3. Result and Discussion

3.1. Descriptive Characteristics of the Study Sample

The descriptive characteristics of the study participants are summarized in Table 1.

Table 1. Frequency Distribution of Study Variables Among Under-Five Children with MCH Handbook Ownership in North Sumatra Province (n = 4,164)

Variable	Category	n	%
MCH Handbook Utilization	Utilized	2,837	68.1
	Not Utilized	1,327	31.9
Maternal Age	20–35 years (Productive)	2,867	68.9
	<20 or >35 years (Non-Productive)	1,297	31.1
Maternal Education	High (≥ Junior High School)	3,522	84.6
	Low (< Junior High School)	642	15.4
Maternal Employment	Employed	2,518	60.5
	Unemployed	1,646	39.5
Area Classification	Urban	1,695	40.7
	Rural	2,469	59.3
Health Insurance Ownership	Insured	2,440	58.6
	Uninsured	1,724	41.4
Travel Time to Health Facility	≤30 minutes	3,929	94.4
	>30 minutes	235	5.6
Transportation Cost	Affordable	4,016	96.4
	Not Affordable	148	3.6

Of the 4,164 children in the analytical sample, 2,837 (68.1%) had their MCH Handbooks actively utilized, while 1,327 (31.9%) did not. The majority of children had mothers in the productive age group (20–35 years; n = 2,867; 68.9%), mothers with high educational attainment (completion of junior high school or above; n = 3,522; 84.6%), and employed mothers (n = 2,518; 60.5%). A larger proportion of children resided in rural areas (n = 2,469; 59.3%) than in urban areas (n = 1,695; 40.7%). Regarding healthcare accessibility, 2,440 (58.6%) children had health insurance coverage, 3,929 (94.4%) lived within 30 minutes of the nearest health facility, and 4,016 (96.4%) had access to affordable transportation.

3.2. Bivariate Analysis

The results of the bivariate analysis examining the association between participant characteristics and MCH Handbook utilization are presented in Table 2. Pearson's chi-square test was used to identify variables associated with handbook utilization prior to multivariable analysis.

Table 2. Bivariate Analysis of MCH Handbook Utilization Among Under-Five Children with MCH Handbook Ownership in North Sumatra Province (n = 4,164)

Variable	Utilized	Not Utilized	Total	p-value
Maternal Age				
20–35 years	69.0	31.0	100	0.083
<20 or >35 years	66.2	33.8	100	
Maternal Education				
High (≥JHS)	69.1	30.9	100	0.003
Low (<JHS)	63.1	36.9	100	
Maternal Employment				
Employed	70.0	30.0	100	0.001
Unemployed	65.2	34.8	100	
Area Classification				
Urban	66.2	33.8	100	0.029
Rural	69.5	30.5	100	
Health Insurance Ownership				
Insured	71.2	28.8	100	<0.001
Uninsured	63.8	36.2	100	
Travel Time to Health Facility				
≤30 minutes	67.7	32.3	100	0.012
>30 minutes	75.7	24.3	100	
Transportation Cost				
Affordable	68.3	31.7	100	0.436
Not Affordable	64.9	35.1	100	

Statistically significant differences in MCH Handbook utilization were observed for maternal education (p = 0.003), maternal employment (p = 0.001), area classification (p = 0.029), health insurance ownership (p < 0.001), and travel time to health facility (p = 0.012).

Children of highly educated mothers had a higher utilization rate (69.1%) than those with low maternal education (63.1%). Children of employed mothers had higher utilization (70.0%) than those of unemployed mothers (65.2%). Children residing in rural areas had slightly higher utilization (69.5%) than those in urban areas (66.2%). Insured children showed higher utilization (71.2%) than uninsured children (63.8%). Notably, children whose nearest facility was more than 30 minutes away had higher utilization (75.7%) than those within 30 minutes (67.7%), a pattern further explored in the multivariate analysis. Maternal age ($p = 0.083$) and transportation cost ($p = 0.436$) did not reach the conventional significance threshold. All variables with $p < 0.25$, with the exception of transportation cost ($p = 0.436$), were carried forward to the multivariate model.

3.3. Multivariate Analysis

Results of the multiple logistic regression analysis are presented in Table 3.

Table 3. Multivariate Logistic Regression Analysis of Predictors of MCH Handbook Utilization Among Under-Five Children in North Sumatra Province

Variable	p-value	AOR	95% CI
Health Insurance Ownership (Insured vs. Uninsured)	<0.001	1.389	1.215–1.587
Maternal Education (High vs. Low)	0.002	1.326	1.107–1.588
Maternal Age (Productive vs. Non-Productive)	0.037	1.163	1.009–1.339
Maternal Employment (Employed vs. Unemployed)	0.040	1.161	1.007–1.338
Area Classification (Rural vs. Urban)	0.052	0.867	0.751–1.001
Travel Time to Health Facility (>30 min vs. ≤30 min)	0.021	0.690	0.503–0.946

AOR = Adjusted Odds Ratio; CI = Confidence Interval. Reference categories: Uninsured; Low education; Non-Productive age; Unemployed; Urban; ≤30 minutes travel time.

Following the backward stepwise elimination procedure, six variables were retained in the final model. Health insurance ownership was the strongest independent predictor (AOR = 1.389; 95% CI = 1.215–1.587; $p < 0.001$), indicating that insured children were approximately 1.4 times more likely to have their MCH Handbooks utilized than uninsured children. Maternal education was the second strongest predictor (AOR = 1.326; 95% CI = 1.107–1.588; $p = 0.002$), with children of highly educated mothers being 1.3 times more likely to have their handbooks utilized. Maternal age (AOR = 1.163; 95% CI = 1.009–1.339; $p = 0.037$) and maternal employment (AOR = 1.161; 95% CI = 1.007–1.338; $p = 0.040$) also demonstrated significant positive associations. Area classification was retained in the final model but did not reach statistical significance (AOR = 0.867; 95% CI = 0.751–1.001; $p = 0.052$). Travel time exhibited a significant inverse association (AOR = 0.690; 95% CI = 0.503–0.946; $p = 0.021$), whereby children whose nearest health facility required more than 30 minutes of travel were 31% less likely to be classified as non-utilizing, a finding discussed further below.

3.4. Discussion

3.4.1. Influence of Sociodemographic Factors on MCH Handbook Utilization

Maternal age emerged as a significant predictor of MCH Handbook utilization in the multivariate model (AOR = 1.163; $p = 0.037$), although it did not reach statistical significance at the bivariate level ($p = 0.083$). This discrepancy suggests that confounding by variables such as educational attainment and employment status partially masked the independent effect of maternal age at the bivariate stage a pattern consistent with known correlations between these sociodemographic characteristics. Mothers in the productive age range (20–35 years) are generally characterized by greater cognitive receptivity to health information, higher health literacy, and more active engagement with preventive health services, factors that collectively facilitate proactive use of child health monitoring tools such as the MCH Handbook [14]. In the context of Green and Kreuter's PRECEDE-PROCEED model, age may function as a predisposing factor through its influence on health knowledge and attitudes. This finding is consistent with that of Widiasari and Indriastuti, who documented higher health-seeking engagement among mothers of productive age [14]. In contrast, studies conducted in Karawang and Surabaya found no significant association between maternal age and MCH Handbook utilization [15], [16], discrepancies potentially attributable to differences in the operationalization of the utilization outcome, sample composition, or geographic and sociocultural variation in health-seeking behavior.

Maternal educational attainment was identified as the second strongest predictor (AOR = 1.326; $p = 0.002$). Higher educational attainment is associated with enhanced capacity to absorb, critically appraise, and act upon health information, a mechanism theorized to improve health behaviors across multiple domains [17]. In this context, more educated mothers are better positioned to understand the purpose and content of the MCH Handbook, including growth monitoring charts, immunization schedules, and danger signs, thereby facilitating its consistent use. This finding is corroborated by studies conducted in Bantul [14], Makassar [17], and Tabanan [18], all of which reported significant associations between maternal knowledge largely a product of educational attainment and handbook utilization. These results emphasize the continued need for sustained health education interventions across all educational strata, particularly for mothers with limited formal schooling, to improve awareness of and practical engagement with the MCH Handbook as an early detection and monitoring tool [20].

Maternal employment status was also a significant predictor (AOR = 1.161; p = 0.040). Employed mothers may benefit from broader exposure to health information through occupational networks, increased economic resources that facilitate health service access, and a heightened sense of agency in health decision-making all of which may reinforce handbook utilization. Nevertheless, employment may simultaneously constrain time availability for health facility visits, which are a prerequisite for provider-side handbook documentation. This paradox suggests that the net effect of employment on handbook utilization may vary depending on local labor conditions, childcare support structures, and the availability and accessibility of community health services. The non-significant finding in the Surabaya study [16] may reflect such contextual variation.

Area classification (urban/rural) was significantly associated with MCH Handbook utilization at the bivariate level (p = 0.029), with a paradoxically higher utilization rate in rural areas (69.5%) compared to urban areas (66.2%). However, after controlling for confounding variables in the multivariate model, this association lost statistical significance (AOR = 0.867; p = 0.052). This attenuation indicates that the observed bivariate rural–urban difference is largely explained by the distribution of correlated variables particularly health insurance ownership and travel time rather than by area classification per se. This finding contrasts with that of Aoki et al. in Angola, who documented higher handbook utilization in urban areas [21]; however, in North Sumatra, the pervasive presence of posyandu networks in rural communities may partially compensate for other rural disadvantages, attenuating the expected urban–rural differential.

3.4.1. Influence of Healthcare Accessibility on MCH Handbook Utilization

Health insurance ownership was the strongest independent predictor of MCH Handbook utilization (AOR = 1.389; p < 0.001), a finding with important implications for health service design and social protection policy. The mechanism underlying this association is consistent with Andersen's Behavioral Model: insurance reduces financial barriers to health service utilization, thereby increasing the frequency of facility-based encounters during which healthcare providers document entries in the MCH Handbook. In the absence of insurance, the direct and indirect costs of health facility visits may deter attendance, consequently limiting opportunities for provider-side handbook recording. While direct evidence linking health insurance specifically to MCH Handbook utilization is limited in the literature, the present finding is consistent with broader evidence that insurance improves maternal and child healthcare utilization in low- and middle-income country settings. Yaya et al. in Ghana demonstrated that insured women were significantly more likely to utilize maternal health services, including antenatal care and institutional delivery [22]. Similarly, Kuwawenaruwa et al. in Tanzania showed that MCH insurance cards improved equity in access to and use of maternal and child health services [23]. These findings collectively affirm the importance of maintaining and expanding universal health insurance coverage, particularly through the JKN scheme, as a structural mechanism for improving MCH Handbook utilization in North Sumatra.

The inverse and statistically significant association between travel time and MCH Handbook utilization (AOR = 0.690; p = 0.021) was initially counterintuitive, as longer travel times would be expected to constitute a structural barrier to health service use and, by extension, to provider-side handbook documentation. However, several contextual mechanisms may explain this finding. First, mothers residing at greater distances from formal health facilities may use the MCH Handbook more intensively as a home-based self-monitoring tool, compensating for reduced facility contact through more diligent independent recording of growth and developmental milestones [24]. Second, the widespread availability of posyandu across both urban and rural areas of North Sumatra substantially reduces the effective distance barrier: posyandu offer regular growth monitoring, immunization, and health education services at the community level, and kader (community health volunteers) actively support handbook recording at these community-based venues [25]. Children residing far from formal health facilities thus retain access to handbook recording through posyandu contact, potentially explaining the higher utilization observed in this group. Third, posyandu have been demonstrated to positively influence a range of maternal and child health outcomes, including immunization coverage, exclusive breastfeeding rates, and stunting prevention [26], suggesting that community-based health infrastructure plays a critical mediating role between physical accessibility constraints and effective MCH Handbook utilization. These findings underscore the strategic importance of posyandu as a platform for MCH Handbook recording and child health monitoring, particularly in geographically disadvantaged communities.

This study has several limitations that should be acknowledged. As a secondary analysis of cross-sectional survey data, causal inferences cannot be drawn. The SKI 2023 does not capture qualitative dimensions of MCH Handbook utilization, such as the completeness or quality of entries, nor does it include information on the frequency of posyandu attendance, which may be an important mediator. Transportation cost was excluded from the multivariate model due to a non-significant bivariate p-value; however, this decision may have resulted in the omission of a theoretically relevant variable, and the direction of its effect warrants further exploration in future studies. Additionally, the

self-reported nature of some variables (e.g., transportation affordability and handbook utilization status) introduces the possibility of recall or social desirability bias. Despite these limitations, the large sample size, nationally representative data source, and use of a theoretically grounded multivariate analytical framework constitute important methodological strengths.

4. Conclusion

This study demonstrated that MCH Handbook utilization for under-five child monitoring in North Sumatra Province is shaped by both individual sociodemographic characteristics and structural healthcare accessibility factors. Health insurance ownership and maternal educational attainment were identified as the strongest and most robust independent predictors. Maternal age and employment status also demonstrated significant positive associations. Longer travel time to health facilities was paradoxically associated with higher utilization, consistent with the hypothesized compensatory role of posyandu-based community health services and home-based self-monitoring. Area classification and transportation cost were not independently significant after controlling for confounding. These findings carry several important implications for policy and practice. First, universal health insurance coverage through the JKN scheme should be maintained and actively expanded, particularly among economically vulnerable and rural populations, given its demonstrated role in enabling health service utilization and MCH Handbook recording. Second, targeted health education programs should be implemented at health facilities and posyandu to improve maternal understanding of and engagement with the MCH Handbook, with particular emphasis on mothers with lower formal educational attainment and those in non-productive age groups. Third, posyandu networks should be strengthened through increased investment in kader training, monitoring supplies, and community outreach, given their critical role in bridging accessibility gaps for geographically disadvantaged populations. Future research should employ mixed-methods approaches incorporating primary data collection to provide deeper contextual insights into the behavioral and structural determinants of MCH Handbook utilization at the district level, including investigation of the mediating role of posyandu attendance and kader support.

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