SOCIOECONOMIC AND DEMOGRAPHIC FACTORS ASSOCIATED WITH GROWTH MONITORING RECORD COMPLETENESS IN THE INDONESIAN MATERNAL AND CHILD HEALTH HANDBOOK: EVIDENCE FROM THE 2023 INDONESIAN HEALTH SURVEY

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Abstract

The Maternal and Child Health (MCH) Handbook is the only home-based health record in Indonesia that contains the child growth monitoring chart. Complete growth records allow health workers and families to follow a child's growth trajectory over time. This study aimed to examine the socioeconomic and demographic factors associated with the completeness of growth monitoring records in the MCH Handbook among children aged 0–59 months in Indonesia. This cross-sectional study used published aggregated tabulations from the 2023 Indonesian Health Survey (SKI) report. We reconstructed category-specific counts by multiplying the weighted number of children in each category by the reported proportion, yielding an estimated weighted total of 55,145 children. Socioeconomic variables included household head occupation, household economic status, household head education, and place of residence; child age was analysed as a demographic variable. Bivariate analyses were performed using the chi-square test and crude odds ratios (COR) with 95% confidence intervals (CI); these analyses could not account for the complex survey design. Overall, 61.2% of children had complete growth records. In bivariate analyses, record completeness was associated with household head occupation (p=0.034), economic status (p<0.001), place of residence (p<0.001), and child age (p=0.002), but not with household head education (p=0.685). Completeness was higher in rural than in urban areas (COR 1.13; 95% CI 1.10–1.18), and lower in the rich than in the poor group (COR 0.93; 95% CI 0.89–0.98) and among children aged 36–59 months than among infants (COR 0.92; 95% CI 0.88–0.97). However, the absolute differences between groups were small (at most 3.2 percentage points). Nearly four in ten children did not have complete growth records, indicating that incomplete recording is common across all socioeconomic and demographic groups. Because the associations were unadjusted and derived from aggregated data, they should be interpreted cautiously and confirmed using individual-level survey data with design-based multivariable analysis.

Keywords: Completeness; Growth Monitoring; Indonesian Health Survey; MCH Handbook; Socioeconomic Factors

1. INTRODUCTION

Early childhood is the period of most rapid growth and the period most vulnerable to growth faltering. Growth failure, such as stunting, wasting, and underweight, is associated with shorter adult height, lower educational attainment, reduced economic productivity, and a higher risk of non-communicable diseases later in life [1], [2]. In Indonesia, the prevalence of stunting among children under five was 21.5% in 2023 [3], underscoring the need for regular and well-documented growth monitoring.

In Indonesia, growth monitoring is documented through the Maternal and Child Health (MCH) Handbook (Buku Kesehatan Ibu dan Anak or Buku KIA). The MCH Handbook has been developed since the 1990s and, through a 2004 decree of the Minister of Health, was established as the only home-based health record for mothers, newborns, and children [4]. The handbook contains records of pregnancy, delivery, and immunisation, as well as child growth and development charts that are filled in by health workers and community health volunteers (cadres) each time the child is weighed and measured, usually at the posyandu (integrated health post) [5]. Evidence shows that home-based health records improve service utilisation, immunisation coverage, and the continuity of maternal and child care [6], [7]. In Indonesia, use of the MCH Handbook has been shown to promote continuous service utilisation and better child care practices at home [8].

These benefits depend on the growth chart being completed, not merely on the handbook being owned. Owning or using the MCH Handbook and having a complete growth record are distinct indicators: a child may possess a handbook whose growth chart is only partly filled in. Incomplete recording makes it difficult to assess growth trends, so growth faltering may be detected late. At the same time, complete recording does not by itself guarantee accurate measurement, correct interpretation of the chart, or appropriate counselling and follow-up [9].

Previous Indonesian studies have mainly examined MCH Handbook ownership or use and posyandu participation. Ownership and use of the handbook have been linked to increased maternal health service utilisation and early breastfeeding practice, higher immunisation coverage, and a more continuous pathway of care [4], [8], [10]. The completeness of maternal and child health record-keeping in Indonesia is influenced by various factors, including the knowledge, attitudes, and skills of health workers, as well as mothers' knowledge. Another important factor is the standard operating procedures for filling out the maternal and child health record book [11].

Studies of family characteristics have produced mixed findings: in North Aceh, household income was the only sociodemographic factor associated with mothers' participation in the posyandu, with low-income families attending more frequently, whereas education was not associated with participation [12]; in the Greater Jakarta metropolitan area, only about 62.5% of mothers used the MCH Handbook [13]; and sociodemographic factors, including education, were not associated with mothers' knowledge of the handbook's content [14]. These studies were local in scope and measured ownership, use, attendance, or knowledge rather than whether the growth chart itself had been completed. Consequently, little is known at the national level about how the completeness of growth recording varies across socioeconomic and demographic groups.

This study addresses this gap by analysing the completeness of growth monitoring records, rather than handbook ownership or use, using nationally representative data from the 2023 SKI. Household socioeconomic position was represented by household head occupation and education, household economic status, and place of residence, which are the household-level characteristics by which the published SKI tabulations are disaggregated. Household head characteristics were used as proxies for household socioeconomic position, although maternal or caregiver characteristics may be more closely related to posyandu attendance and handbook management. Child age was examined separately as a demographic, not a socioeconomic, factor because contact with health services varies with the immunisation and growth monitoring schedule. Therefore, this study aimed to examine the socioeconomic and demographic factors associated with the completeness of growth monitoring records in the MCH Handbook among children aged 0–59 months in Indonesia.

2. METHODOLOGY

This was an analytical cross-sectional study based on secondary data from the 2023 Indonesian Health Survey (Survei Kesehatan Indonesia, SKI), conducted by the Health Development Policy Agency (Badan Kebijakan Pembangunan Kesehatan, BKPK) of the Ministry of Health of the Republic of Indonesia [3]. The SKI integrates the Basic Health Research (Riset Kesehatan Dasar, Riskesdas) and the Indonesian Nutritional Status Study (Studi Status Gizi Indonesia, SSGI) and provides community-based health data that are representative at the national, provincial, and district/city levels. Data collection for the 2023 SKI took place in 38 provinces from August to early October 2023. This study did not use individual-level (micro) data. All figures were obtained from published aggregated tabulations in the 2023 SKI report [3], which present, for each category of a background characteristic, the weighted number of children and the weighted percentage distribution of growth record

completeness (Table 13.12, p. 645). This table reports child age in six groups (0–5, 6–11, 12–23, 24–35, 36–47, and 48–59 months), household head education in six levels, household head occupation in nine categories, place of residence, and household economic status in five quintiles, together with child sex; the categories were merged by the authors as described below.

The study population comprised children aged 0–59 months included in the 2023 SKI for whom the completeness of growth monitoring records in the MCH Handbook was reported. The completeness of the MCH book is assessed by examining the completeness of the entries in MCH book; this refers to a physical MCH book and does not include the digital MCH book. The denominator for the calculation includes all children aged 0–59 months who have a KIA book and can present it. The total of 55,145 children corresponds to the weighted N reported in Table 13.12; it is a weighted estimate rather than the unweighted number of children observed. No additional inclusion or exclusion criteria were applied by the authors, and missing data could not be examined because only aggregated tabulations were available. The dependent variable was the completeness of growth monitoring records in the MCH Handbook. The 2023 SKI classified this variable as fully completed, partially completed, and not completed, based on the growth chart pages of the child's MCH Handbook as observed by the enumerator. The assessment is based on the Health Progress Card (KMS) in the Maternal and Child Health (KIA) Book. “Completely filled out” (code 1): The child’s weight is recorded and the weight-for-age curve is plotted on the KMS according to the child’s age; “Incompletely filled out” (code 2): There is a weight record or plot, but it does not meet both of these requirements; Not filled out (code 3): There are no relevant records in the growth monitoring section. In this study, the variable was dichotomised into complete (fully completed) and incomplete (partially completed and not completed) because only a fully completed chart allows a child's growth trajectory to be followed continuously, whereas both partially completed and blank charts prevent a reliable assessment of growth trends. The dichotomy also allowed the calculation of odds ratios. The independent variables were household head occupation, household economic status, household head education, and place of residence (socioeconomic factors), and child age (demographic factor).

Household head occupation was grouped into not working and working. The not-working category included household heads who were not working or still in school, while the working category included civil servants/military/police/state-owned enterprise employees, private employees, self-employed persons, farmers/farm labourers/fishers, labourers/drivers/domestic workers, and others. Household head occupation and education were used because these were the characteristics by which the published SKI tabulations were disaggregated; maternal or caregiver characteristics were not available. These variables are therefore proxies of household socioeconomic position and may not reflect the characteristics of the person who usually brings the child to the posyandu. Economic status was determined using a household asset ownership index; the higher the household's economic status, the more durable goods it owns. The index was constructed from 12 variables: type and capacity of household lighting, washing machine, refrigerator, air conditioner, computer/laptop, flat-screen TV, gold/jewellery of at least 10 grams, private vehicle, cooking fuel, ceiling type, floor type, and wall type. The five index quintiles reported by the SKI were grouped by the authors into three categories: poor (lowest and lower-middle quintiles), middle (middle and upper-middle quintiles), and rich (highest quintile). This grouping was used to obtain groups of adequate size while keeping the highest quintile separate, because households in this quintile were expected to differ most in their use of private health services. Household head education was grouped into low (never attended school, did not complete primary school, completed primary school, and completed junior secondary school), middle (completed senior secondary school), and high (completed a diploma or university degree). Place of residence was divided into urban and rural. Child age was grouped into 0–11 months (infants), 12–35 months (toddlers), and 36–59 months.

Because only aggregated data were available, the number of children in each cell was reconstructed by multiplying the weighted N of each original SKI category by the reported proportion (n = weighted N × reported proportion); categories were then merged according to the operational definitions, and the summed products were rounded to the nearest whole number. In the source table, the weighted Ns for household head education and occupation sum to 55,144, one fewer than for the other characteristics (55,145). In addition, because the published percentages are rounded to one decimal place, the reconstructed numbers of complete records differ slightly between variables (33,761–33,778; at most 12 children, <0.04%, from the overall 33,773). Univariate analysis was performed to describe the frequency distribution of each variable. Bivariate analysis used Pearson's chi-square test (α=0.05) on the reconstructed 2×k contingency tables to assess the association between each independent variable and record completeness, together with crude odds ratios (COR) and 95%

confidence intervals to describe the magnitude and direction of the associations. The COR was calculated as (a/b)/(c/d), where a and b are the numbers of complete and incomplete records in the category of interest and c and d those in the reference category, and the 95% CI was calculated using the Woolf (logit) method: exp[ln(COR) ± 1.96√(1/a + 1/b + 1/c + 1/d)]. The reference categories were not working, poor, low education, urban, and age 0–11 months. Because the reconstructed counts are weighted estimates and the stratification and clustering of the SKI sample could not be incorporated, the p-values and confidence intervals do not account for the complex survey design and are likely too narrow; therefore, they should be regarded as approximate. All estimates are crude (unadjusted) associations that were not controlled for confounding. Analyses were performed using IBM SPSS Statistics version 26.

Ethical considerations: This study used secondary data in the form of aggregated tables published in the official 2023 Indonesian Health Survey (Survei Kesehatan Indonesia [SKI] 2023) report. The data were publicly available and did not contain individual-level information that could identify study participants. The study did not involve direct contact with human participants, data collection from individuals, or any intervention. The study did not require individual informed consent and therefore did not require ethical approval according to institutional regulations.

3. RESULTS

This analysis included an estimated weighted total of 55,145 children aged 0–59 months from 38 provinces in Indonesia. The univariate and bivariate results are presented in Tables 1 and 2.

Table 1. *Frequency Distribution of Sociodemographic Characteristics and MCH Handbook Record Completeness (weighted N = 55,145)*

Variable	Category	Weighted n*	%
Household head occupation	Not working	1,476	2.7
	Working	53,668	97.3
Economic status	Poor	15,400	27.9
	Middle	25,477	46.2
	Rich	14,268	25.9
Household head education	Low	23,414	42.5
	Middle	23,217	42.1
	High	8,513	15.4
Place of residence	Urban	32,288	58.6
	Rural	22,857	41.4
Child age	0–11 months	10,442	18.9
	12–35 months	22,790	41.3
	36–59 months	21,913	39.7
	Complete	33,773	61.2

Variable	Category	Weighted n*	%
MCH Handbook record completeness	Incomplete	21,372	38.8

*Weighted counts derived from the weighted N and the rounded percentages in Table 13.12 of the 2023 SKI report [3]; they are not unweighted counts of observed children. In the source table, the weighted Ns for household head occupation and education sum to 55,144 rather than 55,145, and percentages may not sum to exactly 100.0% because of rounding.

Table 1 shows that almost all children lived in households whose head was working (97.3%). Nearly half of the children came from households with middle economic status (46.2%). Most household heads had low (42.5%) or middle (42.1%) education, while only 15.4% had high education. A total of 58.6% of children lived in urban areas, and the largest age group was 12–35 months (41.3%). Overall, 61.2% of children had complete growth monitoring records in the MCH Handbook, while 38.8% had incomplete records.

Table 2. *Bivariate Association between Sociodemographic Characteristics and MCH Handbook Record Completeness (Crude Odds Ratios)*

Variable	Complete	Incomplete	Total	COR (95% CI)	p-value
	Weighted n (%)	Weighted n (%)			
Household head occupation					
Not working	865 (58.6)	611 (41.4)	1,476	1.00 (Ref)*	0.034
Working	32,913 (61.3)	20,755 (38.7)	53,668	1.12 (1.01–1.25)	
Economic status					
Poor	9,390 (61.0)	6,010 (39.0)	15,400	1.00 (Ref)*	<0.001
Middle	15,918 (62.5)	9,559 (37.5)	25,477	1.07 (1.02–1.11)	
Rich	8,461 (59.3)	5,807 (40.7)	14,268	0.93 (0.89–0.98)	
Household head education					
Low	14,353 (61.3)	9,061 (38.7)	23,414	1.00 (Ref)*	0.685
Middle	14,232 (61.3)	8,985 (38.7)	23,217	1.00 (0.96–1.04)	
High	5,176 (60.8)	3,337 (39.2)	8,513	0.98 (0.93–1.03)	
Place of residence					
Urban	19,373 (60.0)	12,915 (40.0)	32,288	1.00 (Ref)*	<0.001
Rural	14,400 (63.0)	8,457 (37.0)	22,857	1.13 (1.10–1.18)	

Variable	Complete	Incomplete	Total	COR (95% CI)	p-value
	Weighted n (%)	Weighted n (%)			
Child age					
0–11 months	6,528 (62.5)	3,914 (37.5)	10,442	1.00 (Ref)*	0.002
12–35 months	13,982 (61.3)	8,808 (38.7)	22,790	0.95 (0.91–1.00)†	
36–59 months	13,263 (60.5)	8,650 (39.5)	21,913	0.92 (0.88–0.97)	

*COR = crude (unadjusted) odds ratio; CI = confidence interval; Ref = reference category (COR = 1.00). n values are reconstructed weighted counts (see Table 1); owing to rounding, column totals differ slightly between variables (complete: 33,761–33,778). p-values were obtained from Pearson's chi-square test across all categories of each variable; COR and 95% CI were calculated using the Woolf (logit) method. Neither the p-values nor the CIs account for the complex survey design. †The unrounded 95% CI was 0.907–0.998.

In bivariate analyses, four of the five variables were significantly associated with the completeness of growth monitoring records. Children whose household head was working had higher crude odds of complete recording than those whose household head was not working (61.3% vs 58.6%; COR 1.12; 95% CI 1.01–1.25; p=0.034), although the not-working group comprised only 2.7% of the sample and the lower confidence limit was close to 1. Economic status showed a non-linear association (p<0.001): completeness was highest in the middle group (62.5%; COR 1.07; 95% CI 1.02–1.11), whereas the rich group had the lowest completeness (59.3%), with 7% lower odds than the poor group (COR 0.93; 95% CI 0.89–0.98).

Children living in rural areas had higher record completeness than those in urban areas (63.0% vs 60.0%; COR 1.13; 95% CI 1.10–1.18; p<0.001). Record completeness declined with increasing child age, from 62.5% at 0–11 months to 61.3% at 12–35 months (COR 0.95; 95% CI 0.907–0.998) and 60.5% at 36–59 months (COR 0.92; 95% CI 0.88–0.97; p=0.002). In contrast, household head education was not associated with record completeness (p=0.685), with nearly identical proportions across the three education categories (60.8–61.3%). In all variables, the absolute differences in completeness between categories were small (at most 3.2 percentage points).

4. DISCUSSION

This study found that nearly four in ten children aged 0–59 months in Indonesia did not have complete growth monitoring records in the MCH Handbook. This finding is important because the value of the MCH Handbook as a home-based record lies in the continuity of its information. Systematic reviews have shown that home-based health records encourage care seeking, improve child care practices, and facilitate continuity of care [6], [7]. An interrupted growth chart prevents the assessment of weight and height trends, so opportunities to detect growth disorders and provide timely nutritional counselling may be lost. Record completeness is therefore a necessary, although not sufficient, condition for effective growth monitoring: a complete chart does not guarantee that measurements were accurate, that the chart was correctly interpreted, or that appropriate follow-up was provided [9].

The association between economic status and record completeness was not linear. The middle economic group had the highest completeness, whereas the rich group had the lowest. This pattern is consistent with findings from North Aceh that low-income families participated in the posyandu more frequently than high-income families [12]. One possible explanation is that wealthier households may use private health facilities, such as paediatricians or private clinics, that maintain separate medical records and do not always fill in the growth chart in the MCH Handbook. The low use of the MCH Handbook reported in the Greater Jakarta area is consistent with this possibility [13]. However, this explanation could not be directly assessed because information on the type of health facility used was

not included in the present analysis. These findings suggest that incomplete recording is not confined to poorer households; wealthier groups may also be overlooked in the growth recording system.

The higher record completeness in rural areas may reflect the strong role of the posyandu and cadres in these areas. The posyandu has long functioned as a participatory monitoring system that records the weight and height of children under five every month, and cadres are motivated by concern for community health and the support of local leaders [5]. Cadres' capacity in growth monitoring can also be strengthened through short training courses [15]. In contrast, urban communities may have a wider range of service options, greater mobility, and weaker ties to the posyandu, so recording in the MCH Handbook may be more easily missed. However, posyandu visit frequency, cadre capacity, and service availability were not measured in this study; these mechanisms are therefore possible interpretations that should be tested in future research rather than direct explanations of the observed differences.

Children whose household head was working had slightly higher crude odds of complete recording. Household head occupation may reflect economic stability and access to health services. However, this finding should be interpreted with caution because the not-working group accounted for only 2.7% of the sample and the lower bound of the confidence interval was close to one. In addition, the available variable was the occupation of the household head rather than that of the mother, although mothers usually play the main role in bringing children to the posyandu. Household head education was not associated with record completeness. One possible explanation is that the MCH Handbook is distributed universally and the growth chart is completed by health workers or cadres rather than by parents, so its completeness may depend more on the regularity of visits and staff practices than on the family's educational level. This is in line with a previous study that found no association between education and posyandu participation [12]. Another study found that sociodemographic factors, including education, were not associated with mothers' knowledge of the content of the MCH Handbook [14]. This interpretation remains hypothetical: a non-significant result does not show that education is irrelevant in all contexts, and the variable analysed was household head education rather than the education of the mother or primary caregiver.

Record completeness decreased as child age increased. One possible explanation is that, during the first year of life, visits to health services are relatively frequent because of the basic immunisation schedule, and each visit is an opportunity to weigh the child and record their growth; after basic immunisation is complete, families' motivation to attend regularly may decline. Because visit frequency was not measured in this analysis, this explanation remains to be confirmed. However, growth disorders can still occur after the age of two years, so monitoring of preschool-aged children remains necessary. Strategies such as weighing-schedule reminders, integration of growth monitoring with early childhood education, and home visits by cadres could be explored in future studies for this age group; for example, home visits by trained cadres have been used to support stunting reduction efforts [15], [16].

Although statistically significant, the differences between groups were relatively small (at most 3.2 percentage points; COR 0.92–1.13), and this significance was largely driven by the large (weighted) sample size; statistical significance should therefore not be equated with practical importance. This means that incomplete recording is a widespread problem across all socioeconomic and demographic groups rather than one confined to particular groups. Potential implications include strengthening the capacity of health workers and cadres, encouraging private facilities to record growth in the MCH Handbook, and using the digital MCH Handbook, alongside efforts targeted at the groups with the lowest completeness. However, these are potential implications rather than interventions whose effectiveness was evaluated in this study, which did not examine barriers to recording at health facilities.

This study has several limitations. First, the analysis was based on published aggregated tabulations rather than individual-level data; cell counts were reconstructed from weighted totals and rounded percentages, so small inconsistencies between tables exist and the counts should not be interpreted as exact observations. Second, the stratification, clustering, and weighting of the survey could not be incorporated into the inferential analysis, so the confidence intervals and p-values are likely to be too narrow. Third, only crude bivariate associations were estimated; they were not adjusted for potential confounders (for example, economic status and place of residence are interrelated) and should not be interpreted as independent or causal effects. Fourth, socioeconomic position was represented by household head characteristics rather than maternal or caregiver characteristics, and information on the type of health facility used, posyandu visit frequency, and cadre capacity was not available. Fifth, the cross-sectional design precludes conclusions about temporal relationships, and record

completeness reflects documentation only, not the accuracy of measurements or the quality of follow-up. Sixth, because the 2023 SKI assessed record completeness only among children who had and could present an MCH Handbook, the findings do not apply to children without a handbook, whose growth monitoring may be even less complete.

5. CONCLUSIONS

In this analysis of published 2023 Indonesian Health Survey data, 61.2% of children aged 0–59 months were reported to have complete growth monitoring records in the MCH Handbook. In bivariate analyses, record completeness was associated with household head occupation, household economic status, place of residence, and child age, whereas no statistically significant association was observed with household head education. The differences between groups were small, indicating that incomplete recording remains common across socioeconomic and demographic groups. However, the associations should be interpreted cautiously because they were derived from aggregated data, did not account for the complex survey design, and were not adjusted for potential confounders. Further analysis using individual-level 2023 SKI data with design-based multivariable methods, including maternal characteristics and the type of health facility used, is needed to assess the robustness of these findings and to identify the reasons for incomplete recording.

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