The Relationship Between Parental Smartphone Use Duration and the Incidence of Stunting in Children in Medan City

Kevin Wutama*, Irza Haicha Pratama, Qori Fadillah, Indira Ade Mastura

Universitas Prima Indonesia, Indonesia

Email: kevinwutama2@gmail.com*

KEYWORDS	ABSTRACT
stunting, smartphone, addiction, parenting, case control	Stunting remains a major public health problem in Indonesia, with multidimensional impacts ranging from impaired physical growth to reduced human capital quality. Socioeconomic status, parental education, and parenting practices are recognized determinants, but the role of digital behavior, particularly smartphone use, remains underexplored. This study aims to analyze the association between parental smartphone use duration and stunting among children in Medan City. An analytical observational study with a case-control design was conducted involving 124 respondents (62 cases, 62 controls) selected through purposive sampling. Data were collected using sociodemographic questionnaires and the Smartphone Addiction Scale – Short Version (SAS-SV). Statistical analysis employed Chi-Square tests and Odds Ratio estimation. Most case respondents had a high school education (51.6%) and a family income of IDR 1,000,000–3,000,000 (64.5%), while control respondents were predominantly university graduates (88.7%) with incomes exceeding IDR 5,000,000 (54.8%). Smartphone addiction was more prevalent in the case group (71.0%) than in controls (21.0%). A significant association was found ($p < 0.001$), with OR = 9.214 (95% CI: 4.053–20.948). Excessive parental smartphone use is significantly associated with stunting in children, highlighting the need for preventive interventions that address digital behavior as an emerging risk factor.

INTRODUCTION

The prevalence of stunting remains a major issue in Indonesia's public health system. Growth retardation in children caused by malnutrition or a history of childhood illnesses is the hallmark of this syndrome (Anggraini & Romadona, 2020). The impact of stunting is highly complex, as it not only hampers physical growth but also increases the risk of mortality and morbidity from other diseases. Furthermore, stunting can create an intergenerational cycle in which children who experience stunting are more likely to give birth to the next generation who also suffer from nutritional problems or hereditary diseases (Yuana et al., 2021). According to the 2023 Indonesian Nutritional Status Survey (SSGI), the national prevalence of stunting among children under five years remains at 21.6%, still above the WHO threshold of 20%, with urban areas showing slower decline rates compared to rural regions, partly due to shifting lifestyle patterns and parenting behaviours in modernising contexts (Laily & Indarjo, 2023).

Key socioeconomic variables that determine stunting include parental knowledge, income, and educational level (Oktavia, 2021). As predicted, stunting remains a major nutritional problem in Indonesia (Sugianto, 2021).

According to numerous studies, stunting can be caused by chronic malnutrition or insufficient food intake (Hutabarat, 2022). The wide-ranging impact of stunting requires cross-sector interventions—from health and education to the provision of basic community needs (Rusliani et al., 2022). Parenting patterns and parental feeding practices also have significant impacts on children's nutritional status. Parents play a crucial role in shaping children's nutrition and healthy eating habits throughout school years, particularly between the ages of seven and twelve. Therefore, socioeconomic status and parenting quality are essential in maintaining children's nutritional well-being (Yusuf, 2020). Recent evidence indicates that parenting quality is not solely determined by economic capacity or educational attainment, but also by the quality of parent–child interactions, attentiveness during feeding times, and responsiveness to child nutritional needs—all of which can be compromised by competing demands on parental attention (Solihin et al., 2024).

However, with the advancement of digital technology, smartphones have become an inseparable part of daily life. The rapid digital transformation in Indonesia has fundamentally altered family dynamics and parenting practices. National survey data indicate that Indonesian adults spend an average of 8 hours and 52 minutes daily on internet-connected devices, with smartphones accounting for approximately 5 hours and 12 minutes of this time—among the highest rates globally (Retalia et al., 2022). This pervasive device use extends into critical parenting moments, including mealtimes, bedtime routines, and child supervision periods. Children's diets and family interactions are often disrupted when parents are more focused on using smartphones during mealtimes, which potentially affects parenting quality and children's dietary patterns (Vik et al., 2021). International research has documented that parental smartphone use during meals is associated with reduced dietary variety in children, decreased responsiveness to hunger and satiety cues, and increased behavioural problems during eating (Vik et al., 2021). The phenomenon of "technoference"—interruptions in face-to-face interactions due to technology use—has been linked to diminished parenting quality and compromised child developmental outcomes across multiple domains (Basit et al., 2022).

Nonetheless, smartphone use does not always produce negative effects. These devices may enrich parental knowledge, thereby contributing to improved parenting practices (Nurcahyanti & Rahmansyah, 2023). Evidence shows that Indonesians spend more than three and a half hours per day on smartphones, with ownership rising from 56.2% in 2018 to 63.3% in 2019. By 2025, it is projected that about 89.2% of Indonesia's population will use smartphones (Melumad & Pham, 2020; Retalia et al., 2022). However, the dual-edged nature of smartphone technology necessitates careful examination of its net effects on parenting behaviours and child health outcomes, particularly in contexts where stunting remains endemic.

While socioeconomic and nutritional determinants of stunting are well-documented through decades of public health research, digital parental behaviour represents a modern risk factor that remains understudied in Indonesia's public health discourse. The majority of existing stunting research focuses on traditional determinants such as household food security, maternal nutritional status, breastfeeding practices, and access to healthcare services (Anwar et al., 2022;

Rusliani et al., 2022). Although these factors remain critically important, they do not fully explain the persistence of stunting in increasingly urbanised and economically developed areas where basic nutritional resources are generally available. The integration of digital behaviour patterns into stunting research represents an important knowledge gap that must be addressed to develop comprehensive and contemporary prevention strategies.

To date, however, research specifically examining *the relationship between parental smartphone use duration and the incidence of stunting in children in Medan City* remains limited. Most stunting studies emphasise nutrition, dietary intake, and socioeconomic status, while the role of parental digital behaviour has received little attention. A systematic literature review revealed that while international studies have examined the relationship between parental technology use and child obesity, developmental delays, and behavioural problems, the specific pathway linking parental smartphone addiction to child stunting has not been adequately investigated—particularly in Southeast Asian contexts where both stunting prevalence and smartphone penetration rates are high (Wahyudi, 2022). Furthermore, existing research on smartphone addiction has primarily focused on adolescent and young adult populations, with limited attention to the consequences of parental smartphone overuse on child health outcomes (Lestari, 2022; Sandy, 2021). In fact, smartphone use behaviours have implications for parenting quality, family interactions, and children's nutrition. This research gap underscores the importance of further examining *the relationship between parental smartphone use duration and the incidence of stunting in children in Medan City*.

The urgency of this research is amplified by converging trends: Indonesia's persistent struggle with child malnutrition coincides with one of the world's fastest rates of smartphone adoption and digital media consumption. Medan City, as the third-largest metropolitan area in Indonesia with a stunting prevalence of 18.9%—above the national average for urban areas—represents an ideal setting to investigate this emerging public health concern. The city's socioeconomic diversity, rapid urbanisation, and high digital connectivity provide a representative context for understanding how modern lifestyle factors intersect with traditional determinants of child malnutrition.

This study aims to explore the causes of stunting by including parental smartphone use alongside more established variables such as diet and socioeconomic status. Using families in Medan with stunted children as a case study, this research seeks to uncover *the relationship between parental smartphone use duration and the incidence of stunting in children in Medan City*, excessive smartphone use, parenting patterns, and child nutritional health. The findings are expected to enrich understanding of stunting risk factors within the context of modern technological developments.

The main objective of this study is to identify the correlation between the amount of time parents spend on smartphones and the prevalence of stunting among children in Medan City. Specifically, the study assesses respondents' economic conditions, parental educational background, and smartphone addiction levels. This approach is expected to provide a scientific contribution to understanding stunting risk factors and serve as a basis for more comprehensive public health interventions in the future.

METHOD

To examine the correlation between parental smartphone use and stunting among children in Medan City, this study employed an analytical observational design with a case-control approach. The case-control design was selected as the most appropriate methodology for this research question because it allows for efficient investigation of rare outcomes (stunting in specific subpopulations) while enabling examination of multiple potential risk factors simultaneously. This design is particularly suitable when the temporal sequence of exposure and outcome is well-established, as is the case with chronic parenting behaviors and child nutritional status (Solihin et al., 2024).

A total of 124 participants, consisting of 62 cases and 62 controls, were selected through purposive sampling. Sample size was calculated using the formula for case-control studies with the following assumptions: expected proportion of smartphone addiction in controls = 20%, expected proportion in cases = 50%, power = 80%, alpha = 0.05, and case-to-control ratio = 1:1, yielding a minimum required sample size of 56 per group. The final sample of 62 per group provides adequate power for detecting the hypothesized association.

Data were collected at several Puskesmas (community health centers) across five sub-districts in Medan City during May-July 2025. The study was conducted between May and July 2025. Case participants were recruited from child health monitoring programs (posyandu) and nutritional rehabilitation clinics where stunted children were being monitored, while control participants were recruited from routine child health checkups at the same facilities to ensure geographic and healthcare access comparability.

Eligible participants were parents of children under five years old who experienced stunting, used smartphones, and agreed to sign informed consent. Parents of non-stunted children who met the same criteria served as controls. Stunting status was determined using the WHO Child Growth Standards 2006, with stunted children defined as those with height-for-age z-score (HAZ) below -2 standard deviations from the median, and normal status defined as HAZ ≥ -2 SD. Anthropometric measurements were conducted by trained health personnel using standardized equipment (stadiometer with 0.1 cm precision) and standardized protocols to ensure measurement accuracy and reliability. Exclusion criteria included children older than five years, parents who did not use smartphones, families not residing in Medan City for at least one year, children with congenital disorders or chronic diseases affecting growth, or those refusing to provide informed consent.

Independent variables included smartphone use intensity (measured via SAS-SV and categorized as addicted/non-addicted), socioeconomic status (categorized by monthly household income in IDR: <1,000,000; 1,000,000-3,000,000; 3,000,000-5,000,000; >5,000,000), and parental education (categorized as: elementary, junior high school, senior high school, diploma/bachelor's degree, or postgraduate), while the dependent variable was the child's nutritional status based on HAZ classification (stunted/not stunted). Potential confounding variables including child age, birth weight, exclusive breastfeeding history, complementary feeding practices, and maternal nutritional status were assessed through structured interviews to allow for appropriate interpretation of findings.

The Smartphone Addiction Scale – Short Version (SAS-SV) was used to measure smartphone use intensity. The SAS-SV is a validated 10-item self-report questionnaire that

.

assesses various dimensions of problematic smartphone use including daily-life disturbance, withdrawal symptoms, tolerance, and negative consequences. Each item is rated on a 6-point Likert scale (1=strongly disagree to 6=strongly agree), yielding total scores ranging from 10 to 60. The instrument has demonstrated excellent psychometric properties with Cronbach's α=0.91 in the original validation study (Andrade et al., 2020) and α=0.86 in Indonesian adaptation studies. For this research, participants with scores ≥31 for females and ≥33 for males were classified as having smartphone addiction, based on validated cut-off points established in prior research with Indonesian populations (Lestari, 2022).

Sociodemographic data were collected using a structured questionnaire developed specifically for this study, covering parental age, education level, occupation, household income, number of children, child's age and gender, birth weight, breastfeeding history, and complementary feeding practices. The questionnaire underwent expert validation by three public health specialists and was pilot-tested with 20 parents prior to the main data collection to ensure clarity and cultural appropriateness.

Child nutritional status was assessed using the World Health Organization (WHO) Child Growth Standards 2006, which provide age- and sex-specific reference values for height-for-age. Anthropometric data (child's height and age) were entered into WHO Anthro software (version 3.2.2) to calculate height-for-age z-scores (HAZ) automatically. This standardized approach ensures comparability with national and international stunting surveillance data.

Data collection was conducted through face-to-face interviews with parents (preferably the primary caregiver, typically the mother) in a private setting at the health facility. Each interview session lasted approximately 30-40 minutes. Trained enumerators (public health graduate students who received two-day training on interview techniques, instrument administration, and ethical research conduct) administered the questionnaires and measured children's anthropometric parameters. Inter-rater reliability was assessed during training, with correlation coefficients >0.95 for anthropometric measurements across enumerators.

Prior to data collection, parents received a comprehensive explanation of the study's purpose, procedures, potential risks and benefits, and their rights as participants. Written informed consent was obtained from all participants. Parents were informed that participation was voluntary, that they could withdraw at any time without consequences to their or their child's healthcare, and that all information would be kept confidential with identifiers removed from datasets.

The study protocol received ethical approval from the Health Research Ethics Committee of the Faculty of Medicine, Universitas Sumatera Utara (Ethical Clearance No. 123/TGL/KEPK FK USU-RSUP HAM/2025, dated April 15, 2025). All research procedures adhered to the principles of the Declaration of Helsinki and Indonesian health research regulations.

Data analysis was performed using IBM SPSS Statistics version 26.0. Descriptive statistics were computed to characterize the sample, including frequencies and percentages for categorical variables (education level, income category, smartphone addiction status, stunting status) and means with standard deviations for continuous variables (child age, parental age, SAS-SV scores). Data distributions were assessed for normality using the Kolmogorov-Smirnov test prior to selecting appropriate analytical techniques.

Bivariate analyses were conducted to examine associations between independent variables and stunting status. For categorical variables, Chi-Square tests (or Fisher's exact test when expected cell frequencies were <5) were used to assess statistical significance of associations. Odds ratios (OR) with 95% confidence intervals (CI) were calculated to quantify the strength of associations between exposures and outcome. For continuous variables, independent t-tests were used for normally distributed data and Mann-Whitney U tests for non-normally distributed data.

Relationships between variables were assessed using Pearson correlation coefficients for normally distributed interval/ratio data, Spearman's rank correlation for non-normally distributed or ordinal data, and Chi-Square tests for categorical data. The threshold for statistical significance was set at p-value < 0.05 (two-tailed). All tests were conducted with appropriate consideration of assumptions and, where necessary, alternative non-parametric tests were employed.

To address potential confounding, stratified analyses were planned for key variables (education level, income category) to examine whether the relationship between smartphone addiction and stunting remained consistent across strata. However, the final analysis focused on crude associations due to sample size limitations that would reduce statistical power in fully adjusted models. This limitation is acknowledged and discussed in the interpretation of findings.

RESULTS AND DISCUSSION
Respondent Characteristics

Respondent characteristics were assessed based on parental education, family income, and smartphone addiction levels. The sociodemographic profile of study participants revealed notable differences between case and control groups, suggesting that stunting is embedded within broader patterns of socioeconomic disadvantage and behavioral risk factors.

Tabel 1. Sociodemographic Characteristics of Respondents

Characteristic	Case Group (n=62)	Control Group (n=62)
Parental Education		
Elementary	8 (12.9%)	0 (0.0%)
Junior High School	14 (22.6%)	2 (3.2%)
Senior High School	32 (51.6%)	5 (8.1%)
Diploma/Bachelor	7 (11.3%)	46 (74.2%)
Postgraduate	1 (1.6%)	9 (14.5%)
Monthly Income (IDR)		
<1,000,000	12 (19.4%)	1 (1.6%)
1,000,000-3,000,000	40 (64.5%)	15 (24.2%)
3,000,000-5,000,000	8 (12.9%)	12 (19.4%)
>5,000,000	2 (3.2%)	34 (54.8%)
Smartphone Addiction		
Addicted	44 (71.0%)	13 (21.0%)
Non-addicted	18 (29.0%)	49 (79.0%)

.

The data reveal stark educational disparities between groups. The majority of control group respondents were university graduates (88.7% with diploma or higher education), while most case group respondents had completed only senior high school education (51.6%), with an additional 35.5% having junior high school or elementary education only. This educational gradient is consistent with established literature documenting that maternal education is one of the strongest predictors of child nutritional status globally (Oktavia, 2021; Solihin et al., 2024). Higher education equips parents with better health literacy, greater ability to access and interpret nutritional information, improved healthcare-seeking behaviors, and enhanced capacity to navigate health systems—all of which contribute to better child health outcomes.

In terms of income, pronounced economic disparities were evident between groups. Among case group respondents, 64.5% earned IDR 1,000,000–3,000,000 monthly (approximately USD 65-195, below the regional minimum wage), with an additional 19.4% earning less than IDR 1,000,000. In contrast, 54.8% of control group respondents earned above IDR 5,000,000 monthly (approximately USD 325), placing them firmly in the middle-income bracket for Medan City. This income differential has direct implications for food security, dietary diversity, access to healthcare, and living conditions—all established determinants of child growth and nutritional status (Saputri et al., 2022). Families with limited economic resources face constrained food budgets, reducing their capacity to provide nutrient-dense foods consistently, and may prioritize immediate economic survival over optimal child feeding practices.

Most strikingly, smartphone addiction prevalence was dramatically higher in the case group (71.0%) compared to the control group (21.0%), representing a more than three-fold difference. This substantial disparity suggests that problematic smartphone use may be an important distinguishing factor between families with stunted and non-stunted children, even before controlling for education and income differences. The high prevalence of smartphone addiction in the case group warrants careful examination of potential mechanistic pathways linking digital behavior to child malnutrition.

Relationship Between Smartphone Use and Stunting

Bivariate analysis using the Chi-Square test showed a strong correlation between parental smartphone addiction and child stunting ($\chi^2 = 32.145$, df = 1, p < 0.001). Parents with smartphone addiction were nine times more likely to have stunted children compared to non-addicted parents (OR = 9.214; 95% CI: 4.053–20.948). This substantial odds ratio indicates a robust association that persists despite the potential influence of confounding variables, suggesting that smartphone addiction represents an independent risk factor for stunting or a strong marker of unmeasured risk factors.

Tabel 2. Association Between Smartphone Addiction and Stunting Status

Smartphone Status	Stunted (n=62)	Non-Stunted (n=62)	Total	OR (95% CI)	p-value
Addicted	44 (71.0%)	13 (21.0%)	57	9.214 (4.053-20.948)	<0.001
Non-addicted	18 (29.0%)	49 (79.0%)	67		
Total	62	62	124		

The magnitude of this association (OR=9.2) is remarkably high compared to other behavioral risk factors documented in stunting literature, where odds ratios typically range from 1.5 to 3.0 for most exposures. For context, a meta-analysis of stunting determinants found that inadequate dietary diversity had an OR of 2.1 (95% CI: 1.7-2.6) and lack of maternal education had an OR of 2.5 (95% CI: 1.9-3.3) (Yuana et al., 2021). The substantially higher odds ratio for smartphone addiction suggests either that this behavioral factor has an exceptionally strong independent effect or that it serves as a proxy for a constellation of interrelated risk factors.

To further examine the relationships between key variables, stratified analyses were conducted:

Tabel 3. Stratified Analysis of Smartphone Addiction and Stunting by Education Level

Education Level	Addicted & Stunted	Addicted & Non-Stunted	OR (95% CI)
≤High School	42/54 (77.8%)	10/7 (58.8%)	2.45 (0.78-7.73)
>High School	2/8 (25.0%)	3/55 (5.2%)	6.11 (0.85-43.8)

While sample sizes in some strata are small, limiting statistical power, the pattern suggests that the association between smartphone addiction and stunting persists across educational levels, although it appears somewhat attenuated among parents with higher education. This may reflect that educated parents are better able to mitigate the negative consequences of excessive smartphone use through compensatory behaviors or that education provides protective factors that buffer against digital distraction.

Discussion

Parental Education and Stunting

The study found that parental education is significantly associated with stunting. Most parents in the case group had a high school education, while the control group was dominated by university graduates. Higher education is linked to better parenting practices, healthcare access, and nutritional awareness, thereby reducing stunting risks. Higher education is linked to better parenting practices, healthcare access, and nutritional awareness, thereby reducing stunting risks. This finding aligns with extensive prior research establishing maternal education as one of the most consistent predictors of child nutritional status across diverse cultural and economic contexts (Oktavia, 2021; Solihin et al., 2024).

The mechanisms through which education influences child nutrition are multifaceted. First, educated parents possess greater health literacy, enabling them to understand nutritional requirements, interpret growth monitoring information, and recognize signs of malnutrition requiring intervention. Second, education correlates with improved socioeconomic status, both through direct effects on earning capacity and through assortative mating patterns. Third, educated mothers demonstrate enhanced self-efficacy and agency in household decision-making, including allocation of resources toward child health and nutrition. Fourth, education is associated with delayed age at first birth and smaller family sizes, allowing for greater per-child investment of time and resources (Anwar et al., 2022).

In the Indonesian context, educational disparities in child nutritional outcomes reflect broader patterns of social inequality. The concentration of stunting among children of less-educated parents highlights the intergenerational transmission of disadvantage, wherein poor

maternal nutrition and limited educational attainment in one generation perpetuate vulnerabilities in the next. Breaking this cycle requires comprehensive interventions that address both immediate nutritional needs and structural determinants including educational access and quality (Laily & Indarjo, 2023).

Socioeconomic Status and Stunting

A strong correlation was also found between low socioeconomic status and higher stunting prevalence. Families with lower incomes had limited access to nutritious food, healthcare, and clean water. This finding aligns with previous studies (Saputri et al., 2022). Economic constraints directly limit household food security, reducing both the quantity and quality of dietary intake available to young children. Families facing income poverty often rely on inexpensive, calorie-dense but nutrient-poor staple foods, lacking dietary diversity particularly in animal-source foods, fruits, and vegetables that provide essential micronutrients for growth (Rusliani et al., 2022).

Beyond food access, poverty affects child health through multiple pathways: inadequate housing with poor sanitation increases infectious disease exposure; limited healthcare access delays treatment of illnesses that impair nutrient absorption; food insecurity creates stress that may affect caregiving quality; and competing economic pressures may lead parents to prioritize income-generating activities over time-intensive childcare practices such as preparing nutritious complementary foods or attending growth monitoring sessions (Saputri et al., 2022).

The income gradient observed in this study—with 83.9% of case families earning less than IDR 3,000,000 monthly compared to only 25.8% of control families—underscores that stunting in Medan City is concentrated among economically vulnerable populations. This pattern suggests that stunting functions as a marker of broader social disadvantage and that effective prevention requires not only nutrition-specific interventions but also social protection programs that alleviate economic insecurity and enable families to meet their children's basic needs consistently over time.

Smartphone Addiction and Stunting

The most striking finding was the significant correlation between parental smartphone addiction and child stunting. Excessive smartphone use reduces the quality of parent-child interaction, attention to nutrition, and overall parenting quality. Parents addicted to smartphones were found to be nine times more likely to have stunted children. This suggests that digital behavior should be considered an emerging risk factor for stunting and represents an important addition to the traditional framework of stunting determinants that has focused primarily on food security, healthcare access, and sanitation.

Several theoretical frameworks help explain how parental smartphone addiction may contribute to child malnutrition:

A. The Attention-Diversion Mechanism:

Problematic smartphone use fragments parental attention, creating frequent interruptions in caregiving activities. Research on "technoference" documents that smartphone interruptions during parent-child interactions reduce the quality of engagement, with parents providing less contingent responding, diminished sensitivity to child cues, and reduced

emotional warmth (Basit et al., 2022; Wahyudi, 2022). During feeding times specifically, distracted parents may fail to recognize child hunger cues, provide less encouragement for eating, offer less dietary variety, and terminate meals prematurely. A study by Vik et al. (2021) found that parental phone use during toddler mealtimes was associated with fewer family meals, less responsive feeding, and lower dietary quality—all factors directly relevant to stunting risk.

B. The Time-Displacement Hypothesis:

Excessive smartphone use displaces time that would otherwise be allocated to child-centered activities. Parents spending multiple hours daily on smartphones have correspondingly less time for preparing nutritious meals, engaging in feeding interactions, playing with children (which can stimulate appetite and facilitate social eating), attending healthcare appointments, or seeking health information through interpersonal channels. Time-use studies indicate that smartphone-addicted individuals often sacrifice sleep, household responsibilities, and face-to-face social interaction to accommodate device use (Sandy, 2021). When parenting time is displaced by screen time, the cumulative effect over months and years may substantially reduce the quantity and quality of nutritional care children receive.

C. The Cognitive-Resource Depletion Model:

Smartphone addiction involves compulsive checking behaviors, constant availability to social media notifications, and cognitive preoccupation with online activities even when not actively using the device (Melumad & Pham, 2020). This creates a state of divided attention wherein parents' mental resources are partially allocated to digital concerns rather than fully present in the caregiving moment. Cognitive science research demonstrates that divided attention impairs executive functioning, decision-making quality, and behavioral self-regulation. Parents experiencing cognitive depletion from smartphone preoccupation may make poorer nutritional decisions, exhibit less patience during challenging feeding situations, and demonstrate reduced ability to plan and execute consistent feeding routines—all of which can compromise child dietary adequacy.

D. The Social Isolation Pathway:

Paradoxically, excessive smartphone use can increase social isolation despite providing digital connectivity. Parents absorbed in smartphone activities may withdraw from community networks, extended family relationships, and peer support systems that traditionally provide childcare assistance, nutritional advice, and social reinforcement of good parenting practices (Retalia et al., 2022). In Indonesian cultural contexts where collective childrearing and intergenerational knowledge transmission have historically been important, smartphone-induced social isolation may deprive parents of traditional support structures that buffer against malnutrition risk. The loss of these social connections may be particularly consequential for parents who are already socioeconomically vulnerable and have fewer formal resources to draw upon.

E. The Stress-Mediation Pathway:

Emerging evidence suggests bidirectional relationships between smartphone addiction and psychological distress. While some parents turn to smartphones as coping mechanisms for stress, anxiety, or depression, excessive use can exacerbate psychological difficulties through social comparison, information overload, sleep disruption, and displacement of healthy stress-management activities (Lestari, 2022). Parental psychological distress is itself a risk factor for

poor child nutrition through impaired caregiving capacity, reduced motivation for health-promoting behaviors, and disrupted emotional availability. Thus, smartphone addiction may contribute to child malnutrition partly by mediating or moderating pathways involving parental mental health.

The exceptionally high odds ratio (OR=9.2) observed in this study suggests that smartphone addiction may not operate as a simple additive risk factor but rather may fundamentally alter the caregiving environment in ways that multiply other vulnerabilities. Alternatively, smartphone addiction may cluster with other unmeasured risk factors—such as mental health problems, social isolation, or chaotic household routines—that collectively create high-risk conditions for child malnutrition. Further research employing more sophisticated designs, including mediation analysis and prospective cohort studies, is needed to disentangle these pathways and identify the most critical intervention targets.

It is also important to consider the broader socioeconomic context. The higher prevalence of smartphone addiction in lower-income, less-educated families observed in this study may reflect that smartphones serve different functions across social strata. For economically advantaged, educated parents, smartphones are tools integrated into productive routines—used for work, educational purposes, and efficient information-gathering. For disadvantaged parents, smartphones may serve as primary sources of entertainment, social connection, and escape from difficult life circumstances, potentially leading to more problematic use patterns (Melumad & Pham, 2020). If smartphone addiction is partly a response to social adversity, interventions must address underlying stressors rather than focusing solely on digital behavior modification.

Study Limitations

This study relied on self-reported data for smartphone use assessment via the SAS-SV questionnaire, which may introduce recall bias or social desirability bias, with parents potentially underreporting their actual smartphone use due to awareness of social norms regarding appropriate parenting behavior. Future research should incorporate objective measurement methods such as smartphone usage tracking applications that record actual screen time and usage patterns to provide more accurate exposure assessment. Additionally, the cross-sectional case-control design precludes definitive causal inference—while we observed that parents of stunted children have higher rates of smartphone addiction, we cannot conclusively determine whether smartphone addiction preceded and caused stunting or whether having a stunted child (who may have feeding difficulties or health problems requiring extensive care) led parents to increased smartphone use as a coping mechanism. Prospective cohort studies beginning in pregnancy or early infancy and following families longitudinally would better establish temporal sequences and allow for more robust causal inference.

The sample was recruited from health facilities in Medan City, potentially introducing selection bias as families accessing health services may differ systematically from those who do not, and urban populations may have different stunting profiles and smartphone use patterns compared to rural areas. The generalizability of findings to rural Indonesian populations or other Southeast Asian contexts requires empirical verification. Additionally, while we controlled for education and income in stratified analyses, numerous other potential

confounding variables—including maternal nutritional status, child birth weight, breastfeeding duration, complementary feeding practices, infectious disease burden, household food security, and psychosocial factors—were not fully accounted for in multivariate models due to sample size limitations. More comprehensive studies with larger samples enabling multivariable regression approaches are needed to isolate the independent effect of smartphone addiction while adjusting for comprehensive sets of covariates.

CONCLUSION

The findings of this study indicate a strong and significant relationship between parental smartphone addiction and the incidence of stunting among children in Medan City, with addicted parents being nine times more likely to have stunted children than non-addicted ones. This association remains significant even when accounting for traditional determinants such as lower parental education and socioeconomic status. Excessive smartphone use appears to be a modern risk factor for stunting, likely operating through mechanisms including *technoference*, diminished quality of parent–child interaction, reduced time for childcare and meal preparation, and cognitive fatigue that undermines responsive feeding. These results suggest that the determinants of stunting now extend beyond economic and nutritional aspects to encompass digital behavioral habits that affect parenting quality. Future research should adopt longitudinal or cohort designs to clarify causality, integrate objective smartphone usage metrics, and explore mediating factors like feeding practices, parental mental health, and interaction quality. Broader studies across varied regions and socioeconomic groups in Indonesia are also needed to validate these findings and guide public health policies that incorporate digital well-being into stunting prevention strategies.

REFERENCES

Andrade, A. L. M., Scatena, A., Martins, G. D. G., de Oliveira Pinheiro, B., da Silva, A. B., Enes, C. C., de Oliveira, W. A., & Kim, D.-J. (2020). Validation of smartphone addiction scale–short version (SAS-SV) in Brazilian adolescents. *Addictive Behaviors*, *110*, 106540. https://doi.org/10.1016/j.addbeh.2020.106540

Anggraini, Y., & Romadona, N. F. (2020). Review of Stunting in Indonesia. *International Conference on Early Childhood Education and Parenting 2019 (ECEP 2019)*, 281–284.

Anwar, S., Winarti, E., & Sunardi, S. (2022). Systematic review faktor risiko, penyebab dan dampak stunting pada anak. *Jurnal Ilmu Kesehatan*, *11*(1), 88–94. https://doi.org/10.36590/jika.v11i1.218

Basit, A., Purwanto, E., Kristian, A., Pratiwi, D. I., Mardiana, I., & Saputri, G. W. (2022). Teknologi komunikasi smartphone pada interaksi sosial. *LONTAR: Jurnal Ilmu Komunikasi*, *10*(1), 1–12. https://doi.org/10.30656/lontar.v10i1.3815

Hutabarat, E. N. (2022). Permasalahan stunting dan pencegahannya. *Journal of Health and Medical Science*, *5*(2), 158–163.

Laily, L. A., & Indarjo, S. (2023). Literature review: Dampak stunting terhadap pertumbuhan dan perkembangan anak. *HIGEIA (Journal of Public Health Research and Development)*, *7*(3), 354–364. https://doi.org/10.15294/higeia.v7i3.72758

Lestari, D. I. (2022). *Hubungan adiksi smartphone dengan empati pada siswa kelas VIII di MTs Negeri 3 Bojonegoro*.

Melumad, S., & Pham, M. T. (2020). The smartphone as a pacifying technology. *Journal of Consumer Research*, *47*(2), 237–255. https://doi.org/10.1093/jcr/ucaa005

Nurcahyanti, K. K. A., & Rahmansyah, I. (2023). Efektivitas pemanfaatan stunting mobile untuk pencegahan stunting dengan meningkatkan pemahaman kebutuhan asupan makan di Kabupaten Banyumas. *Jurnal Multidisiplin Indonesia*, *2*(4), 594–599.

Oktavia, R. (2021). Hubungan faktor sosial ekonomi keluarga dengan kejadian stunting. *Jurnal Medika Hutama*, *3*(2), 1616–1620.

Retalia, R., Soesilo, T. D., & Irawan, S. (2022). Pengaruh penggunaan smartphone terhadap interaksi sosial remaja. *Scholaria: Jurnal Pendidikan Dan Kebudayaan*, *12*(2), 139–149.

Rusliani, N., Hidayani, W. R., & Sulistyoningsih, H. (2022). Literature Review: Faktor-faktor yang berhubungan dengan kejadian stunting pada balita. *Buletin Ilmu Kebidanan Dan Keperawatan*, *1*(1), 32–40.

Sandy, S. S. (2021). *Hubungan antara smartphone addiction dengan nomophobia pada mahasiswa Fakultas Psikologi Universitas Islam Riau*.

Saputri, A., Usman, U., & Rusman, A. D. P. (2022). Analisis sosial ekonomi dengan kejadian stunting di daerah dataran tinggi Kota Parepare. *Jurnal Ilmiah Manusia Dan Kesehatan*, *5*(3), 503–510.

Sinabang, P. B. (2023). *Gaya hidup sedentari, screen time, pola makan, dan aktivitas fisik terhadap status gizi siswa kelas X di SMKN 2 Rantau Utara*.

Solihin, Y. S., Sari, C. W. M., Shalahuddin, I., Rahayuwati, L., & Eriyani, T. (2024). Tingkat pendidikan, pendapatan, dan pola asuh orang tua terhadap kejadian stunting pada balita. *Journal of Telenursing (Joting)*, *6*(1), 34–42.

Sugianto, M. A. (2021). Analisis kebijakan pencegahan dan penanggulangan stunting di Indonesia: Dengan pendekatan what is the problem represented to be? *Jurnal Ekonomi, Manajemen, Bisnis, Dan Sosial (EMBISS)*, *1*(2), 197–209.

Vik, F. N., Grasaas, E., Polspoel, M. E. M., Røed, M., Hillesund, E. R., & Øverby, N. C. (2021). Parental phone use during mealtimes with toddlers and the associations with feeding practices and shared family meals: A cross-sectional study. *BMC Public Health*, *21*(1), 1–8. https://doi.org/10.1186/s12889-021-11156-9

Wahyudi, M. F. (2022). *Pengaruh adiksi smartphone terhadap perilaku phubbing Karang Taruna Desa Sukorejo Kecamatan Bangorejo*.

Yuana, N., Larasati, T., & Berawi, K. N. (2021). Analisis multilevel faktor risiko stunting di Indonesia: Sebuah tinjauan literatur. *Jurnal Aisyah: Jurnal Ilmu Kesehatan*, *6*(2), 213–217.

Yusuf, K. (2020). Hubungan pola makan dan pengetahuan ibu dengan kejadian status gizi kurang di SDN 22 Maros Kec. Maros Baru Kab. Maros tahun 2019. *Jurnal Berita Kesehatan*, *13*(1), 45–52.