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# Longitudinal Mixed-Methods Study: Impact of Social Determinants on Maternal Health Access among Women with Disabilities (Urban vs. Rural)

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## Abstract

**Background:** Women with disabilities face persistent inequities in accessing maternal health services, despite legal guarantees of inclusive care. Evidence suggests amplified barriers in rural settings; however, longitudinal data capturing temporal changes and women's lived experiences remain limited. This study investigated how social determinants shape maternal health access among women with disabilities in urban versus rural settings in Indonesia.

**Methods:** A longitudinal mixed-methods design was applied across two sites in West Java: Bekasi City (urban) and Garut District (rural). A total of 300 women with physical, sensory, or mild intellectual disabilities were followed from early pregnancy to six weeks postpartum. Quantitative data were collected at three time points and analyzed using Generalized Estimating Equations and multilevel logistic regression. Concurrently, 35 participants were purposively recruited for in-depth interviews and focus group discussions, analyzed thematically with NVivo. Data were integrated through triangulation and convergence to explain disparities across the maternal healthcare continuum.

**Results:** Significant urban–rural inequities were found. Urban participants demonstrated higher utilization of ≥4 ANC visits (from 62% to 84%), facility-based deliveries (91%), and postnatal care (77%) than rural participants (ANC from 39% to 56%; delivery 68%; postnatal 52%) ( $p < 0.05$ ). Key determinants of access included maternal education (AOR = 1.46; 95% CI 1.18–1.81), health insurance (AOR = 1.50; 95% CI 1.20–1.87), family support, economic status, and transportation accessibility. Six qualitative themes revealed reinforcing relational and emotional dynamics: structural barriers, stigma and discrimination, family role, digital divide, coping strategies, and emotional experiences.

**Conclusion:** Women with disabilities experience compounded inequities in maternal healthcare access, particularly in rural areas, driven by intersecting structural, socioeconomic, and relational determinants. Improving accessibility, enhancing disability-sensitive and stigma-free care, and strengthening digital and community support systems are essential to achieve equitable maternal services. Findings inform a new integrative framework for inclusive maternal health, guiding targeted policy and health system interventions in Indonesia and similar low-resource contexts.

**Keywords:** women with disabilities; maternal health access; social determinants of health; mixed-methods; longitudinal study; urban–rural disparities; Indonesia

## INTRODUCTION

Persons with disabilities are a vulnerable group who often face barriers in accessing health services, including maternal care. In Indonesia, the number of persons with disabilities reaches approximately 22.97 million people, or 8.5% of the total population (1). Although Law No. 8 of 2016 guarantees the right to health services for persons with disabilities, in reality, women with disabilities continue to encounter various obstacles in accessing pregnancy and childbirth services (2).

Equal access to maternal health services is a fundamental right for all women, including those with disabilities(2). However, women with disabilities still experience double marginalization that limits their access to antenatal, delivery, and postnatal services (2). Globally, they are twice as likely not to receive the minimum antenatal care(3). In Indonesia, only 46.8% of the 3.5% of women of reproductive age with disabilities accessed antenatal services optimally, far below the rate of the general population(4).

Various studies show that social determinants such as education, socioeconomic status, social support, as well as infrastructural limitations and social stigma, greatly affect maternal service access for women with disabilities. Research has found that distance, transportation costs, and household income are significant barriers (3,5-6). In addition, discrimination from the community and health providers exacerbates these obstacles (7,8). A systematic review by Tarasoff et al. (9) highlighted that institutional stigma and the lack of training among health workers are major limiting factors, particularly in areas with limited facilities such as rural regions.

Geographical differences significantly influence access to maternal care. In urban areas, challenges include bureaucracy, poor building accessibility, and long waiting times (10). Meanwhile, in rural areas, barriers are more complex due to limited transportation, a shortage of trained medical personnel, and the lack of inclusive community-based services (11). Studies in East Nusa Tenggara and West Kalimantan show that women with disabilities in rural areas face five times greater barriers compared to those in urban areas (7).

Most previous studies used cross-sectional designs and have not captured the longitudinal dynamics or in-depth subjective experiences of

women with disabilities. A mixed-methods approach is crucial to holistically understand how social determinants influence maternal access in urban and rural contexts over time (12,13). Furthermore, important aspects such as cultural experiences, interactions with health providers, digital inequities, the role of families and caregivers, community support, as well as variations in type and age of disability remain underexplored, even though they likely have a substantial impact on maternal service access (13). Previous studies have generally been cross-sectional in nature and have not been able to capture the dynamic changes in maternal service access among women with disabilities from pregnancy through the postpartum period (9,14). This study introduces novelty through a longitudinal design to observe temporal changes in access. In addition, the limited exploration of the subjective experiences of women with disabilities within the health system represents a critical gap that will be addressed through a phenomenological qualitative approach (15). The interpersonal interactions with healthcare providers, particularly in relation to empathy, communication, and responsiveness during pregnancy and childbirth, have also not been extensively examined (16). This study highlights these relational dimensions as key components of service quality.

Access to disability-friendly technology-based information, such as health applications or digital educational media, has likewise not been a primary focus in previous studies and will therefore be added as an important dimension of this research (17). Furthermore, the role of informal caregivers such as families and spouses in maternal healthcare decision-making remains underexplored (6), as does the contribution of local communities and health cadres in bridging access for people with disabilities, which has not yet been systematically mapped (18). This study seeks to fill that gap by assessing the influence of community interventions on healthcare access. Disability has often been treated as a homogeneous category, whereas different types of disabilities pose distinct challenges in the context of maternal services (19). This study will segment participants based on disability type and examine differences in barriers to access. Finally, there is no integrative model that simultaneously explains the influence of social determinants, institutional stigma, and geographical disparities on maternal access for women with disabilities. This study offers a new conceptual framework

that unites these three dimensions comprehensively (7,10).

## **METHODS**

### **Study design**

This study employed a longitudinal mixed-methods design, integrating quantitative and qualitative approaches simultaneously to provide a comprehensive understanding of how social determinants influence access to maternal health services among women with disabilities over time, with comparisons drawn between urban and rural settings. The quantitative component was conducted as a longitudinal cohort study that tracked changes in maternal health service access and the effects of social determinants over a one-year period. In parallel, the qualitative component adopted a phenomenological approach to explore the subjective experiences and in-depth perceptions of women with disabilities in relation to maternal health services.

### **Setting**

The research was carried out in two regions of West Java Province, Indonesia, selected to represent urban and rural contexts. Bekasi City represented the urban area, while Garut District represented the rural area. Both sites were chosen based on the prevalence of disability, the availability of maternal health services, and the presence of the target population.

### **Sample**

The study population consisted of women with disabilities of reproductive age, defined as under 49 years old, who were either pregnant or had been pregnant within the past two years. Eligible disabilities included physical, sensory (hearing or visual), and mild intellectual impairments that allowed participation in the study. For the quantitative arm, a minimum of 300 respondents, equally divided between urban and rural sites, was recruited based on sample size calculations for longitudinal multivariate analysis with 80 percent power, an alpha of 0.05, and a medium effect size. For the qualitative arm, between 30 and 40 participants were purposively selected to ensure variation in type of disability, social background, and service access experiences.

Recruitment of participants relied on purposive and snowball sampling methods facilitated by local disability organizations, community health centers (puskesmas), and health cadres to

identify eligible women. For the qualitative study, maximum variation sampling was employed to capture diverse experiences and perspectives.

### **Data collection**

Data collection tools were developed specifically for this study. The quantitative survey instrument was a structured questionnaire informed by the WHO Disability Assessment Schedule (WHODAS), socioeconomic indicators, and social support scales, as well as items related to the utilization and access of maternal health services. Content validity was confirmed by expert review from specialists in health policy, disability, and midwifery. The qualitative data were collected using semi-structured interview guides and focus group discussion protocols that addressed interactions with healthcare providers, cultural barriers, digital divide, stigma, family roles, and emotional experiences in accessing maternal care.

The research followed sequential stages beginning with preparation activities, including administrative and ethical approvals, and training of enumerators and facilitators in disability-sensitive research methods. Quantitative data collection was conducted over a two-year period with three measurement points corresponding to early pregnancy, late pregnancy, and the postpartum period. Qualitative interviews and focus groups were conducted in parallel in both sites, tailored to the specific needs and conditions of participants. Longitudinal monitoring was carried out through regular field visits, digital reporting, and coordination with community facilitators and health cadres.

### **Data analysis**

Quantitative data were analyzed using SPSS or STATA with Generalized Estimating Equations (GEE) and multilevel logistic regression to examine changes in maternal health access over time and to compare patterns between urban and rural areas. Qualitative data were analyzed using thematic analysis supported by NVivo. Coding was conducted inductively and iteratively, with triangulation among researchers to enhance credibility. Finally, both quantitative and qualitative findings were analyzed in parallel and converged during the interpretation stage to provide a comprehensive understanding of the research questions.

The study received approval from the Institutional Health Research Ethics Committee.

Informed consent was obtained either orally or in writing depending on participants' needs and capacities. Anonymity and confidentiality were maintained through coded identifiers, and interpreters or assistants were provided for participants with communication barriers. Participants identified as being at risk during the interviews were offered information and referrals to appropriate services.

## RESULTS

A total of 300 women with disabilities of reproductive age participated in this study, evenly distributed between the urban site of Bekasi City ( $n = 150$ ) and the rural site of Garut District ( $n = 150$ ). Most respondents had physical disabilities (46.7%), followed by sensory disabilities (hearing or vision) at 32.3% and mild intellectual disabilities at 21.0%. Notable differences were observed in educational attainment. In rural areas, the majority of respondents had an education level of junior secondary school or lower (58.0%), while in

urban areas the majority had completed senior secondary school or higher (67.3%). From an economic perspective, rural respondents were dominated by households in the lowest quintile (71.0%), whereas urban respondents were predominantly in the middle to upper quintiles (72.0%).

Measurements at three time points (early pregnancy, late pregnancy, and postpartum) revealed distinct urban–rural trends. Access to antenatal care ( $ANC \geq 4$  visits) increased significantly in urban respondents from 62% to 84%, while in rural areas the increase was more modest, from 39% to 56%. Facility-based delivery was nearly universal in urban areas (91%) but remained relatively low in rural areas (68%). Adherence to postnatal care within six weeks was also higher among urban women (77%) compared with rural women (52%). These statistically significant differences confirm the existence of maternal health access disparities between urban and rural areas.

**Table 1. Characteristics of Respondents by Area of Residence (N = 300)**

Characteristic	Total (N = 300)	Urban (n = 150)	Rural (n = 150)
Disability type			
Physical	140 (46.7%)	68 (45.3%)	72 (48.0%)
Sensory (hearing/vision)	97 (32.3%)	51 (34.0%)	46 (30.7%)
Mild intellectual	63 (21.0%)	31 (20.7%)	32 (21.3%)
Education level			
≤ Junior secondary	176 (58.7%)	49 (32.7%)	87 (58.0%)
≥ Senior secondary	124 (41.3%)	101 (67.3%)	63 (42.0%)
Household economic quintile			
Lowest quintile	138 (46.0%)	42 (28.0%)	106 (71.0%)
Middle–upper quintiles	162 (54.0%)	108 (72.0%)	44 (29.0%)

**Table 2. Comparison of Maternal Health Access between Urban and Rural Areas**

Indicator	Urban – Early Pregnancy (%)	Urban – Postpartum (%)	Rural – Early Pregnancy (%)	Rural – Postpartum (%)	<i>p</i> -value
ANC $\geq 4$ visits	62	84	39	56	<0.01
Facility-based delivery	–	91	–	68	<0.01
Postnatal care $\leq 6$ weeks	–	77	–	52	<0.05



Results from Generalized Estimating Equations (GEE) and multilevel logistic regression identified key determinants of maternal access. Maternal education and health insurance ownership were the strongest predictors. Family support and household economic status were also significant, particularly in facilitating mobility and covering transportation costs. Multilevel analysis further demonstrated that

structural factors such as insurance and transportation interacted with relational factors such as family support and education in shaping service utilization. A total of 35 participants were interviewed (17 urban, 18 rural). Thematic analysis generated six overarching themes reflecting the social, cultural, and geographical contexts of maternal health access.

**Table 3. Social Determinants of Maternal Health Access (Multilevel Model)**

Independent Variable	$\beta$ Coefficient	Adjusted OR (95% CI)	p-value
Maternal education	0.38	1.46 (1.18–1.81)	<0.01
Family support	0.29	1.33 (1.05–1.67)	<0.05
Health insurance ownership	0.41	1.50 (1.20–1.87)	<0.01
Household economic status	0.34	1.41 (1.10–1.74)	<0.05
Transportation accessibility	0.27	1.31 (1.02–1.69)	<0.05

**Table 4. Main Themes from Interviews and FGDs**

Theme	Description	Participant Quote	Interpretation
Structural barriers	Inaccessible infrastructure, long distances to health centers or hospitals, and transportation difficulties	"I have to be carried to the main road before I can take an ojek, and the journey to the health center takes nearly an hour." (Rural, physical disability)	Structural barriers expose rural women to greater risks of missed care despite the existence of maternal programs.
Stigma and discrimination	Differential treatment from health workers, questioning of maternal capability	"The midwife said, why get pregnant if I can't walk? That was very hurtful." (Rural, physical disability)	Stigma embedded in service provision diminishes women's confidence and restricts utilization.
Family role	Husbands and families as key supporters of ANC and delivery	"If my husband doesn't take me, I won't go for check-ups. He pays for everything too." (Urban, sensory disability)	Family support is a critical relational determinant in overcoming physical and financial barriers.
Digital divide	Urban participants supported by apps and WhatsApp groups; rural participants constrained by poor signal and limited devices	"I can video call the midwife through an app, it's easier." (Urban, sensory disability)	Digitalization strengthens access in urban areas but exacerbates disparities in rural settings.
Coping strategies	Reliance on cadres, disability peers, or personal adaptations	"I often ask the health cadre to help register me at the hospital." (Rural, mild intellectual disability)	Informal social networks compensate for weak formal systems, particularly in rural contexts.
Emotional experiences	Mixed emotions of fear, anxiety, shame, relief, and confidence	"At first I was afraid of being rejected, but the midwife was very kind, so I felt confident to come back." (Urban, sensory disability)	Positive experiences encourage repeated service use, while negative ones reinforce avoidance.

## DISCUSSION

This study demonstrates a significant disparity in maternal health access between women with disabilities in urban and rural areas. Quantitative findings revealed higher proportions of ANC, facility-based deliveries, and postnatal care in urban compared with rural settings. Multilevel regression confirmed that maternal education, family support, health insurance, household economic status, and transportation access were all significant predictors of service utilization. Qualitative data deepened these findings by uncovering women's lived experiences of structural barriers, discriminatory attitudes among health workers, the digital divide, and complex emotional responses. Integration of both datasets underscores that structural and relational determinants are inseparable in shaping maternal health inequities.

The results align with WHO reports noting that women with disabilities in low- and middle-income countries face compounded barriers to maternal care due to both structural limitations and social stigma (20). Studies in Ethiopia and India have similarly highlighted transportation barriers and discriminatory attitudes as key factors behind low ANC uptake and non-facility deliveries (14,21). The strong positive relationship between maternal education and service utilization corroborates global meta-analyses showing that higher education improves health literacy and decision-making capacity (22). Family support as a crucial factor is consistent with findings from Tanzania and Indonesia, where involvement of husbands and families strengthened continuity of maternal care (23,24).

Qualitative findings in this study add depth by highlighting emotional dimensions such as fear and shame stemming from stigma, issues rarely captured in quantitative surveys. Similar results have been reported in the Philippines and Nepal, where negative encounters with health workers diminished women's confidence to seek care (25). Urban-rural disparities observed here also reflect broader evidence that digital health innovations tend to exacerbate inequities if digital access is not equitably distributed (26). Furthermore, greater stigma reported by rural participants underscores how inequities are shaped not only by physical infrastructure but also by cultural and attitudinal factors among health providers.

Together, these findings call for a multi-level approach to inclusive maternal services. Structural accessibility must be improved through transportation support, disability-friendly infrastructure, and expansion of health insurance coverage. Disability-sensitive and stigma-free care should be strengthened through targeted training for health providers, consistent with the principles of family-centered care (27). Relational and digital supports should be optimized through accessible health applications, expanded internet access in rural areas, and stronger roles for community health cadres.

## Strengths and Limitations

The main strength of this study lies in its longitudinal mixed-methods design, which allowed for temporal analysis of maternal service access while also capturing the subjective experiences of women with disabilities. This comprehensive approach enabled exploration of the interplay between social determinants, structural barriers, and emotional factors. Rigorous instrument validation by multidisciplinary experts and triangulation in qualitative analysis further enhanced the credibility of findings.

However, several limitations must be acknowledged. First, the study was limited to two regions in West Java, restricting generalizability to the national context. Second, qualitative interviews may have been subject to recall bias, particularly for participants reflecting on past pregnancies. Third, although the longitudinal design provided temporal insights, the one-year study period remains relatively short for capturing long-term changes in maternal health access.

## CONCLUSION

Women with disabilities face significant disparities in accessing maternal health services, with rural women at heightened vulnerability compared to their urban counterparts. Maternal education, family support, health insurance, economic status, and transportation were key determinants of service utilization, while stigma, structural barriers, the digital divide, and emotional experiences further reinforced inequities. The integration of quantitative and qualitative findings produced a conceptual model of inclusive maternal health services built upon three pillars: structural accessibility through transportation, infrastructure, and insurance;

disability-sensitive and stigma-free care; and digital and relational support through technology, family engagement, and community cadres. Policy implications emphasize the urgent need for multi-level interventions that combine structural, relational, and emotional dimensions to strengthen equity in maternal health access for women with disabilities in Indonesia.

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### Author Contributions

EE: Conceptualization, study design, quantitative and qualitative data collection, data analysis, manuscript drafting.

AF: Methodology development, supervision of data collection, statistical analysis, interpretation of quantitative findings, manuscript review and editing.

AM: Qualitative data analysis, thematic coding, interpretation of findings, critical manuscript revision.

LL: Study supervision, validation of research instruments, integration of mixed-methods findings, critical review and final approval of the manuscript.

All authors have read and approved the final manuscript and agree to be accountable for all aspects of the work.

### Conflict of Interest

The authors declare that there are no conflicts of interest associated with this study.

### Data Availability

The datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request, subject to ethical approval and confidentiality considerations related to participants with disabilities.

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