

Health-System Predictors of Maternal and Perinatal Health Outcomes among Perinatal Women in Public Health Facilities in Mombasa County, Kenya

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Abstract

Maternal and perinatal outcomes in low- and middle-income countries remain poor despite increased service coverage, reflecting health system constraints in service delivery. This study examined health system-related predictors of reported outcomes in public health facilities in Mombasa County, emphasizing responsiveness, access, clinical practices, and resources. A cross-sectional mixed-methods study was conducted across three public facilities (tertiary, secondary, and primary levels). Responses were obtained from 157 perinatal women, 23 healthcare providers, and 12 key informants out of 208 targeted (92.3% response rate). Quantitative data were analyzed using descriptive statistics, Mann–Whitney U tests, chi-square tests, and multivariable logistic regression. Qualitative data were analyzed thematically. Adjusted odds ratios (AORs) indicated the likelihood of favorable outcomes. Perinatal complications were common (69% of women), and over half reported recent facility-based maternal deaths. In adjusted analyses, favorable perinatal outcomes were significantly associated with culturally responsive care (AOR = 2.60; $p = 0.040$), timely access (AOR = 3.91; $p = 0.012$), geographical accessibility (AOR = 3.92; $p = 0.011$), adequate clinical care/decision-making (AOR = 4.50; $p = 0.013$), and availability of medical supplies and equipment (AOR = 3.23; $p = 0.006$). Supply and equipment availability was also associated with reduced likelihood of reported maternal deaths (AOR = 3.15; $p = 0.003$). Qualitative findings corroborated these results, highlighting emergency care delays, essential supply shortages, and inconsistent respectful care as key health system barriers. Maternal and perinatal outcomes in public facilities are strongly associated with health system performance, particularly timeliness, clinical competence, and resource availability. Strengthening these domains alongside culturally responsive delivery may substantially improve outcomes in similar urban settings.

Keywords: *Maternal health, Perinatal outcomes, Health system performance*

IJPP 14(4); 73-83

1.0 Introduction

Maternal and perinatal outcomes remain critical indicators of health system performance, particularly in low- and middle-income countries where preventable complications continue to contribute substantially to morbidity and mortality (Boerma et al., 2023; Abraham & Melendez-Torres, 2023). Although global maternal mortality has declined over recent decades, the burden remains disproportionately concentrated in sub-Saharan Africa, reflecting persistent gaps in access to timely, quality, and responsive maternal healthcare (Musarandega et al., 2021; WHO et al., 2023). In Kenya, maternal mortality remains high despite increased facility-based deliveries and sustained policy attention to safe motherhood (Kenya National Bureau of Statistics [KNBS] & ICF, 2022). National gains have not translated evenly across counties, with urban and peri-urban settings such as Mombasa continuing to experience significant maternal risk. These patterns suggest that improving maternal outcomes requires more than expanding service coverage; it demands attention to how care is accessed, delivered, and experienced within health facilities.

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The determinants of maternal outcomes are widely conceptualized through the Three Delays Model, which highlights postponements in seeking care, reaching care, and getting suitable care. While this framework remains relevant, it is increasingly evident that these delays are

rooted in underlying health system performance constraints. These include service responsiveness, geographical and financial accessibility, provider competence, and the availability of essential medicines, supplies, and infrastructure. Together, these factors shape not only whether women access care, but whether that care is timely, appropriate, and effective (Tadesse et al., 2018; Mgawadere et al., 2017).

Evidence from high-income countries shows that sustained reductions in maternal mortality are achieved through integrated systems that combine universal access, strong clinical governance, and continuous quality improvement (Hernæs, 2023; Anwar et al., 2023). In contrast, many health systems in sub-Saharan Africa continue to face structural and operational constraints, including resource limitations, workforce gaps, and variability in quality of care. As a result, maternal outcomes are often influenced by a combination of system-level readiness and service delivery practices within facilities (Meghani, 2021; Mpembeni et al., 2019; Sayinzoga et al., 2017).

In public health facilities, these health system dimensions are experienced directly by women through the responsiveness of services, timeliness of care, provider–client interactions, and the availability of essential resources. However, empirical evidence linking these service-level factors to maternal and perinatal outcomes, particularly from both user and provider perspectives, remains limited in many Kenyan county contexts. This study therefore examined health system–related predictors of maternal and perinatal outcomes amongst women attending selected public health facilities in Mombasa County. Specifically, it focused on four key domains: client-centered service delivery, access to care, healthcare provider practices, and availability of resources. By linking these domains to reported outcomes, the study aims to provide context-specific

evidence to inform targeted health system improvements in maternal care.

2.0 Materials and methods

Study design

Facility-based cross-sectional mixed-methods research was carried out in Mombasa County, Kenya: 4.05° S, 39.66° E. The study was implemented in three purposively selected public health facilities representing different levels of maternal healthcare delivery: Coast General Teaching and Referral Hospital, Likoni Sub-County Hospital, and Mlaleo CDF Health Centre.

Study population, sample, sampling

The study population comprised perinatal women, healthcare providers involved in maternal care, and key informants in supervisory or managerial roles. Perinatal women were defined as women at 28 or more weeks of gestation or within 42 days postpartum. The study targeted 208 participants. These included 166 perinatal women, 27 healthcare providers, and 15 key informants. Perinatal women were proportionately sampled across the three facilities, with 112 drawn from Coast General Teaching and Referral Hospital, 41 from Likoni Sub-County Hospital, and 13 from Mlaleo CDF Health Centre. Healthcare providers were similarly sampled across the facilities, with 17 from Coast General Teaching and Referral Hospital, six from Likoni Sub-County Hospital, and four from Mlaleo CDF Health Centre. Key informants were purposively selected because of their supervisory, managerial, or technical roles in maternal health service delivery. The professional participants included gynecologists or obstetric specialists, medical officers or reproductive health clinicians, and nurses or midwives. Nurses and midwives formed the largest professional group, reflecting their

central role in routine maternal care provision within public health facilities.

“This study concludes that maternal health outcomes among perinatal women in Mombasa County public facilities were shaped by health-system performance at the point of care”

Data collection

Quantitative data were collected using structured questionnaires administered to perinatal women and healthcare providers. Qualitative data were collected using key informant interview guides. The tools captured information on maternal and perinatal outcomes, client-centered services, access to care, provider practices, and resource availability. The instruments were pretested at Portreitz Sub-County Hospital among 25 respondents who were not included in the final study. Content validity was assessed through expert review, while internal consistency was measured by means of Cronbach’s alpha. A coefficient of 0.70 or higher was well-thought-out to be satisfactory.

Variables and measurement

Main outcomes were reported perinatal complications and reported recent maternal death occurrence. Perinatal outcomes were categorized as favourable where no perinatal complication was reported. Maternal outcomes were categorized as favourable where no recent maternal death occurrence was reported. Because maternal death occurrence was based on participant report rather than verified facility

mortality records, it was interpreted as reported recent occurrence rather than a direct facility mortality estimate. The independent variables were grouped into four health system domains: client-centered services, access to care, provider practices, and resource availability. Client-centered services included age-tailored care, education-linked services, and culturally sensitive services. Access to care included timeliness, financial accessibility, and geographical accessibility. Provider practices included medical care and decision-making, provider–client relationships, and health education. Resource availability included human resources, medical supplies and equipment, and maternal care units. Original five-point Likert responses were collapsed into three categories for descriptive analysis: inadequate, moderate, and adequate. For multivariable logistic regression, responses were dichotomized into inadequate and adequate categories.

Data analysis

Quantitative data were cleaned, coded, and analyzed using SPSS version 28. Descriptive statistics summarized participant features and study variable star. Occurrences and percentages were used for definite variables, while medians were used for ordinal response categories. Mann–Whitney U tests were used to compare perceptions between perinatal women and healthcare providers. Multivariable logistic regression was used to examine predictors of favorable perinatal and maternal outcomes. Adjusted odds ratios, 95% confidence intervals, and p-values were reported. For interpretive consistency, adjusted odds ratios were presented as odds of a favorable outcome; therefore, values greater than one indicated higher odds of a favorable outcome. Model diagnostics included assessment of multicollinearity using tolerance and variance inflation factors. Model fit was assessed using the Hosmer–Lemeshow

test, omnibus test, Nagelkerke R^2 , and classification accuracy.

Ethical considerations

Ethical approval was obtained from the Kenya Methodist University Institutional Scientific Ethical Review Committee (KEMU/ISERC/HSM/16/2025), the National Commission for Science, Technology and Innovation (NACOSTI/P/25/4176469), and the Mombasa County Department of Health (ERC-CGH/MSc/VOL.II). Written informed consent was obtained from all members. Confidentiality, anonymity, and intended contribution were maintained throughout the study.

3.0 Results and Discussion

Response rate and participant characteristics

The results in Table 1 show that a total of 208 participants were targeted, of whom 192 provided usable responses, yielding an overall response rate of 92.3%. This included 157 perinatal women, 23 healthcare providers, and 12 key informants. The high response rate strengthens the reliability of the findings and suggests adequate engagement across both service users and providers. Most perinatal women were aged 20–39 years (86.7), married, and had attained at least secondary education. However, the majority (90.8%) reported low and inadequate income, highlighting underlying socio-economic vulnerability. Healthcare providers were predominantly nurses and midwives, reflecting the frontline nature of maternal care delivery in public facilities. This demographic profile suggests that maternal health outcomes in this setting are shaped within a context of economic constraint and workforce structures typical of county-level public health systems. Socio-economic disadvantage and health-system constraints are widely recognized as important determinants of maternal healthcare access and outcomes (Gabrysch & Campbell, 2009; Hamal et al., 2020).

Table 1
Participant characteristics

Variable	Category	Mothers n (%) (n=157)	Providers n (%) (n=23)
Age (years)	<20	17 (10.8)	-
	20–39	136 (86.7)	15 (65.2)
	≥40	4 (2.5)	8 (34.8)
Marital status	Married	130 (82.8)	16 (69.6)
	Other	27 (17.2)	7 (30.4)
Education	≤Secondary	138 (87.9)	-
	≥Diploma	19 (12.1)	23 (100.0)
Monthly Income (KES)	<20,000	120 (76.4)	-
	20,000-30,000	19 (12.1)	-
	>30,000	18 (11.5)	-
Income adequacy	Adequate	14 (9.2)	-
	Not adequate	138 (90.8)	-
Provider sex	Female	-	23 (100.0)
Provider cadre	Nurse/Midwife	-	23 (100.0)
Experience (years)	≤5	-	15 (65.2)
	>5	-	8 (34.8)

Reported maternal and perinatal outcomes outcome

Perinatal complications were widely reported, with 69.4% of women indicating at least one complication during pregnancy or childbirth (Table 2). Providers corroborated this pattern, reporting frequent encounters with complications such as hypertension, hemorrhage, anemia, and obstructed labor (Table 3). These findings point to a high burden of obstetric risk within routine facility populations rather than isolated high-risk cases. In addition, more than half of women reported awareness of recent maternal deaths within the preceding three months, while 65% of providers reported direct encounters with maternal deaths. Although these reports are perception-based and

not derived from verified facility mortality data, they reflect a strong awareness of adverse outcomes within the care environment. From a health systems perspective, these findings indicate that the challenge is not only access to care but also the effectiveness, timeliness, and quality of care delivered after access is achieved. This aligns with the Three Delays Model, particularly the third delay, where maternal outcomes are influenced by the readiness and responsiveness of the health system after women reach a facility (Thaddeus & Maine, 1994). It also reflects the broader argument that increasing service coverage without improving quality may be insufficient to reduce preventable maternal and newborn morbidity and mortality (Kruk et al., 2018).

Table 2
Reported maternal and perinatal outcomes

Outcome	Mothers n (%) (n=157)	Providers n (%) (n=23)
≥1 perinatal complication	109 (69.4)	23 (100.0)
Awareness of danger signs	102 (93.6)	-
Preferred place of care: hospital	106 (97.2)	-
*Maternal deaths (past 3 months)	83 [(52.9) aware]	15 [(65.2) witnessed]

*Maternal deaths reflect self-reported recent occurrences, not verified facility records.

Table 3
Common reported perinatal outcomes

Outcome	Complication	Mothers n (%)	Providers n (%)
Common reported complications	Hypertension	28 (17.8)	23 (100.0)
	Haemorrhage	16 (10.2)	20 (87.0)
	Blood infection	16 (10.2)	-
	Obstructed labour	14 (8.9)	12 (52.2)
	Cervical incompetency	12 (7.6)	-
	Anaemia	9 (5.7)	13 (56.5)
	Hyperemesis	7 (4.5)	-
	Sepsis	6 (3.8)	2 (8.7)
	Unsafe abortion	-	15 (65.2)
	Acute fluid embolism	-	6 (26.1)
Reported pre-existing conditions among deceased mothers	Other	13 (8.3)	-
	Bleeding	22 (29.7)	-
	Hypertension	8 (10.8)	-
	Anaemia	5 (6.8)	-
	Other	39 (52.7)	-

Client-centered maternal services and outcomes

Client-centered service domains were generally rated more positively than access-related factors, although notable perception gaps existed between women and providers (Table 4). Age-tailored services were widely perceived as adequate by both groups, suggesting that basic demographic responsiveness is reasonably addressed in these facilities. However, education-linked services and culturally sensitive services revealed significant differences in perception, indicating a disconnect between provider intent and

patient experience. In the multivariable analysis, only culturally sensitive services were significantly associated with favorable perinatal outcomes. This finding is important because it highlights that acceptability of care, not just availability, matters for outcomes. When services align with women's cultural expectations and protect dignity, trust, communication, and care-seeking may improve. This is consistent with evidence that mistreatment, poor communication, discrimination, and lack of respectful care affect women's experiences and may reduce confidence in facility-based maternity services (Bohren et al., 2015; Bohren et al., 2019).

Table 4
Association of favorable perinatal and maternal outcomes with maternal health service factors

Factors	Adequate maternal health service factors n (%)	Median Response	Mann–Whitney U (p-value)	No reported perinatal complications AOR (p-value)	No recent reported maternal mortality AOR (p-value)
Services personalized to age	142 (78.9)	3	1661.5 (0.386)	1.46 (0.483)	0.76 (0.533)
Services related to education	127 (70.6)	3	2338.0 (0.004*)	0.80 (0.612)	1.59 (0.222)
Culturally sensitive services	115 (63.9)	3	1318.0 (0.014*)	2.60 (0.040*)	0.82 (0.580)
Appropriateness of access to maternal services	20 (13.3)	2	2423.0 (0.004*)	3.91 (0.012*)	3.04 (0.031*)
Financial accessibility of maternal services	4 (2.2)	1	1773.0 (0.873)	6.67 (0.141)	0.20 (0.228)
Geographical accessibility of maternal services	22 (12.2)	2	1141.0 (0.001*)	3.92 (0.011*)	1.14 (0.804)
Medical care & choice-creation	129 (71.7)	3	2305.5 (0.006*)	4.50 (0.013*)	2.84 (0.015*)
Health care worker–client association	140 (77.8)	3	2265.5 (.007*)	0.55 (0.307)	0.86 (0.745)
Health teaching	77 (42.8)	2	2156.5 (0.105)	0.93 (0.847)	1.33 (0.405)
Human incomes	119 (66.1)	2	806.5 (0.001*)	1.21 (0.679)	1.05 (0.892)
Medical supplies & equipment	52 (28.9)	2	1528.5 (0.199)	3.23 (0.006*)	3.15 (0.003*)
Maternal care units	138 (76.7)	3	587.5 (0.001*)	0.78 (0.602)	1.86 (0.143)

Note. Combined median presents the average response of participants (1 = Inadequate; 2 = moderate; 3 = adequate). Mann–Whitney U tests compare perceptions between mothers and providers (p-values are in brackets). AOR = adjusted odds ratio. The reference category is “inadequate”. AORs represent the odds of a favourable outcome (p-values are in brackets); AOR > 1 indicates higher odds of a favourable outcome.

Access factors and outcomes

Access-related indicators were the weakest-performing domain in the descriptive analysis (Table 4). Timeliness, financial accessibility, and geographical accessibility were all rated as inadequate by the majority of respondents. Notably, financial access was rated as inadequate by nearly all participants, despite the presence of subsidized maternal health programs. However, in the adjusted models, timely access and geographical accessibility emerged as significant predictors of favorable perinatal outcomes, while financial access did not show a statistically significant association.

This distinction is important. It suggests that removing user fees alone is insufficient if physical access, referral delays, transport barriers, and delays in receiving care persist. Timeliness of care directly reflects the second and third delays: reaching care and receiving appropriate care promptly. Even where services are available, delays in transport, triage, referral, or initiation of emergency care can worsen maternal and perinatal outcomes (Gabrysch & Campbell, 2009; Thaddeus & Maine, 1994). Geographical access also remained a significant predictor, reinforcing that spatial barriers can remain important even in urban and peri-urban settings.

Healthcare provider practices and maternal outcomes

Healthcare provider practices revealed a mixed pattern (Table 4). Clinical care and decision-making were strongly related with favorable perinatal and maternal outcomes, while provider–client relationships and health education were not statistically significant predictors. The strong effect of clinical care underscores that technical quality of care remains central to maternal survival and outcomes. Appropriate diagnosis, timely intervention, emergency obstetric decision-making, and referral are critical once patients enter the health system. This finding is consistent with evidence that quality maternal care requires not only facility contact but also competent clinical processes, functional referral systems, and the capacity to manage complications (Homer et al., 2018; Kruk et al., 2018). The non-significant association for health education may suggest that information provision alone is insufficient unless supported by functional service pathways, timely care, and adequate resources.

Availability of resources and maternal outcomes

Resource availability presented a contrasting picture between perception and impact (Table 4). While human resources and facility units were rated as adequate by many respondents, only the availability of medical supplies and equipment was significantly associated with favourable outcomes in the adjusted analysis. This indicates that functional readiness, rather than structural presence alone, is what matters most. Having staff or physical infrastructure is insufficient if essential medicines, consumables, equipment, blood, and emergency supplies are unavailable at the point of care. This aligns with studies showing that facility readiness and supply-side capacity are central to quality maternal and newborn care, particularly in low-resource settings (Daniels & Abuosi, 2020; Mkoaka et al., 2014; Narayanan et al., 2019).

Taken together, the findings show that maternal and perinatal outcomes are shaped by a

combination of service responsiveness, timely access, clinical competence, and functional resource availability. Among these, clinical care, timeliness, and availability of supplies emerge as the most consistent predictors. Importantly, the study demonstrates that improving maternal outcomes requires moving beyond a narrow focus on service coverage to a broader focus on health system performance in practice. This includes how quickly care is delivered, how well providers make decisions, how culturally responsive services are, and whether essential resources are available when needed. This interpretation is consistent with the high-quality health systems perspective, which argues that effective coverage requires both access and quality, not coverage alone (Kruk et al., 2018).

4.0 Conclusion

We can conclude from the study that maternal health outcomes among perinatal women in Mombasa County public facilities were shaped by health-system performance at the point of care. Timely access, competent clinical decision-making, culturally responsive services, and availability of essential supplies were the strongest predictors of favorable outcomes. Strengthening these domains can reduce delays, improve emergency readiness, and support more equitable maternal healthcare delivery.

5.0 Recommendations

Maternal and perinatal outcomes in this setting underscore the need for strengthened health system performance aligned with the WHO quality-of-care framework and SDG 3.1 targets. Governments should prioritize maternal and newborn health through clear national and county-level policy commitments, including increased and ring-fenced financing to ensure sustained availability of essential medicines, blood products, supplies, and functional equipment. Policy implementation should also strengthen emergency obstetric and newborn care standards as a core component of universal health coverage, with accountability mechanisms for monitoring facility readiness and service quality. County health systems should prioritize rapid triage, timely referral,

and strengthened emergency response systems to reduce preventable delays in care. In addition, continuous clinical mentorship, emergency obstetric training, and routine maternal and perinatal death reviews should be institutionalized to improve clinical decision-making, learning, and accountability. Finally, maternal health services should be organized around respectful, culturally responsive, and client-centered care to improve trust, service uptake, and overall quality of care.

Strengths and limitations of the study

This study is strengthened by its inclusion of perspectives from perinatal women and

healthcare providers across tertiary, secondary, and primary facilities, enhancing contextual relevance. It links service delivery factors to reported outcomes, providing a practical health systems perspective, and benefits from a high response rate, supporting reliability. Though, its cross-sectional strategy confines causal clarification, and dependence on self-reported consequences may introduce recall bias. Findings from selected public facilities in one county may also limit generalizability. Nonetheless, the study offers useful insights into health-system factors influencing maternal and perinatal outcomes.

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