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Factors associated with quality of postnatal care in Kenya: an analysis of the 2022 Kenya demographic and health survey

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Abstract

Introduction Despite the significant contribution of postnatal care (PNC) to maternal and newborn survival, few studies have explored the concept of the quality of PNC received by mothers in Kenya. Therefore, this study aimed to determine the prevalence and factors associated with the quality of PNC in Kenya.

Methods Secondary data from the Kenya Demographic and Health Survey (KDHS) of 2022 were analyzed, comprising 11,863 women who were aged 15 to 49 years. The quality of PNC was indicated as receiving all components of PNC in the first two days after childbirth. Multivariable logistic regression was conducted to determine the factors associated with the quality of PNC, using SPSS, version 20.

Results Out of the 11,863 women, 39% (95% CI: 37.0-40.9) had received all components of PNC in the first two days after childbirth. Additionally, older women aged 35–49 years (AOR 1.88, 95%CI: 1.07–3.29), those who made decisions to seek health care jointly (AOR 1.48, 95%CI: 1.18–1.85), those who owned a telephone (AOR 1.36, 95%CI: 1.05–1.76), women who received quality antenatal care (AOR 4.62, 95%CI: 3.69–5.76), older women aged 30–34 years at the time of their first childbirth (AOR 2.25, 95%CI: 1.11–4.55), those who gave birth through cesarean section birth (AOR 1.93, 95%CI: 1.49–2.49), those who gave birth at public health facilities (AOR 1.69, 95%CI: 1.01–2.82) and those who received quality intrapartum care (AOR 1.87, 95%CI: 1.43–2.43) when compared with their counterparts were more likely to receive quality PNC. On the other hand, women from other provinces of Kenya i.e., Western (AOR 0.51, 95%CI: 0.33–0.80), and Rift Valley (AOR 0.57, 95%CI: 0.39–0.81), those who gave birth to female children (AOR 0.75, 95%CI: 0.61–0.91) and those who reported to have not been respected at all times during their hospital stay (AOR 0.49, 95%CI: 0.29–0.82) when compared with their counterparts were less likely to receive quality PNC.

Conclusion The proportion of mothers receiving quality PNC was found to be low. The study also highlights the need to continue encouraging mothers to attend numerous ANC visits. Moreover, emphasis should be placed on providing quality ANC, intrapartum care, and respectful maternity care by health workers. Targeted interventions to

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increase access to quality PNC may need to focus on young mothers, mothers living in certain regions of Kenya, and those giving birth to female babies, most especially at private health facilities, and through vaginal birth.

Keywords Kenya, PNC, Women, Newborns, Quality

Text box 1. Contributions to the literature

- Previous research has focused on postnatal attendance, utilization, and coverage from a health care delivery perspective with little attention to the quality of care received.
- This study provides insights into factors associated with the quality of postnatal care from the mother's perspectives, using data from a natiaonally representative survey.
- To improve access to quality postnatal care, the study emphasizes the importance of focusing more on the mother's demographic characteristics and hospital experience.

Introduction

Postnatal care (PNC) encompasses services availed to women and newborns immediately after childbirth and up to six weeks thereafter, to ensure optimum health outcomes for the mother and their newborn [1, 2]. This is because there is a high risk of maternal and neonatal death in the first hours and days after childbirth with approximately two-thirds of all maternal deaths taking place during the postnatal period [3]. Over 57% of global maternal deaths occur in the postpartum period worldwide [4]. Daily, approximately, 800 women die due to avertable causes related to pregnancy and childbirth and 95% of these are from developing countries [5]. In defiance of the high rates of hospital deliveries, in most low-income settings, more than 75% of the mothers do not attain quality postnatal care [6].

Inadequate access to quality PNC results in poor health outcomes for both the newborn and the mother [2]. Early treatment in the postnatal period could save more lives and support the adoption of healthy behaviors (Warren et al., 2015). Previous studies have roughly estimated that attaining 90% quality PNC coverage in sub-Saharan Africa could circumvent about 10–27% of all causes of newborn deaths in the region [1].

The World Health Organization (WHO) recommends that postnatal mothers should be observed for at least 24 h following childbirth and cared for in a health facility to enable mothers to receive this vital care or mothers should receive health facility checkups within 24 h after home births [2, 7, 8]. During the postnatal checkups, the mother's vital signs are measured, and any physical symptoms experienced by the mother as well as uterine contractions, uterine tears, and the ability to pass urine or stool [9, 10]. In the case of the newborn, the healthcare provider rules out jaundice and sepsis, ensures good breastfeeding, and examines the umbilical cord stump [1]. The healthcare provider also offers the mother adequate postnatal health education about breastfeeding and the postnatal danger signs and complications associated with maternal and newborn death [11].

In 2020, Kenya's maternal mortality rate (MMR) was at 530/100,000 live births and neonatal mortality rate (NMR) at 21/1000 live births, which remains higher than the global MMR estimates at 223/100,000 and NMR at 18/1000 [12]. The Kenyan Ministry of Health developed the maternal and obstetric guidelines which stipulated four postnatal visits. The first within 48 h, the second between 1 and 2 weeks, the third within 4–6 weeks, and the fourth between 4 and 6 months post-delivery [12]. Over 80% of Kenya's health facilities can offer maternal and child health services [13]. Unfortunately, only 59% of them provide PNC services [13]. According to the Kenyan Demographic Health Survey (KDHS) of 2014, about 53% of the mothers had a postnatal check within 48 h post delivery. Approximately 43% of the mothers did not receive a PNC checkup within the first 42 days [14]. Whereas only 36% of the newborns had a postnatal check within the first two days, 62% of the newborns did not receive any postnatal checkups within 7 days and 52% did not receive a postnatal check at all [12].

Studies in Ethiopia and Iran have reported factors associated with PNC outcomes, namely, sociodemographic factors such as the age of the mother, ethnicity, language, place of residence, occupation, and media exposure [15, 16]. Other studies also reported obstetric characteristics associated with PNC, for example, quality antenatal care, mode of delivery, place of delivery, and insufficient knowledge of PNC, among others [15, 17, 18].

Previous studies in Kenya have explored the determinants of the first postnatal checkups among newborns and postnatal use [14, 19]. However, there is a dearth of literature about the determinants of receiving quality PNC in Kenya as a whole. Therefore, this study assessed the factors associated with quality PNC, using data from the 2022 Kenya Demographic Health Survey.

Methods

Data source, sample design, and collection

The 2022 Kenya Demographic and Health Survey (KDHS) data was used in this study, which used a two-stage stratified sampling approach. The first stage involved selecting 1692 enumeration areas (EAs) or clusters from a master sample frame of 129,067 EAs from the 2019 Kenya population and housing census using equal probability and independent selection [12]. The second stage involved household listings to build a sampling frame from which 25 households per cluster were

chosen. If a cluster had fewer than 25 households, all of them were sampled. The survey was carried out in 1691 clusters in total. The Inner-City Fund (ICF) aided in the pre-testing of study tools as well as the training of data collectors. Data was collected between February and July 2022. All women between the ages of 15 and 49 who were regular members of the selected families or who had slept in those households the night before the survey were interviewed in Swahili or English. This analysis comprised 11,863 women who were either pregnant or had just given birth during the previous 5 years out of 32,156 women who answered the survey. We got explicit permission to use the 2022 KDHS dataset from the MEASURE DHS website (https://www.dhsprogram.com/data/available-datasets.cfm). Although the dataset comprised numerous variables, we only investigated and used those that were significant and appropriate to our study.

Study variables

Dependent/outcomes

The quality of PNC was computed as a dependent variable in this study. The quality of postnatal care was a composite variable computed from multiple binary outcomes (yes vs. no) which included whether the mother or their baby had received certain services from health workers during the first two days of the postnatal period. The services included examining the newborn's umbilical cord, showing the mother how to clean the umbilical cord, observing the mother while breastfeeding their newborns, taking the newborn's temperature and the mother's blood pressure, counseling or advising the mother about breastfeeding, family planning, vaginal bleeding, and danger signs associated with newborn illness. Therefore, the quality of PNC was defined as the mother receiving all these postnatal services (yes). If the mother missed one of the nine postnatal services (no) then they were considered to have not received quality PNC [20].

Independent variables

Based on the literature review and the availability of the variables of interest in the KDHS dataset, factors included in the analysis were categorized into three namely sociodemographic, obstetric, and health facility-related characteristics [3, 7, 11, 19–21]. These variables were also further categorized into predisposing, enabling, and need factors (Fig. 1).

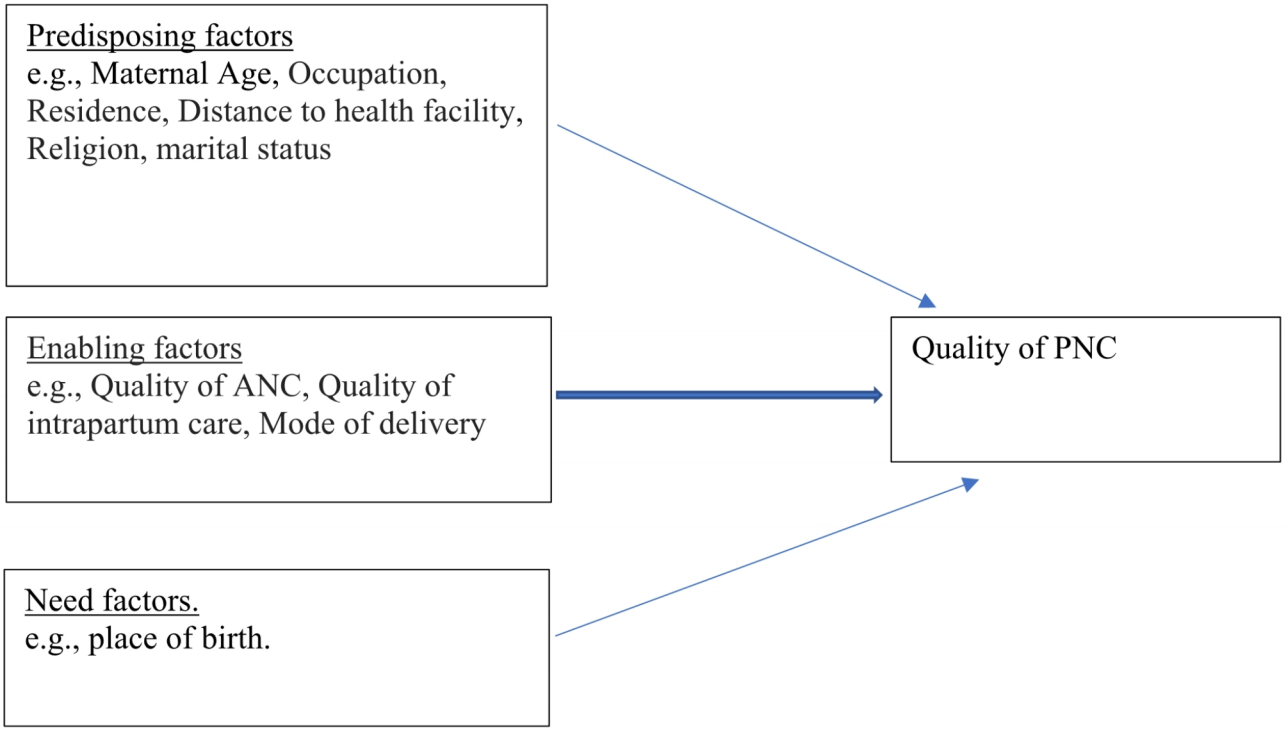

Fig. 1 Conceptual Framework

Sociodemographic characteristics

We included nineteen sociodemographic factors in the analysis. These factors included wealth index in five classes (poorest to richest), husband and maternal education (tertiary, secondary or none/primary), marital status (married, separated/divorced/widowed, or single), age in years (15–19, 20–34, 35–49), husband and maternal working status (no or yes), residence (rural or urban), and religion (Muslim, Christian, or others). The region was categorized into the eight provinces of Kenya (Rift Valley, Nairobi, Central, Northeastern, Eastern, Western, Coast, and Nyanza). Family composition was measured as the number of household members (≤4 or ≥5). Telephone ownership, and exposure to mass media such as television, newspapers, the internet, and radio (no or yes) were also included in the analysis. Maternal autonomy was assessed through two proxy variables namely, who makes healthcare-seeking decisions for the mother/participant (self, jointly with partner or another person, partner, or others) and who heads the household (male or female). It is worth noting that the wealth index was calculated by 2022 KDHS from information on household asset ownership using principal component analysis [12].

Obstetric and child-related factors

Thirteen obstetric and child-related factors were included in the analysis, such as the number of living children, the birth interval in months (≤24 or ≥25), receiving information about PNC from a community health worker (yes or no), antenatal care (ANC) visits (≤3 or ≥4), timing of first ANC visit in months (0–3, 4–6, 7–9), age at first birth in 5 year age groups (≤19yrs, 20-24yrs, 25-29yrs, 30-34yrs, ≥35), mode of delivery (vaginal or cesarean), and wantedness of the pregnancy (yes or no).

Two composite variables (quality of antenatal care and intrapartum care) were included in the analysis. The quality of antenatal care was computed from multiple binary outcomes (yes or no) which included whether the mother had received all eight services provided during ANC (such as taking off urine samples and blood samples, breastfeeding counseling, taking blood pressure, nutritional counseling, monitoring fetal heartbeat, receiving advice about the danger signs of pregnancy (bleeding), and receiving (or buying) iron tablets) [22]. Whereas receiving the quality of intrapartum care was constructed from three binary variables (yes/no), namely (1) receiving skilled assistance during birth; (2) facility-based delivery, and (3) the skilled birth attendant placing the baby on the mother's chest within one hour after birth. Therefore, receiving quality antenatal or intrapartum care meant a woman receiving all elements of antenatal or intrapartum care which was recategorized as a binary outcome (yes/no). Lastly, child-related factors included the sex of the child (male, female), and the current age of the child in years (≤1, ≥ 2 years).

Health facility factors

We included five variables related to the place of delivery or PNC such as who assisted the mother during delivery and in the postnatal period (doctor, nurse/midwife/clinical officer, or others), the specific place of delivery (non-governmental organizational (NGO), public, private, and faith-based organization (FBO) health facilities or clinics), and being treated with respect at the health facility (sometimes, all the time, or not at all). Minutes to a health facility of birth (≥61, 31–60, ≤30) were also added to the analysis as a proxy indicator of access to the health facility.

Statistical analysis

Data were cleaned and dummy variables were established before analysis. For all categorical variables, descriptive statistics such as frequencies were calculated at the univariate level. Pearson chi-square statistics and univariate logistic regression were used to identify independent factors associated with the quality of PNC. All variables with P-values less than 0.05 were included in simple multivariate logistic regression to determine the characteristics associated with the quality of PNC while controlling for confounders. The odds ratios for all variables are presented with 95% confidence intervals. To analyze the data, the complex samples package in SPSS (Version 20) was utilized, which helped account for the complicated sample design inherent in DHS data.

The complex sample package gives correct parameter estimates since it accounts for sample stratification, weighting, and clustering that happened during the study participants' sampling [23, 24]. DHS sample weights were also applied to all frequencies computed to account for unequal probability sampling in different strata and assure the representativeness of the study results [23, 24]. During preliminary analysis, a variance inflation factor (VIF) of less than 10 was used as a criterion to examine multi-collinearity among all predictor variables in the model [23, 24]. The cutoff was not surpassed by any of the factors.

Ethical consideration

The Inner-City Fund (ICF) Institutional Review Board granted ethical approval for the investigation described in the datasets. The study was also conducted by the Kenya National Bureau of Statistics in collaboration with other stakeholders. Because the secondary data is publicly available, no additional ethical permission was required to examine it. However, MEASURE DHS granted access to the 2022 KDHS datasets (https://www.dhsprogram.com/data/available-datasets.cfm). Written informed con

sent was obtained from human participants and written informed consent was also obtained from legally authorized representatives of minor participants.

Results

Socio-demographic characteristics of the study participants

The KDHS data of 11,863 women who had recently given birth were evaluated in this study (Table 1). The majority (74.4%) were between the ages of 20 and 34 years, were from the Central, Nyanza, Eastern, Nairobi, and Rift Valley provinces (76.7%), and categorized themselves as residing in rural areas (61.4%). The majority (44.8%) had no/primary education, were married (80.2%), and were Christians (88.5%). More than half (57.3%) of the women worked, and over fourty percent (43.9%) belonged to the richer and richest wealth quintiles. Furthermore, the majority of the participants' husbands had completed at least secondary school (55.9%) and were employed (91%). The majority lived in male-headed households (71.5%), with their partners (83.2%), with more than five household members (79%), and made decisions to seek health care services jointly with either their partner or someone else (44.9%). Many of the participants had access to mainstream media, such as radio (74.3%), followed by the internet (47.9%), television (38.4%), and newspapers (17.2%). Furthermore, most participants (81.1%) possessed a cell phone.

Most participants (53.9%) had at least two living children, first became pregnant when they were less than 24 years old (87.1%), wanted/desired to have the most recent pregnancy (91.2%), and had a pregnancy interval of at least 2 years following their previous birth (75.4%). The majority (60.1%) had their first prenatal appointment in the second trimester, at least four total antenatal visits (67.2%), and had received quality antenatal care (61.2%).

Many of the participants had vaginal births (82.9%), with the assistance of doctors (62.2%), who performed the deliveries at health facilities (88.2%), and especially at public health facilities (65.2%). Most mothers (73.1%) took about 30 min to reach the medical facilities, had quality intrapartum care (60.8%), and were always treated with respect during their stay (87.3%). Only 1.2% of the participants had received PNC advice from a community health worker. About half the participants gave birth to babies of the male sex (51%), their babies were weighed at birth (88.2%), and were aged at most two years (68.1%) at the time of the survey. Half of the participants received postnatal checks from the nurse/midwife/clinical officer (50.1%).

Quality of postnatal care

Overall, 39% (95% CI: 37.0-40.9) of the participating mothers had received all components of PNC (quality PNC) in the first two days after childbirth (Table 2). Among the components of PNC, 78.1% of the participants had their newborn's umbilical cord examined, were shown how to clean the umbilical cord (73.9%) and were observed while breastfeeding their newborns by health care professionals (75.8%). Most of the participants had their newborn's temperature taken (72%), received breastfeeding counseling (77.6%), and were counseled about danger signs associated with newborn illness (65.6%). Following childbirth, a relatively low proportion of the participants received family planning counseling from health care professionals (58.2%), discussed vaginal bleeding with a health worker (65.9%), or had their blood pressure taken (68.8%) by a health professional.

Factors associated with the quality of postnatal care

Table 3 summarizes the factors associated with the quality of PNC following logistic regression analysis. In multivariate logistic regression, older women (35–49 years), compared with the younger (15–19 years) were 1.88 times more likely to receive quality PNC. Women who made decisions to seek health care jointly (with partners or someone else), compared with those who took them alone were 1.48 times more likely to receive quality PNC. Women who owned a telephone compared with those who did not were 1.36 times more likely to receive quality PNC. Participants who received quality antenatal care, compared with those who did not; were 4.62, times more likely to receive quality PNC. Older participants (30–34 years) at the time of their first childbirth, compared with those who were younger (≤19 years) were 2.25 times more likely to receive quality PNC. Mothers who gave birth through cesarean section birth, compared with those who had a vaginal birth were 1.93 times more likely to receive quality PNC. Mothers who gave birth at public health facilities, compared with those who gave birth at faith-based organizations or facilities were 1.69 times more likely to receive quality PNC. Participants who received quality intrapartum care compared with those who did not were 1.87 times more likely to receive quality PNC.

On the other hand, participants from other provinces of Kenya (Western/Rift Valley) compared with those from the coastal region were 0.51–0.57 times less likely to receive quality PNC. Participants who gave birth to female children compared with those who gave birth to male children were 0.75 times less likely to receive quality PNC, respectively. Finally, mothers who reported having not been respected at all times during their hospital stay compared with those who were respected all the time, were 0.49 less likely to receive quality PNC.

Table 1 Sociodemographic characteristics of the study participants of the 2022 Kenya Demographic and Health Survey

Variable	*n* (weighted %)
Residence	
Urban	4574 (38.6)
Rural	7289 (61.4)
Age (years)	
15–19	785 (6.6)
20–34	8825(74.4)
35–49	2253 (19.0)
Region/Province	
Coast	1107 (9.3)
Northeastern	406 (3.4)
Eastern	1336 (11.3)
Central	1380 (11.6)
Rift Valley	3605 (30.4)
Western	1253 (10.6)
Nyanza	1406 (11.8)
Nairobi	1371 (11.6)
Religion	
Christians	10,220 (88.5)
Muslims	1120 (9.7)
Others	209 (1.8)
Education	
None/primary	5311 (44.8)
Secondary	4231 (35.7)
Tertiary	2321 (19.6)
Working status/occupation	
Working	6791 (57.3)
Not working	5063 (42.7)
Wealth index	
Poorest	2523 (21.3)
Poorer	2062 (17.4)
Middle	2074 (17.5)
Richer	2510 (21.2)
Richest	2695 (22.7)
Marital status	
Single	1298(10.9)
Married	9519 (80.2)
Divorced/widowed/separated	1046 (8.8)
Husband's working status/occupation	
Working	8632 (91)
Not working	858 (9.0)
Husband's education	
None/primary	4206 (44.2)
Secondary	2984 (31.4)
Tertiary	2329 (24.5)
Health seeking decision making	
Self	3618 (38.5)
Partner	1590 (16.7)
Joint	4279 (44.9)
Others	32 (0.3)
Sex of household head	
Male	8483 (71.5)
Female	3380 (28.5)
Household size (members)	

Table 1 (Continued)

Variable	*n* (weighted %)
≤ 4	2493 (21.0)
≥ 5	9370 (79.0)
Living children	
≤ 2	6395 (53.9)
3–4	3360 (28.3)
≥ 5	2108 (17.8)
Newspapers	
Yes	2037 (17.2)
No	9826 (82.8)
TV	
No	7303 (61.6)
Yes	4561 (38.4)
Radio	
Yes	8809 (74.3)
No	3055 (25.7)
Internet use	
Yes	5684 (47.9)
No	6179 (52.1)
Telephone	
Yes	9626 (81.1)
No	2237 (18.9)
Age at first birth (years)	
≤ 19	5503 (47.3)
20–24	4630 (39.8)
25–29	1215 (10.4)
30–34	229 (2.0)
≥ 35	57 (0.5)
Pregnancy wanted	
Yes	10,823 (91.2)
No	1041 (8.8)
Preceding pregnancy interval	
≤ 24 Months	2111 (24.6)
≥ 25 Months	6475 (75.4)
ANC Visits	
≤ 3	3157 (32.8)
≥ 4	6472 (67.2)
Timing of first ANC visit	
1st trimester	2920 (31)
2nd trimester	5671 (60.1)
3rd trimester	841 (8.9)
Quality of ANC	
Yes	5877 (61.2)
No	3728 (38.8)
Received postnatal information or service from a community health worker	
Yes	76 (1.2)
No	6103 (98.8)
Mode of last delivery	
Cesarean section	1867 (17.1)
Vaginal	9043 (82.9)
Place of delivery	
Facility	9328 (88.2)
Others	1246 (11.8)
The specific place of delivery	

Table 1 (Continued)

Variable	*n* (weighted %)
Home	1246 (11.7)
Public health facility	6927 (65.2)
Private health facility	1796 (16.9)
NGO	31 (0.3)
FBO	574 (5.4)
Others	55 (0.5)
Delivery Assistant	
Doctor	6506 (62.2)
Nurse/midwife/clinical officer	2954 (28.2)
Others	996 (9.5)
Time to the health facility (minutes)	
≤ 30	4515 (73.1)
31–60	1168 (18.9)
≥ 61	496 (8)
Quality intrapartum care	
Yes	3413 (60.8)
No	2205 (39.2)
Treated with respect at health facility	
All the time	3833 (87.3)
Sometimes	411 (9.4)
Not at all	145 (3.3)
Weighing baby	
Yes	4717 (88.2)
No	629 (11.8)
Sex of child	
Male	5333 (51.0)
Female	5121 (49.0)
Current age of the Child (years)	
≤ 1	6897 (68.1)
≥ 2	3230 (31.9)
Postnatal care provider	
Doctor	3585 (49.7)
Nurse/midwife/clinical officer	3610 (50.1)
Others	13 (0.2)

ANC = Antenatal Care, FBO = Faith Based Organisation, NGO = Non-Government Organisation

Table 2 Component of postnatal care received by study participants of the 2022 Kenya Demographic and Health Survey

Variable	*n* (weighted %, 95% CI)
Overall (Quality of PNC)	39.0 (37.0-40.9)
Examined the cord	78.1 (76.6–79.5)
Showed how to clean the cord	73.9 (72.3–75.5)
Measured temperature	72.0 (70.3–73.6)
Measured blood pressure	68.8 (67.0- 70.6)
Counseled about danger signs associated with newborn illness	65.6 (63.8–67.4)
Breastfeeding counselling	77.6 (76.1–79.0)
Observed breastfeeding	75.8 (74.3–77.3)
Discussed vaginal bleeding	65.9 (64.1–67.6)
Discussed family planning	58.2 (56.3–60.1)

Discussion

The present study using data from the 2022 KDHS revealed that 39% of the participating mothers had received all components of quality PNC. This prevalence is higher than the 28.4% reported in Rwanda [3] but lower than the 41.42% observed in 21 African, Asian, and European countries [1]. The observed difference in the quality of PNC received by mothers in this study and that from numerous countries may be attributed to the differential efforts and resources put into PNC services, as well as differences in socio-demographics across countries.

Joint decision-making significantly enhances the likelihood of receiving quality PNC. Women who made healthcare decisions collaboratively with partners or others were more likely to receive comprehensive PNC compared with those who made decisions independently. The study findings are supported by a study in Bangladesh,

Table 3 Factors associated with the quality of postnatal care among women aged 15–49 years of the 2022 Kenya Demographic and Health Survey

	Quality PNC					
Variable	**Yes, *n* (%)**	**No, *n* (%)**	**COR (95%CI)**	***P*-value**	**AOR (95%CI)**	***p*-value**
Age (years)				0.003		0.018
15–19 (Ref.)	103 (2.1)	251 (5.1)	1		1	
20–34	1456 (29.5)	2267 (45.9)	**1.56 (1.17–2.07) ***		1.28 (0.76–2.15)	
35–49	363 (7.4)	495 (10.0)	**1.78 (1.28–2.47) ***		**1.88 (1.07–3.29) ***	
Residence				0.001		0.157
Rural (Ref.)	1128 (22.9)	1991 (40.3)	1		1	
Urban	794 (16.1)	1023 (20.7)	**1.37 (1.14–1.65) ***		0.79 (0.58–1.09)	
Region/Province				< 0.001		0.017
Coast (Ref.)	229 (4.6)	222 (4.5)	1		1	
Northeastern	32 (0.6)	132 (4.4)	**0.23 (0.14–0.39) ***		0.78 (0.38–1.62)	
Eastern	260 (5.3)	323 (6.5)	0.78 (0.58–1.05)		0.79 (0.54–1.14)	
Central	261 (13.6)	287 (9.5)	0.88 (0.62–1.25)		0.89 (0.56–1.41)	
Rift Valley	470 (9.5)	1035 (21.0)	**0.44 (0.34–0.58) ***		**0.57 (0.39–0.81) ***	
Western	168 (3.4)	344 (7.0)	**0.47 (0.34–0.67) ***		**0.51 (0.33–0.80) ***	
Nyanza	221 (11.5)	380 (12.6)	**0.56 (0.42–0.75) ***		0.71 (0.48–1.06)	
Nairobi	281 (5.7)	290 (5.9)	0.94 (0.59–1.49)		0.83 (0.48–1.46)	
Education				< 0.001		0.357
None/primary (Ref.)	765 (15.5)	1469 (29.8)	1		1	
Secondary	730 (14.8)	1077 (21.8)	**1.30 (1.09–1.54) ***		0.91 (0.69–1.19)	
Tertiary	427 (8.7)	467 (9.5)	**1.76 (1.76–2.27) ***		1.09 (0.70–1.69)	
Religion				0.895		
Christians	1656 (34.4)	2617 (54.4)	1.15 (0.62–2.14)		-	
Muslims	182 (3.8)	280 (5.8)	1.18 (0.59–2.34)		-	
Others (Ref.)	27 (1.5)	50 (1.7)	1		-	
Marital status				0.309		
Single (Ref.)	202 (4.1)	375 (7.6)	1		-	
Married	1550 (31.4)	2363 (47.9)	1.22 (0.96–1.54)		-	
Divorced/widowed/separated	171 (3.5)	276 (5.6)	1.15 (0.78–1.68)		-	
Wealth index				< 0.001		0.589
Poorest (Ref.)	282 (5.7)	766 (15.5)	1		1	
Poorer	326 (6.6)	569 (11.5)	**1.56 (1.26–1.92) ***		0.99 (0.74–1.37)	
Middle	355 (18.4)	529 (17.6)	**1.82 (1.47–2.26) ***		0.93 (0.64–1.33)	
Richer	472 (9.6)	596 (12.1)	**2.15 (1.71–2.71) ***		1.22 (0.78–1.90)	
Richest	489 (9.9)	554 (11.2)	**2.40 (1.85–3.12) ***		1.08 (0.61–1.92)	
Working status/occupation				0.401		
Not working (Ref.)	801 (16.2)	1306 (26.5)	1		-	
Working	1121 (22.7)	1704 (34.5)	1.07 (0.91–1.26)		-	
Husband's Education				0.007		0.027
None/primary (Ref.)	648 (16.6)	1115 (28.5)	1		1	
Secondary	478 (12.2)	744 (19.0)	1.11 (0.90–1.36)		0.75 (0.57–0.97)	
Tertiary	424 (10.8)	503 (12.9)	**1.45 (1.14–1.84) ***		0.75 (0.53–1.05)	
Husband's Working status/occupation				< 0.001		0.669
Working	1453 (37.2)	2109 (54.1)	**1.89 (1.48–2.42) ***		0.97 (0.69–1.37)	
Not working (Ref.)	91 (2.3)	249 (6.4)	1		1	
Sex of Household head				0.399		
Male (Ref.)	1371 (27.8)	2104 (42.6)	1		-	
Female	552 (11.2)	909 (18.4)	0.93 (0.78–1.10)		-	
Health seeking decision making				< 0.001		0.004
Self (Ref.)	560 (14.3)	956 (24.4)	1		1	
Partner	188 (4.8)	424 (10.8)	**0.76 (0.576–0.99)**		1.09 (0.77–1.56)	
Joint	801 (20.5)	972 (24.8)	**1.41 (1.16–1.71)**		**1.48 (1.18–1.85) ***	

Table 3 (Continued)

	Quality PNC					
Variable	**Yes, *n* (%)**	**No, *n* (%)**	**COR (95%CI)**	***P*-value**	**AOR (95%CI)**	***p*-value**
Others (Ref.)	2 (0.0)	10 (0.3)	0.31 (0.06–1.69)		0.39 (0.05–2.96)	
Household number				0.806		
≤ 4 (Ref.)	382 (7.7)	611 (12.4)	1		-	
≥ 5	1540 (31.2)	2402 (48.7)	1.03 (0.84–1.25)		-	
Parity/living children				0.603		
≤ 2 (Ref.)	1044 (21.2)	1630 (33.0)	1		-	
3–4	561 (11.4)	846 (17.1)	1.06 (0.87–1.26)		-	
≥ 5	317 (6.4)	538 (10.9)	0.92 (0.75–1.13)		-	
Newspaper				< 0.001		0.047
No (Ref.)	1542 (31.2)	2594 (52.6)	1		1	
Yes	380 (7.7)	419 (8.5)	**1.53 (1.23–1.89) ***		1.24 (0.94–1.63)	
TV				< 0.001		0.844
No (Ref.)	607 (12.3)	1291 (26.2)	1		1	
Yes	1316 (26.7)	1722 (34.9)	**1.63 (1.39–1.89) ***		0.99 (0.78–1.28)	
Radio				0.001		0.113
No (Ref.)	439 (8.9)	859 (17.4)	1		1	
Yes	1483 (30.0)	2154 (43.6)	**1.35 (1.13–1.61) ***		1.23 (0.94–1.61)	
Internet use				< 0.001		0.207
No (Ref.)	931 (18.9)	1731 (35.1)	1		1	
Yes	991 (20.1)	1282 (26.0)	**1.44 (1.22–1.69) ***		1.16 (0.90–1.49)	
Telephone				< 0.001		0.011
No (Ref.)	294 (6.0)	676 (13.7)	1		1	
Yes	1629 (33.0)	2337 (47.4)	**1.60 (1.35–1.91) ***		**1.36 (1.05–1.76) ***	
ANC Visits				< 0.001		0.843
≤ 3 (Ref.)	535 (10.8)	1098 (22.2)	1		1	
≥ 4	1388 (28.1)	1915 (38.8)	**1.49 (1.26–1.76) ***		0.96 (0.74–1.25)	
Timing of first ANC visit				0.002		0.479
1st trimester (Ref.)	612 (12.7)	808 (16.7)	1		1	
2nd trimester	1175 (24.3)	1824 (37.7)	0.85 (0.71–1.03)		0.96 (0.76–1.20)	
3rd trimester	127 (2.6)	291 (6.0)	**0.58 (0.43–0.77) ***		0.73 (0.46–1.16)	
Quality of ANC				< 0.001		< 0.001
No (Ref.)	348 (7.1)	1560 (31.7)	1		1	
Yes	1572 (31.9)	1446 (29.4)	**4.87 (4.08–5.81) ***		**4.62 (3.69–5.76)**	
Age at first birth (years)				0.001		0.299
≤ 19 (Ref.)	840 (17.1)	1535 (31.2)	1		1	
20–24	816 (16.6)	1144 (23.2)	**1.31 (1.09–1.56) ***		1.07 (0.83–1.38)	
25–29	210 (4.3)	282 (5.7)	**1.36 (1.03–1.81) ***		0.96 (0.64–1.43)	
30–34	52 (1.1)	37 (0.7)	**2.60 (1.38–4.89) ***		**2.25 (1.11–4.55) ***	
≥ 35	4 (0.1)	4 (0.1)	2.15 (0.53–8.81)		0.85 (0.15–4.97)	
Preceding pregnancy interval (months)				0.980		
≤ 24 (Ref.)	334 (9.3)	514 (14.3)	1		-	
≥ 25	1086 (30.1)	1671 (46.3)	1.003 (0.81–1.24)		-	
Pregnancy wanted				0.785		
No (Ref.)	162 (3.3)	263 (5.3)	1		-	
Yes	1760 (35.7)	2750 (55.7)	1.04 (0.79–1.35)		-	
Mode of last delivery				< 0.001		< 0.001
Vaginal (Ref.)	1468 (30.0)	2602 (53.1)	1		1	
Cesarean section	454 (9.3)	373 (12.5)	**2.16 (1.72–2.72) ***		**1.93 (1.49–2.49) ***	
Specific Place of delivery				< 0.001		0.039
FBO (Ref.)	95 (1.9)	184 (3.7)	1		1	
Public health facility	1406 (28.5)	1809 (36.6)	1.51 (0.98–2.32)		**1.69 (1.01–2.82) ***	
Private health facility	347 (7.0)	496 (10.1)	1.35 (0.86–2.14)		1.26 (0.71–2.23)	

Table 3 (Continued)

	Quality PNC					
Variable	**Yes, *n* (%)**	**No, *n* (%)**	**COR (95%CI)**	***P*-value**	**AOR (95%CI)**	***p*-value**
NGO	9 (0.5)	7 (0.2)	**0.24 (0.15–0.39) ***		2.98 (0.57–15.56)	
Time to the health facility (minutes)				0.018		0.407
≤ 30 (Ref.)	1441 (29.2)	2134 (43.2)	1		1	
31–60	353 (7.2)	602 (12.2)	0.87 (0.72–1.05)		1.08 (0.84–1.39)	
≥ 61	129 (2.6)	277 (5.6)	**0.69 (0.52–0.92) ***		1.32 (0.93–1.89)	
Delivery Assistant				< 0.001		0.418
Others (Ref.)	40 (0.8)	408 (8.4)	1		1	
Doctor	581 (11.9)	751 (15.4)	**7.94 (5.61–11.24) ***		1.09 (0.33–3.69)	
Nurse/midwife/clinical officer	1286 (26.4)	1783 (36.6)	**7.40 (5.32–10.31) ***		0.96 (0.28–3.26)	
Weighing baby				< 0.001		0.363
No (Ref.)	51 (1.1)	483 (10.0)	1		1	
Yes	1864 (38.5)	2446 (50.5)	**7.19 (5.38–5.38) ***		1.43 (0.69–2.91)	
Sex of child				0.014		0.005
Male (Ref.)	1024 (21.0)	1432 (29.3)	**1**		1	
Female	899 (18.4)	1529 (31.3)	**0.82 (0.70–0.96) ***		**0.75 (0.61–0.91) ***	
Current age of the child (years)				0.118		
≤ 1 (Ref.)	1324 (27.8)	2113 (44.4)	1		-	
≥ 2	552 (11.6)	774 (16.2)	1.14 (0.97–1.34)		-	
Quality of intrapartum care				< 0.001		0.025
No (Ref.)	401 (8.2)	1077 (22.0)	1		1	
Yes	1521 (31.1)	1892 (38.7)	**2.16 (1.79–2.59) ***		**1.87 (1.43–2.43) ***	
Postnatal check provider				0.200		
Doctor	902 (24.5)	926 (25.1)	1.44 (0.2–7.29)		-	
Nurse/midwife/clinical officer	847 (23.0)	1006 (27.3)	1.25 (0.25–6.33)		-	
Others (Ref.)	3 (0.1)	4 (0.1)	1		-	
Received postnatal information or service from a community health worker				0.507		
No (Ref.)	1898 (38.4)	2981 (60.4)	1		-	
Yes	25 (0.5)	33 (0.7)	1.20 (0.69–2.06)		-	
Treated with respect at health facility				< 0.001		0.043
All the time	1658 (38.1)	2142 (49.2)	**2.78 (2.87–4.66)** *		1	
Sometimes	166 (3.8)	244 (5.6)	**2.44 (1.38–4.33)** *		0.89 (0.64–1.25)	
Not at all (Ref.)	31 (0.7)	110 (2.5)	1		**0.49 (0.29–0.82) ***	

Bold = significant, * = significant at 0.05, CI = confidence interval, —not evaluated in that model, Ref.=reference category, CORs = crude odd ratios, AORs = adjusted odds ratios, ANC = antenatal care, FBO = faith-based organizations, NGO = nongovernmental organization

Rwanda, and Malawi which reported that quality PNC was associated with male partner support and perceived joint decision-making [25–27]. This may be because men or partners play a significant role in the health-seeking behavior of their families and influence the course of action [28]. Therefore, more advocacy campaigns from numerous health sector stakeholders are needed to continuously influence men's involvement in PNC service utilization.

Telephone use was statistically significantly associated with quality PNC. Mothers who used telephones were more likely to receive quality PNC compared with their counterparts who do not use a phone. The findings are consistent with studies in Nigeria and Malawi [29, 30] which reported access to mass media was associated with quality PNC. The telephone as a medium of receipt of health information may inform, educate, and improve women's knowledge. Subsequently, this may improve one's ability to demand and access quality PNC [1, 31]. Stakeholders who champion maternal health must continue to channel effective health-related information (including PNC services) to mothers through telephones (telehealth).

The quality of ANC was found to be statistically significantly associated with quality PNC. Although no previously accessible study assessed the association between quality ANC and PNC, research evidence from Uganda, Bangladesh, and Nepal [31–33] indicates that attending at least four ANC visits is associated with PNC service utilization. ANC exposes pregnant women to counseling and education about their health and the care of their children as well as expectations about their health during

PNC [1, 31–33]. Therefore, this finding emphasizes the need for health workers to provide quality ANC to the mothers, through ensuring that all mothers who come for ANC receive all its components.

Age at first birth was also associated with quality PNC in this study, where women aged 30–34 years at first birth were more likely to receive quality PNC compared with their younger counterparts. The study finding is partly supported by a study in Kenya which found age at first birth to be associated with PNC service utilization [14]. Older women are thought to be more enlightened and experienced in seeking care for themselves and their newborns. Hence such mothers have a higher chance of demanding quality PNC [34]. This study finding therefore suggests that delaying childbirth may influence receiving quality PNC. Public policies and campaigns should continue to emphasize the delaying of pregnancy and childbirth among adolescents and young women.

The mode of delivery was statistically significantly associated with quality PNC. Mothers who gave birth through cesarean section had higher odds of receiving quality PNC compared with those who had a vaginal birth. The finding is partly consistent with studies from Ethiopia and Tanzania [3, 35] which reported that cesarean section delivery was significantly associated with completing the postnatal services or care package. This could be because mothers who have operative delivery tend to have greater perceived susceptibility to a wide range of postoperative complications; therefore, frequent return to the health facility would be the strategy to minimize these perceived risks [3]. Health providers, therefore, need to pay more attention during PNC to mothers who have given birth vaginally regardless of their perceived susceptibility to maternal and child complications.

Institutional delivery was statistically significantly associated with quality PNC. Delivering from public health facilities was associated with quality PNC compared with their counterparts. This finding is contradictory to a study that reported that mothers who had given childbirth from private health facilities were more likely to receive quality PNC than ones in public health centers and this was partly due to the heavy workload in public health centers which hindered midwives from delivering quality PNC services [36]. Delivering from a health facility ensures that mothers receive comprehensive care, including PNC after delivery [31]. On the other hand, this finding may indicate that the Kenyan government's efforts or investments in the public health sector are paying off returns. However, we recommend that more qualitative studies by researchers be conducted to establish why there are differences in quality PNC receipt or perceptions by mothers across the various facilities.

The Quality of intrapartum care was significantly associated with quality PNC. The study finding is consistent with a study that reported that quality intrapartum care was strongly associated with quality PNC [37]. Quality intrapartum care does not only influence immediate childbirth outcomes but also sets the foundation for postpartum recovery and well-being [37]. As a result, this study highlights the necessity for health workers to offer quality intrapartum care to mothers by ensuring that all mothers who come in for delivery receive all of the components of intrapartum care as discussed in this research.

The Sex of the child born was found to be negatively associated with the quality of PNC. Mothers who gave birth to a girl child were less likely to receive quality PNC compared with those who delivered boys. The study findings are supported by a study in India which reported an association between the sex of the child and maternal health services utilization [7]. This could be related to the implicit cultural values espoused by the health providers during PNC. Therefore, raising awareness among health workers about gender equality, the influence of cultural beliefs on health, and challenging cultural preferences for male children can help ensure equitable access to PNC services for all mothers and newborns.

The region where the mother resides was significantly associated with quality PNC, where mothers from the western and Rift Valley provinces of Kenya were less likely to receive quality PNC compared with their counterparts from the coast region. The western and Rift Valley provinces are rural areas still in the process of urbanization (City Population 2020). The finding is consistent with other studies in Uganda and Malawi which reported lower quality PNC among mothers in rural hard-to-reach areas [25, 31]. This finding implores the government of Kenya and other stakeholders to address regional disparities in PNC utilization, through increased investments in PNC services in health facilities located in rural and hard-to-reach areas.

The study showed that being treated with no respect at a health facility was statistically significantly associated with quality PNC. The finding is consistent with studies in the USA and Iran [15, 38] which reported that maternal disrespect during hospital stay was negatively associated with quality PNC. This lack of respect for mothers could be attributed to midwives' workload which reduces the quality of care provided [15]. This study finding emphasizes the necessity to devise a standard capacity-building postnatal program at health centers to educate healthcare workers about providing respectful maternity care because it has an influence on the mother's perception of receiving high-quality PNC [15, 39].

Study strengths and limitations

We used the most recent data from the 2022 Kenya Demographic and Health survey, with a large sample size and standardized data collection protocols. The study is

limited by the fact that it is based on retrospective information provided by the survey respondents, which may be subject to recall bias. In addition, the cross-sectional design of this study limits inferring causality but rather only assesses association.

Conclusions

The study revealed that less than half of the mothers had received quality PNC. The study also found several sociodemographic factors associated with quality PNC, which include age at first birth, telephone use, place of birth, mode of delivery, being treated with respect at the health facility during delivery, region, sex of the child born, joint decision making, quality intrapartum care and quality of ANC. The above factors are therefore worth contemplation when reconsidering strategies to enhance the quality of PNC. Strategies should also focus on supporting mothers who undergo vaginal birth sections, addressing regional disparities in PNC utilization, and promoting respectful maternity care practices to ensure all women receive dignified treatment during childbirth and the postnatal period. Additionally, raising awareness about gender equality and challenging cultural preferences for male children can help ensure equitable access to PNC services for all newborns.

Abbreviations

PNC	Postnatal care
MMR	Maternal Mortality Ratio
EA	Enumeration area
AOR	Adjusted Odds Ratio
KDHS	Kenya Demographic Health Survey
CI	Confidence Interval
DHS	Demographic Health Survey
VIF	Variance Inflation Factor
COR	Crude Odds Ratio
OR	Odds Ratio
WHO	World Health Organisation

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Author contributions

L.N. and J.B.A. Conceived the idea, drafted the manuscript, performed analysis, interpreted the results, and drafted the subsequent versions of the manuscript. A.N., Q.S., J.K., M.G.N., A.M. and E.I. reviewed the first draft, helped with results interpretation, and drafted the subsequent versions of the manuscript. All authors read and approved the final manuscript.

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Data availability

This data set used is openly available upon obtaining permission from the MEASURE DHS website (URL: https://www.dhsprogram.com/data/available-datasets.cfm). However, authors are not authorized to share this data set with the public however anyone interested in the data set can seek it with written permission from the MEASURE DHS website (URL: https://www.dhsprogram.com/data/available-datasets.cfm).

Declarations

Ethics approval and consent to participate

In this study, high international ethical standards are ensured during MEASURE DHS surveys, and the study protocol is performed following the relevant guidelines. The 2022 KDHS survey protocol was reviewed and approved by the ICF Institutional Review Board. Written informed consent was obtained from human participants and written informed consent was also obtained from legally authorized representatives of minor participants.

Consent for publication

This is not applicable in this study.

Competing interests

The authors declare no competing interests.

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