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Bypassing high-quality maternity facilities: evidence from pregnant women in peri-urban Nairobi

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Abstract

Utilization of high-quality maternal care is an important link along the pathway from increased facility-based delivery to improved maternal health outcomes, however women in Nairobi do not all deliver in the highest quality facilities available to them. We explored whether women living in peri-urban Nairobi who live nearby to high-quality facilities bypassed, or travelled farther than, their nearest high technical quality facility using survey data collected before and after delivery from women ($n = 358$) and from facility assessments ($n = 59$). We defined the nearest high technical quality facility as the nearest Comprehensive Emergency Obstetric and Newborn Care (CEmONC) capable facility to each woman's neighbourhood. We compared women who delivered in their nearest CEmONC ($n = 44$) to women who bypassed their nearest CEmONC to deliver in a facility that was farther away ($n = 200$). Among bypassers, 131 (65.5%) women delivered in farther non-CEmONC facilities with lower technical quality and 69 (34.5%) delivered in farther CEmONCs with higher technical quality capacity compared to their nearby CEmONCs. Bypassers rated their delivery experience higher than non-bypassers. Women who bypassed to deliver in non-CEmONCs were less likely to have completed four antenatal care visits and to consider delivering in any CEmONC prior to delivery while women who bypassed to deliver in farther CEmONCs paid more for delivery and were more likely to report being able to access emergency funds compared to non-bypassers. Our findings suggest that women in peri-urban Nairobi bypassed their nearest CEmONC facilities in favour of delivering in facilities that provided better non-technical quality care. Bypassers with access to financial resources were also able to deliver in facilities with higher technical quality care. Policies that improve women's delivery experience and ensure that information about facility technical quality is widely distributed may be critical to increase the utilization of high-quality maternity facilities.

Keywords: Maternal health, healthcare quality, health-seeking behaviour, health policy

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Key Messages

- Improvements in maternal and child health outcomes surrounding childbirth will require expanding access to and utilization of high-quality obstetric care.
- Women in peri-urban Nairobi lived nearby to delivery facilities with capacity to handle obstetric emergencies and provide high technical quality care, however only 12.3% of a sample of pregnant women living in peri-urban Nairobi delivered in their nearest high technical quality facility and over half (55.9%) of women bypassed their nearest high technical quality facility to deliver in facilities that are farther away.
- Women bypassed their nearest high technical quality facility in favor of delivering in facilities with lower technical quality and higher interpersonal care ratings on average. Bypassers with greater access to financial resources were able to deliver in facilities with both high technical and interpersonal care quality.
- Policies that improve women's delivery experience and ensure that information about facility technical quality is widely distributed may be critical to increase the utilization of high-quality maternity facilities.

Introduction

Reducing preventable deaths during childbirth is a primary global health priority. A key strategy to improve maternal health outcomes is to encourage women to deliver at health facilities with a skilled birth attendant or trained medical professional (Kruk *et al.*, 2016b; Hunter *et al.*, 2017). However, increased rates of facility-based births have not been accompanied by a corresponding decrease in maternal mortality in many countries with high maternal death rates (van den Broek and Graham, 2009; Lozano *et al.*, 2011; Souza *et al.*, 2013; Kruk *et al.*, 2016b). In sub-Saharan Africa, a significant share of births occurs in facilities at the primary care level with no surgical capacity and poor capacity to respond to common obstetric emergencies like pre-eclampsia and postpartum haemorrhage (Kruk *et al.*, 2016b). There is increasing recognition that continued improvements in maternal and child outcomes surrounding childbirth will require expanding access to and utilization of high-quality obstetric care [Maru *et al.*, 2012; Jha *et al.*, 2013; Rosen *et al.*, 2015; Tangcharoensathien *et al.*, 2015; United Nations (UN) General Assembly, 2015; Sobel *et al.*, 2016; Kruk *et al.*, 2016a,b].

A growing body of evidence shows that women in low- and middle-income countries do not simply go to the closest or cheapest health facility but instead actively choose their healthcare providers (Leonard, 2014, 2007; Cohen *et al.*, 2016). Rural women in sub-Saharan Africa spend time and money to bypass nearby health facilities in favour of receiving care from higher technical quality providers (Leonard *et al.*, 2002; Parkhurst and Ssengooba, 2009; Kruk *et al.*, 2009a, 2014; Kahabuka *et al.*, 2011). In a major metropole like Nairobi, within a relatively short distance there are hundreds of maternity providers of widely varying quality from which women can choose (Ziraba *et al.*, 2009). Many urban women deliver in low-quality facilities despite the availability of nearby high-quality facilities within Nairobi (Cohen *et al.*, 2017). It is not well understood why urban women choose to deliver in low technical quality facilities when highly technically capable facilities are physically accessible.

Bypassing has been documented as a way of studying women's preference for healthcare and has largely been studied in rural areas (Leonard *et al.*, 2002). In this article, we explored the extent to which women living in peri-urban Nairobi bypassed (i.e. travelled farther than) their nearest high technical quality hospital for delivery. We defined nearest high technical quality hospital as the nearest Comprehensive Emergency Obstetric and Newborn Care (CEmONC) capable facility, or the nearest facility capable of handling obstetric emergencies. We evaluated the differences in technical quality and delivery experience (non-technical quality) for women who delivered in their nearest CEmONC facility and women who bypassed their nearest CEmONC facility to deliver in (a) a farther, low technical quality (i.e. non-CEmONC) facility and (b) a farther, high technical quality (i.e. CEmONC) facility. We also examined the individual and contextual factors associated with the decision to bypass the nearest CEmONC facility. Understanding this component of women's healthcare-seeking behaviour will serve to inform demand-side maternal health interventions aimed at encouraging women to deliver in high-quality health facilities with the capacity to provide life-saving emergency care (Montagu *et al.*, 2017).

Methods

Study sample

Women

We used data from a randomized controlled trial conducted in 24 peri-urban neighbourhoods of Nairobi, Kenya, between February and September 2015, which is described in detail in Cohen *et al.* (2017). Pregnant women were recruited in months five through seven of pregnancy and completed baseline (months five through seven gestation), midline (month eight), and endline (two to four weeks after delivery) surveys. Baseline survey data included demographic information, pregnancy history, plans for delivery and ranked delivery facility preferences by perceived quality and by how much they would want to deliver in each facility across all delivery facilities that women reported considering using at baseline. Midline surveys collected delivery facility preferences again, and endline surveys post-delivery asked about place of delivery, delivery and transport costs and patient-reported quality of care. If women did not remember delivery cost and travel details, a companion was identified who could provide the information (Cohen *et al.*, 2017).

Facilities

We used facility quality data from facility surveys that were conducted from June to November 2016 in facilities women delivered in as part of the same study (Cohen *et al.*, 2017). Surveyed facilities included health centres and maternity homes, hospitals and tertiary hospitals that were either public, private for profit or private non-profit [i.e. religious/mission or Non-governmental organization (NGO) run]. Global Positioning System (GPS) coordinates of facility locations were recorded during data collection. The facility assessment tool collected information about performance of signal functions of routine and emergency obstetric and newborn care proposed by Gabrysch *et al.* (2012) and Tripathi *et al.* (2015).

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Signal functions are process of care indicators that represent facility capacity to provide routine and emergency obstetric and newborn services that are essential for preventing maternal and newborn mortality (Tripathi *et al.*, 2015). Routine care includes universal practices such as infection control, newborn thermal protection and initiation of exclusive breastfeeding. Emergency care includes practices such as administration of parenteral oxytocin for maternal haemorrhage, newborn resuscitation and caesarean sections (C-sections) (Gabrysch *et al.*, 2012). The facility assessment tool was adapted from the Columbia Mailman School of Public Health's Averting Maternal Death and Disability (AMDD) programme's emergency obstetric and newborn care Needs Assessment Toolkit [Averting Maternal Death and Disability (AMDD), 2010]. More detailed description of the facility assessment and basic characteristics of facilities is found in Supplementary Table A1 and Cohen *et al.* (2017). For the analysis in this article, we included women who delivered in facilities in Nairobi city and for whom we had delivery facility quality data from completed facility assessments.

Measures

Technical quality

We measured facility technical quality of maternal and newborn care by constructing a 23-item technical quality index containing the routine and emergency care signal functions described above (see Supplementary Table A2 for the list of 23 items included in the quality index) (Gabrysch *et al.*, 2012; Tripathi *et al.*, 2015; Kruk *et al.*, 2016b). This 23-item quality index represents the proportion of signal functions reported to be performed by each facility in the past 3 months and is reported as a number between 0 (no signal functions reported performed) and 1 (all 23 signal functions reported performed) (Cohen *et al.*, 2017).

We additionally categorized facilities into those with and without CEmONC capacity. Facilities that reported providing a list of nine emergency signal functions including caesaren section and blood transfusion were designated as CEmONC capable facilities (see Supplementary Table A3 for the list of nine items included in the CEmONC definition).

Non-technical quality

Women rated their delivery facility on dimensions of non-technical quality using a Likert scale during endline surveys. We created a non-technical quality index comprised of four binary indicators: good or very good respectfulness of healthcare workers, good or very good communication skills of healthcare workers, good or very good friendliness of healthcare workers and reporting never being disrespected or abused at the facility. The non-technical quality index is a number between 0 and 1 and is the average of each of the four binary indicators normalized so that higher scores represent higher quality.

Distance

We calculated distance to facility from each woman's neighbourhood centroid. Coordinates for the centroid of a woman's neighbourhood and facility locations were recorded during the baseline survey. We projected latitude and longitude coordinates onto a World Geodetic System 1984 (WGS84) projection scheme. We then calculated the Cartesian minimum distance between two spatial data points. We calculated the distance to reach each woman's delivery facility from their neighbourhood centroid. We also calculated the minimum distance to reach a CEmONC capable facility from each neighbourhood and subsequently identified each woman's closest CEmONC capable facility. Women were classified as 'bypassing' their nearest CEmONC facility when the distance to the facility they used for delivery was greater than the distance to their nearest CEmONC facility.

Travel time

We calculated Google Maps travel time from neighbourhood centroids to women's delivery facility and to their closest CEmONC facility by querying the Google Maps API. The query returned travel time through different modes of transport (walking, public transit or driving) between an origin (neighbourhood centroid) and destination (facility) location. We calculated travel time using the mode of transport women reporting taking to their delivery facility. Women reported either walking or taking a car or taxi or motorcycle (categorized as driving) and matatu (minibus) or bus (categorized as public transit). Women who reported both taking public transit (matatu or bus) and walking were categorized as taking public transit.

Covariates

We included control variables in the analysis representing whether women had prior interaction with the health system (including parity or if they had completed at least four antenatal care, or ANC, visits by midline) and indicators of risky pregnancies (if they had a prior C-section or were told by a provider that they were high risk). To approximate women's access to resources, we included indicators for having National Hospital Insurance Fund (NHIF) coverage and reporting that it would be easy or very easy to pay $10 USD for medical emergencies (compared to those who report it would have been difficult or very difficult). We included covariates for preferences prior to delivery including whether women indicated that they wanted to deliver in their own neighbourhood at baseline, whether they considered delivering in any CEmONC and their nearest CEmONC facility at baseline and ranked their nearest CEmONC facility as the facility they most wanted to deliver in at baseline.

Statistical analysis

We categorized women into the following three groups: women who delivered in their nearest CEmONC facility, women who bypassed their nearest CEmONC facility to deliver in a facility of lower technical quality (defined as a non-CEmONC facility) and women who bypassed their nearest CEmONC facility to deliver in a facility of equal capacity to handle obstetric emergencies (defined as a farther CEmONC facility). We compared women who delivered in their nearest CEmONC facility to women who bypassed their nearest CEmONC to deliver in a farther non-CEmONC facility and to women who bypassed their nearest CEmONC to deliver in a farther CEmONC facility using two-sample *t*-tests with unequal variances. We compared the average distance and time travelled from neighbourhoods to delivery facilities, technical and non-technical quality of delivery facilities and self-reported costs for vaginal deliveries (topcoded to exclude values above the 90th percentile—198 USD—to remove the influence of outliers).

We explored the association between women's characteristics and contextual factors and the probability of bypassing their nearest CEmONC to deliver in a farther, non-CEmONC facility and a farther, CEmONC facility with log-linked bivariate generalized linear models with standard errors clustered at the neighbourhood level. Women's characteristics included prior health system interaction, risk factors, available resources and delivery facility preferences reported prior to delivery. Contextual factors included distance to

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the nearest hospital and distance to the nearest CEmONC capable facility.

Statistical analysis was conducted in Stata version 15. Distance and travel time calculations were conducted using R statistical software and the rgeos and gmapsdistance packages (Bivand, 2018; Melo *et al.*, 2018).

Results

In the original study, 454 women successfully interviewed at endline delivered in 79 unique delivery facilities. In this analysis, we retained 358 women who delivered in 59 unique facilities for which we had a complete facility assessment. We excluded observations from 93 women who delivered in 18 facilities where data on facility quality were not collected. An additional three observations (and two delivery facilities) were dropped because the women delivered outside of Nairobi city proper. Out of the 59 facilities used for delivery, only 8 (13.6%) facilities performed all nine signal functions to be considered as a CEmONC capable facility (Supplementary Table A1).

Demographic characteristics of women in our sample are found in Table 1. On average, women had 2.1 (SD = 1) pregnancies including their current pregnancy with 112 (31.3%) women experiencing their first pregnancy. Among those with one or more pregnancy, 32 (13.0%) women had a prior C-section. Women completed 2.9 (SD = 1.1) ANC visits on average, and 27 (7.7%) women were told at baseline by a provider that they had high-risk pregnancies. The NHIF, which is a government run insurance programme for those above age 18, covered 139 (38.8%) women (NHIF, 2019). Only 137 (38.3%) women reported that it would be easy or very easy to pay about $10 USD out of pocket for medical bills. Most women were driven in a car to their delivery facility. Less than half (152 or 42.5%) of women took public transportation, or a matatu, while 102 (28.5%) took a taxi, 32 (9.0%) went by motorcycle and 69 (19.3%) women walked to their place of delivery. A total of 133 (37.2%) women delivered in a health centre or maternity home, 103 (28.8%) delivered in a hospital and 122 (34.1%) delivered in a tertiary hospital.

Almost a third (117 or 32.7%) of women lived <2 km away from a CEmONC capable facility, while 216 (60.3%) lived <3 km away, 263 (73.5%) lived <5 km and 331 (92.5%) lived <10 km away (Table 2). During Months 5–7 of pregnancy, 200 (56.3%) women reported ever considering delivering in a facility that was CEmONC capable while 86 (24.8%) women reported that the facility they most wanted to deliver in was a CEmONC facility. Meanwhile 88 (24.8%) women reported ever considering delivering in their nearest CEmONC facility and only 27 (7.7%) women reported that their nearest CEmONC facility was the facility they most wanted to deliver in. Among women who attended at least one ANC visit prior to being surveyed in their eighth month of pregnancy ($n = 356$), only 95 (26.7%) reported being advised about where they should deliver and 13 (3.7%) reported being advised to deliver in their nearest CEmONC facility.

Describing bypassing behaviour

Almost one-third (113 of 31.6%) of women delivered in any CEmONC facility (Table 2). Overall, 44 (12.3%) women delivered in their nearest CEmONC capable facility. Among women who delivered in their nearest CEmONC capable facility, 15 (34.1%) were emergency referred to the facility during labour. More than half (200 or 55.9%) of women bypassed their nearest CEmONC facility for delivery. Among women who bypassed their nearest CEmONC, 131 (65.5%) bypassed for a farther non-CEmONC facility and 69 (34.5%) bypassed to deliver in a farther CEmONC facility.

Table 1 Sociodemographic and healthcare utilization characteristics from a sample of pregnant women living in peri-urban Nairobi ($N = 358$)

Variable	Mean (SD) or *n* (%)
Women's characteristics	
Age (years)	25.6 (4.6)
Married or partnered	315 (88.0%)
Pregnancies	2.1 (1.0)
Education (some secondary or higher)	238 (66.5%)
Household assets	
Has improved toilet	318 (88.8%)
Has electricity	331 (92.5%)
Prior health system interaction and risk factors	
Completed four ANC visits by midline (Month 8)	101 (28.2%)
Told by provider high risk ($n = 350$)	27 (7.7%)
Prior C-section[a] ($n = 246$)	32 (13.0%)
Resources	
Covered by NHIF	139 (38.8%)
Easy or very easy to pay $10 USD ($n = 356$)	137 (38.4%)
Has car at baseline	21 (5.9%)
Mode of transport to delivery facility	
Motorcycle	32 (9.0%)
Taxi	102 (28.5%)
Matatu	152 (42.5%)
Walking	69 (19.3%)
Delivery facility level	
Health centre or maternity home	133 (37.2%)
Hospital	103 (28.8%)
Tertiary hospital	122 (34.1%)
Delivery costs	
Self-reported vaginal delivery fee[b] ($USD) ($n = 332$)	37.6 (64.1)
Paid any money for transport to delivery facility ($n = 355$)	264 (73.7%)

SD, standard deviation.
[a]Among those with one or more pregnancy.
[b]Excluding transport, topcoded at the 90th percentile.

Comparing women who delivered in their nearest CEmONC with women who bypassed to deliver in a farther non-CEmONC

Characteristics of facility technical quality, patient experience (non-technical quality), transportation and delivery costs among women who used the nearest CEmONC compared to those who bypassed the nearest CEmONC for a non-CEmONC facility are shown in Table 3. On average, women who bypassed their nearest CEmONC spent almost twice as long (83.5 vs 44.0 min, $P = 0.047$) travelling a farther distance (8.5 vs 3.5 km, $P < 0.001$) to their delivery facility. Women who bypassed their nearest CEmONC to deliver in a farther non-CEmONC facility rated their delivery facility higher on non-technical quality items (0.88 vs 0.69, $P = 0.003$) and were more likely to recommend their delivery facility to a friend (90.1% vs 68.2%, $P = 0.006$). Average technical quality of bypasser's delivery facilities was lower than the average technical quality among women who used their nearest CEmONC (0.75 vs 0.82, $P = 0.003$). There was no difference in vaginal delivery costs between the two groups ($27.8 USD vs $42.9 USD, $P = 0.193$).

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Table 2 Distance to nearest CEmONC, preferences for CEmONC delivery, ANC recommendation for CEmONC delivery, characteristics of facility used for delivery, and bypasser status ($N = 358$)

Measure	Women, *n* (%)
Distance to nearest CEmONC capable facility	
Less than 2 km	117 (32.7%)
Less than 3 km	216 (60.3%)
Less than 5 km	263 (73.5%)
Less than 10 km	331 (92.5%)
Preferences for CEmONC delivery	
Ever considered delivering in any CEmONC at baseline ($n = 355$)	200 (56.3%)
Most wanted to deliver in any CEmONC at baseline ($n = 350$)	86 (24.6%)
Ever considered delivering in nearest CEmONC at baseline ($n = 355$)	88 (24.8%)
Most wanted to deliver in nearest CEmONC at baseline ($n = 350$)	27 (7.7%)
Recommendation to deliver in CEmONC during delivery	
Advised during ANC on delivery facility ($n = 356$)[a]	95 (26.7%)
Advised to deliver in nearest CEmONC ($n = 356$)	13 (3.7%)
Characteristics of facility used for delivery	
Delivered in any CEmONC	113 (31.6%)
Delivered in nearest CEmONC	44 (12.3%)
Emergency referral to nearest CEmONC ($n = 44$)[b]	15 (34.1%)
Bypassing behaviour[c]	
Bypassed nearest CemONC	200 (55.9%)
Bypassed nearest CEmONC for farther non-CEmONC ($n = 200$)[d]	131 (65.5%)
Bypassed nearest CEmONC for farther CEmONC ($n = 200$)[d]	69 (34.5%)

[a]Among women who completed at least one ANC visit prior to being surveyed in their eighth month of pregnancy.
[b]Among women who delivered in nearest CEmONC capable facility.
[c]Bypassing was defined as travelling farther than the nearest CEmONC facility for delivery.
[d]Among women who bypassed their nearest CEmONC.

Table 3 Comparing quality and delivery experience, transportation, and costs among women who used their nearest CEmONC facility and women who bypassed their nearest CEmONC facility

	Used nearest CEmONC ($n = 44$)	Bypassed nearest CEmONC for non-CEmONC facility ($n = 131$)	*P*-value[e]	Bypassed nearest CEmONC for farther CEmONC facility ($n = 69$)	*P*-value[e]
Distance and travel time to delivery facility					
Mean distance from neighbourhood (km)	3.5	8.5	<0.001	12.1	<0.001
Mean travel time from neighbourhood[a] (min)	44.0 ($n = 36$)	83.5 ($n = 119$)	0.047	155.8 ($n = 64$)	<0.001
Quality and delivery experience					
Mean technical quality index score[b]	0.82	0.75	0.003	0.91	<0.001
Mean non-technical quality index score[c]	0.69	0.88	0.003	0.82	0.060
Would recommend facility to a pregnant friend	30 (68.2%)	118 (90.1%)	0.006	59 (85.5%)	0.040
Delivery costs					
Mean self-reported vaginal delivery costs[d] (USD$)	42.9 ($n = 42$)	27.8 ($n = 125$)	0.193	90.3 ($n = 60$)	0.002

[a]By self-reported mode of transport. Transport modes were walking, driving and transit (public transportation). Travel times could not be calculated for 20 women who reported taking public transit.
[b]From 23-item technical quality index.
[c]Average of four binary items: good respectfulness of healthcare workers, good communication skills of healthcare workers, good friendliness of healthcare workers, never disrespected or abused at the facility.
[d]Topcoded at the 90th percentile. Among women who reported a vaginal delivery.
[e]*P*-value comparing to women who used their nearest CEmONC.

Looking at the correlates of bypassing, an additional 1 km of distance to a woman's nearest hospital (of any quality) was associated with 1.04 (95% CI: 1.00–1.08, $P = 0.033$) times the probability of bypassing the nearest CEmONC capable facility (Figure 1a). Completing four ANC visits was associated with a 22% (95% CI: 0.64–0.94, $P = 0.008$) reduced probability of bypassing the nearest CEmONC capable facility compared to women who did not complete four ANC visits. Being multiparous was associated with 1.33 (95% CI: 1.07–1.64, $P = 0.010$) times the probability of bypassing the nearest CEmONC capable facility compared to women who were primiparous. Considering any CEmONC for delivery at baseline was associated with an 18% (95% CI: 0.71–0.95) reduced probability of bypassing the nearest CEmONC facility for a non-CEmONC facility. There were no significant associations between availability of resources or the presence of risk factors and the probability of bypassing the nearest CEmONC in favour of delivering in

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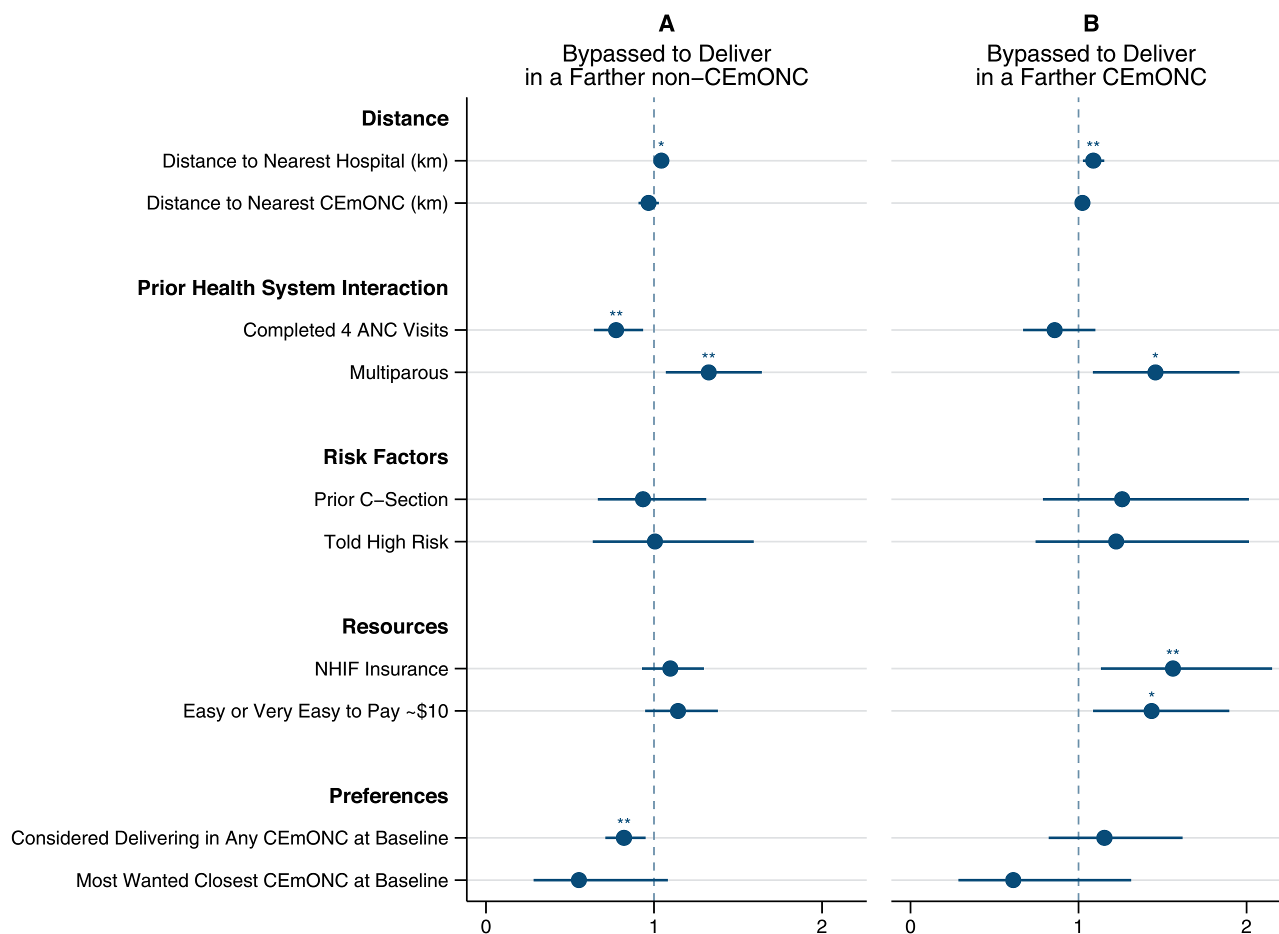

Figure 1 (a) Coefficient plot of bivariate associations between women's characteristics prior to delivery and probability of bypassing their nearest CEmONC capable facility to deliver in a non-CEmONC facility. (b) Coefficient plot of bivariate associations between women's characteristics prior to delivery and probability of bypassing their nearest CEmONC capable facility to deliver in a farther CEmONC facility. ***P*-value <0.01; **P*-value <0.05. Dots represent risk ratios, and lines are 95% confidence intervals. Models were log-linked bivariate generalized linear models with standard errors clustered at the neighbourhood level.

a farther non-CEmONC. Estimated risk ratios for these relationships can be found in Supplementary Table A4 and are illustrated in Figure 1a.

Comparing women who delivered in their nearest CEmONC with women who bypassed to deliver in a farther CEmONC

Women who bypassed their nearest CEmONC to deliver in a farther CEmONC capable facility travelled significantly farther than women who delivered in their nearest CEmONC (12.1 vs 3.5 km, $P < 0.001$) and travelled for longer (44.0 vs 155.8 min, $p < 0.001$) (Table 3). Women who bypassed their nearest CEmONC delivered in farther CEmONCs with higher average technical quality scores (0.91 vs 0.82, $p < 0.001$). Compared to women who delivered in their nearest CEmONC facility, significantly more women that bypassed their nearest CEmONC would recommend their friend deliver there (85.5% vs 68.2%, $P = 0.040$). Mean vaginal delivery costs were higher among women who bypassed their nearest CEmONC to deliver in a farther CEmONC ($90.3 USD vs $42.9 USD, $P = 0.002$).

Women who were multiparous had a higher probability of bypassing their nearest CEmONC to deliver in a farther CEmONC facility compared to women who were primiparous (RR: 1.46, 95% CI: 1.09–1.96, $p = 0.012$) (Figure 1b). Women with NHIF insurance (RR: 1.56, 95% CI: 1.13–2.15, $p = 0.006$) and who reported it would be easy or very easy to pay about $10 USD for emergency medical expenses (RR: 1.44, 95% CI: 1.09–1.90, $p = 0.011$) had a higher probability of bypassing their nearest CEmONC for a farther CEmONC compared to women without NHIF insurance and who reported it would be difficult or very difficult to pay about $10 USD for emergency medical expenses. An additional 1 km of distance to the nearest hospital was associated with a slightly higher probability of bypassing the nearest CEmONC for a farther CEmONC (RR: 1.09, 95% CI: 1.03–1.15, $p = 0.005$). Estimated risk ratios for these relationships can be found in Supplementary Table A5 and are illustrated in Figure 1b.

Discussion

This study found that in informal settlements of peri-urban Nairobi, where 73.5% of women live within 5 km of a CEmONC capable facility, only 12.3% of women ended up delivering in their nearest CEmONC facility. Over half (55.9%) of women bypassed, or travelled farther than, their nearest CEmONC facility, of which 65.5% bypassed to deliver in a farther, lower technical quality facility. The other 34.5% of bypassers delivered in farther CEmONC facilities with higher average technical quality scores compared to their nearby CEmONC facilities. Both groups of women who bypassed their

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nearest CEmONC rated their delivery experience higher than women who delivered in their nearest CEmONC.

Proximity of highly technically capable facilities to women's neighbourhoods does not seem to be sufficient to ensure women will deliver there. Previous literature has found that women actively choose their healthcare providers and bypass nearby, low-quality facilities in rural areas (Kruk *et al.*, 2009a, 2014; Leonard, 2014; Cohen *et al.*, 2016). We have shown that urban women are also bypassing nearby facilities, but they are bypassing to deliver mostly in facilities of lower technical quality. With a saturation of delivery facility options, women may be choosing facilities based on salient interpersonal indicators of the healthcare experience.

Women who delivered in their nearest CEmONC facilities rated their facilities lower in terms of non-technical quality (on dimensions of respectfulness, communication skills, friendliness of healthcare workers and experience of disrespect or abuse) on average compared to women who bypassed their nearest CEmONC. Women who delivered in their nearest CEmONC were also less likely to report that they would recommend this delivery facility to a pregnant friend. The receipt of respectful maternity care may be a key perceivable factor influencing pregnant women's decision-making process (Kruk *et al.*, 2009b). Evidence in other settings shows that women are more likely to deliver in facilities that they perceive will treat them better (Larson *et al.*, 2015). Patients across countries also rank dignity, including being shown respect, as the second most important non-clinical domain of quality care (Valentine *et al.*, 2008). These interpersonal components of a mother's healthcare experience may be especially important in Kenya where an estimated one in five women experience disrespect and abuse during childbirth (Abuya *et al.*, 2015).

Nonetheless, women report that they want to deliver in facilities of high technical quality (Jha *et al.*, 2013; Cohen *et al.*, 2017). At baseline, 68% (165/243) of a sub-sample of women ranked their most wanted delivery facility as the one they perceived as best able to handle obstetric emergencies. Not all bypassers, however, ended up delivering in highly technically capable facilities. This may be due to the inherent information asymmetry present in healthcare markets that contributes to the difficulty in accurately perceiving technical aspects of a provider's healthcare quality (Arrow, 1978; Hsaio, 1995; Kolstad and Chernew, 2009). It may be especially hard to decipher technical quality in this population of facilities due to the inverse relationship between technical and non-technical qualities within many facilities (Cohen *et al.*, 2017). A recent study using a sample of women from the same cohort found that only 44% of women accurately ranked the facilities they were choosing to deliver in by measured technical quality scores using their perception of facility capacity to handle obstetric emergencies (Siam *et al.*, 2019). High-quality ANC can play a role in diminishing information asymmetry by ensuring that women are aware of high technical quality delivery facilities available in broader Nairobi. However, out of the women who had attended at least one ANC visit by delivery in our sample, only 26.7% (95/356) reported being advised about where they should deliver and only 3.7% (13/356) were advised to deliver in their nearest CEmONC capable facility.

We also found that women with greater access to financial resources were more likely to bypass their nearest CEmONC for a farther CEmONC compared to women with less resources. These bypassers also delivered in facilities of higher technical quality and paid more for delivery on average. These findings suggest that among women who chose to bypass their nearest CEmONC facility, women with access to resources and the ability to pay more for delivery were able to get to a higher 'tier' of CEmONC facility that provided high technical and non-technical quality care. For women with fewer resources, the trade-off between technical and non-technical qualities may be more pronounced.

We have shown that women who live near facilities of high technical quality often do not use them, frequently bypassing them for lower technical quality facilities that are farther away. Our results suggest that the perceived healthcare experience is likely an important component of choosing a delivery location. Given the inverse relationship between technical and non-technical qualities within facilities in Nairobi and the difficulty in perceiving technical quality, choosing a facility that maximizes components of both technical and non-technical qualities may be difficult, especially for women with fewer resources (Cohen *et al.*, 2017). Our evidence does not allow us to know whether women would have chosen higher technical quality hospitals if they believed them to offer better interpersonal care or if they were informed of facility technical quality prior to delivery. Still, our findings suggest that informing women prior to delivery of nearby high-quality facilities available to them may be valuable. More evidence is needed on effective strategies to decrease disrespect and humiliation and improve the delivery care experience in hospitals in Nairobi (Rosen *et al.*, 2015).

Our analysis has several limitations. First, we measured distance to delivery facility with women's neighbourhood centroids as their origin, which is less precise than having individual GPS data for a woman's residence. We also do not know where women were when they began to travel to their delivery facility (i.e. when they were in labour) so our estimates cannot fully capture the role of distance at the time of delivery facility choice. Second, we only included facilities for which we had facility quality data. While we expect that this would include all nearby CEmONC facilities since there are a limited number of these higher-level hospitals in Nairobi, we may not have every hospital or health centre in our data, which could mean that the 'nearest facility' in our data is not actually the nearest facility to a woman's residence. In addition, since we only have quality data on facilities in which women delivered, there may be selection in our facility sample wherein we are not including facilities that women did not chose to deliver in for reasons that may be related to our variables of interest (distance and quality). As we included CEmONC capable facilities and all public hospitals in Nairobi in the analysis, it is likely that the remaining non-included facilities were small maternity centres or private facilities. Third, the technical quality index score is based on process of care measures self-reported by facility staff and was not observed to be performed by survey enumerators. The technical quality index only asks about reported performance of signal functions in the last 3 months but does not measure the technical quality actually received by women at the time of delivery. This analysis also used data from a pilot study with a modest sample size and results may not be generalizable to populations outside of women living in peri-urban Nairobi. It is also important to consider that the facility some women end up delivering in may not represent their preferences under ideal conditions since women are sometimes turned away from facilities, emergency referred to another facility, or cannot get to their facility of choice (Naanyu *et al.*, 2020).

Despite these limitations, a key strength of this analysis is that women were surveyed multiple times during their pregnancy and after their delivery. This provides a better sense of women's decision-making process and evolution of their preferences and knowledge during pregnancy and at the time key decisions were made instead of in retrospect having already experienced delivery in a chosen facility.

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Conclusion

Although women living in peri-urban Nairobi state wanting to deliver in a facility of high technical quality and live relatively close to them, many women bypass nearby, high technical quality facilities in favor of delivering in farther facilities of lower technical quality. Women may not know where they should go to receive the highest quality care due to the difficulty in perceiving technical quality or they may prefer to deliver in a facility that provides them with higher non-technical quality care. Some women may not be able to pay to deliver in facilities with both high technical and non-technical qualities and choose to prioritize their delivery experience. Health policies targeting poor pregnant women living in urban areas need to recognize these informational and interpersonal barriers to receiving high-quality technical maternity care.

Supplementary data

Supplementary data are available at *Health Policy and Planning* online.

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References

Abuya T, Warren CE, Miller N *et al.* 2015. Exploring the prevalence of disrespect and abuse during childbirth in Kenya. *PLoS One* **10**: e0123606.

Arrow KJ. 1978. Uncertainty and the welfare economics of medical care. In: *Uncertainty in Economics*. Elsevier, 345–75.

Averting Maternal Death and Disability (AMDD). 2010. *Toolkit*|Columbia *University Mailman School of Public Health*. Needs Assessment of Emergency Obstetric and Newborn Care: Data Collection Modules. https://www.mailman.columbia.edu/research/averting-maternal-death-and-disability-amdd/toolkit, accessed 10 May 2019.

Bivand R. 2018. *Interface to Geometry Engine—Open Source ('GEOS') [R Package rgeos]*. CRAN.

Cohen J, Golub G, Kruk ME, McConnell M. 2016. Do active patients seek higher quality prenatal care?: a panel data analysis from Nairobi, Kenya. *Preventive Medicine* **92**: 74–81.

Cohen J, Rothschild C, Golub G *et al.* 2017. Measuring the impact of cash transfers and behavioral "nudges" on maternity care in Nairobi, Kenya. *Health Affairs* **36**: 1956–64.

Gabrysch S, Civitelli G, Edmond KM *et al.* 2012. New signal functions to measure the ability of health facilities to provide routine and emergency newborn care. *PLoS Medicine* **9**: e1001340.

Hsaio WC. 1995. Abnormal economics in the health sector. *Health Policy (Amsterdam, Netherlands)* **32**: 125–39.

Hunter BM, Harrison S, Portela A, Bick D. 2017. The effects of cash transfers and vouchers on the use and quality of maternity care services: a systematic review. *PLoS One* **12**: e0173068.

Jha AK, Larizgoitia I, Audera-Lopez C *et al.* 2013. The global burden of unsafe medical care: analytic modelling of observational studies. *BMJ Quality & Safety* **22**: 809–15.

Kahabuka C, Kvåle G, Moland KM, Hinderaker SG. 2011. Why caretakers bypass Primary Health Care facilities for child care—a case from rural Tanzania. *BMC Health Services Research* **11**:315.

Kolstad JT, Chernew ME. 2009. Quality and consumer decision making in the market for health insurance and health care services. *Medical Care Research and Review* **66**: 28S–52S.

Kruk ME, Hermosilla S, Larson E, Mbaruku GM. 2014. Bypassing primary care clinics for childbirth: a cross-sectional study in the Pwani region, United Republic of Tanzania. *Bulletin of the World Health Organization* **92**: 246–53.

Kruk ME, Larson E, Twum-Danso NAY. 2016a. Time for a quality revolution in global health. *The Lancet Global Health* **4**: e594–6–e596.

Kruk ME, Leslie HH, Verguet S , *et al.* 2016b. Quality of basic maternal care functions in health facilities of five African countries: an analysis of national health system surveys. *The Lancet Global Health* **4**: e845–e855.

Kruk ME, Mbaruku G, McCord CW *et al.* 2009a. Bypassing primary care facilities for childbirth: a population-based study in rural Tanzania. *Health Policy and Planning* **24**: 279–88.

Kruk ME, Paczkowski M, Mbaruku G, de Pinho H, Galea S.. 2009b. Women's preferences for place of delivery in rural Tanzania: a population-based discrete choice experiment. *American Journal of Public Health* **99**: 1666–72.

Larson E, Vail D, Mbaruku GM *et al.* 2015. Moving toward patient-centered care in Africa: a discrete choice experiment of preferences for delivery care among 3,003 Tanzanian women. *PLoS One* **10**: e0135621.

Leonard KL. 2007. Learning in health care: evidence of learning about clinician quality in Tanzania. *Economic Development and Cultural Change* **55**: 531–55.

Leonard KL. 2014. Active patients in rural African health care: implications for research and policy. *Health Policy and Planning* **29**: 85–95.

Leonard KL, Mliga GR, Haile Mariam D. 2002. Bypassing health centres in Tanzania: revealed preferences for quality. *Journal of African Economies* **11**: 441–71.

Lozano R, Wang H, Foreman KJ *et al.* 2011. Progress towards Millennium Development Goals 4 and 5 on maternal and child mortality: an updated systematic analysis. *The Lancet* **378**: 1139–65.

Maru DS-R, Andrews J, Schwarz D *et al.* 2012. Crossing the quality chasm in resource-limited settings. *Globalization and Health* **8**: 41.

Melo RA, Rodriguez TD, Zarruk D. 2018. *Distance and Travel Time Between Two Points from Google Maps [R package gmapsdistance]*. CRAN.

Montagu D, Sudhinaraset M, Diamond-Smith N *et al.* 2017. Where women go to deliver: understanding the changing landscape of childbirth in Africa and Asia. *Health Policy and Planning* **32**: 1146–52.

Naanyu V, Mujumdar V, Ahearn C, McConnell M, Cohen J *et al.* 2020. Why do women deliver where they had not planned to go? A qualitative study from peri-urban Nairobi Kenya. *BMC Pregnancy and Childbirth* **20**: 30.

NHIF.2019. NHIF. National Hospital Insurance Fund. http://www.nhif.or.ke/healthinsurance/, accessed 9 May **2019**.

Parkhurst JO, Ssengooba F. 2009. Assessing access barriers to maternal health care: measuring bypassing to identify health centre needs in rural Uganda. *Health Policy and Planning* **24**: 377–84.

Rosen HE, Lynam PF, Carr C *et al.*; On behalf of the Quality of Maternal and Newborn Care Study Group of the Maternal and Child Health Integrated Program. 2015. Direct observation of respectful maternity care in five countries: a cross-sectional study of health facilities in East and Southern Africa. *BMC Pregnancy and Childbirth* **15**:306.

Siam ZA, McConnell M, Golub G *et al.* 2019. Accuracy of patient perceptions of maternity facility quality and the choice of providers in Nairobi, Kenya: a cohort study. *BMJ Open* **9**: e029486.

Sobel HL, Huntington D, Temmerman M. 2016. Quality at the centre of universal health coverage. *Health Policy and Planning* **31**: 547–9.

Souza JP, Gülmezoglu AM, Vogel J *et al.* 2013. Moving beyond essential interventions for reduction of maternal mortality (the WHO Multicountry Survey on Maternal and Newborn Health): a cross-sectional study. *The Lancet* **381**: 1747–55.

Tangcharoensathien V, Mills A, Palu T. 2015. Accelerating health equity: the key role of universal health coverage in the Sustainable Development Goals. *BMC Medicine* **13**:101.

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Tripathi V, Stanton C, Strobino D, Bartlett L. 2015. Development and validation of an index to measure the quality of facility-based labor and delivery care processes in sub-Saharan Africa. *PLoS One* **10**: e0129491.

United Nations (UN) General Assembly. 2015. *Transforming Our World: The 2030 Agenda for Sustainable Development*.

Valentine N, Darby C, Bonsel GJ. 2008. Which aspects of non-clinical quality of care are most important? Results from WHO's general population surveys of "health systems responsiveness" in 41 countries. *Social Science & Medicine* **66**: 1939–50.

van den Broek NR, Graham WJ. 2009. Quality of care for maternal and newborn health: the neglected agenda. *BJOG: An International Journal of Obstetrics and Gynaecology* **116**: 18–21.

Ziraba, A.K., Madise, N., Mills, S., Kyobutungi, C. and Ezeh, A., 2009. Maternal mortality in the informal settlements of Nairobi city: what do we know?. *Reproductive health*, 6(1), p.6.

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