

By Jessica Cohen, Claire Rothschild, Ginger Golub, George N. Omondi, Margaret E. Kruk, and Margaret McConnell

DOI: 10.1377/hlthaff.2017.0537
HEALTH AFFAIRS 36,
NO. 11 (2017): 1956–1964
©2017 Project HOPE—
The People-to-People Health
Foundation, Inc.

Measuring The Impact Of Cash Transfers And Behavioral ‘Nudges’ On Maternity Care In Nairobi, Kenya

Jessica Cohen (cohenj@hsph.harvard.edu) is an associate professor in the Department of Global Health and Population, Harvard T. H. Chan School of Public Health, in Boston, Massachusetts.

Claire Rothschild is a doctoral student in the School of Public Health, University of Washington, in Seattle.

Ginger Golub is a research manager at Innovations for Poverty Action–Kenya, in Nairobi.

George N. Omondi is an adherence and retention officer at the Center for Health Solutions, in Nairobi.

Margaret E. Kruk is an associate professor in the Department of Global Health and Population, Harvard T. H. Chan School of Public Health.

Margaret McConnell is an assistant professor in the Department of Global Health and Population, Harvard T. H. Chan School of Public Health.

ABSTRACT Many patients in low-income countries express preferences for high-quality health care but often end up with low-quality providers. We conducted a randomized controlled trial with pregnant women in Nairobi, Kenya, to analyze whether cash transfers, enhanced with behavioral “nudges,” can help women deliver in facilities that are consistent with their preferences and are of higher quality. We tested two interventions. The first was a labeled cash transfer (LCT), which explained that the cash was to help women deliver where they wanted. The second was a cash transfer that combined labeling and a commitment by the recipient to deliver in a prespecified desired facility as a condition of receiving the final payment (L-CCT). The L-CCT improved patient-perceived quality of interpersonal care but not perceived technical quality of care. It also increased women’s likelihood of delivering in facilities that met standards for routine and emergency newborn care but not the likelihood of delivering in facilities that met standards for obstetric care. The LCT had fewer measured benefits. Women preferred facilities with high technical and interpersonal care quality, but these quality measures were often negatively correlated within facilities. Even with cash transfers, many women still used poor-quality facilities. A larger study is warranted to determine whether the L-CCT can improve maternal and newborn outcomes.

Every year in sub-Saharan Africa, 1.3 million women and newborns die in delivery or shortly thereafter.^{1,2} For delivery complications to be managed effectively, women must deliver in facilities that have essential medicines and supplies, well-trained health care workers, and functioning referral systems. Studies of African maternity facilities have found extremely insufficient quality of routine and emergency care.³ In Kenya only 5 percent of maternity facilities perform cesarean sections, only 49 percent have referral capacity, and many lack antibiotics and injectable anticonvulsants.⁴

Beyond these technical components of care quality, many Kenyan facilities perform poorly in nontechnical interpersonal aspects of care, with 20 percent of women reporting that they experienced disrespect or abuse during delivery.⁵

Many policy approaches to improving the quality of maternal care focus on the supply side—for example, by training providers or upgrading facility infrastructure and equipment.⁶ Demand-side financing programs have focused on improving patient access to facilities through reducing costs or providing financial assistance in the form of cash transfers.^{7,8} Cash transfer programs have been used in low-income coun-

tries to help poor women overcome barriers to reaching facilities, including defraying the costs of transportation and facility fees. Conditional cash transfers aim to overcome financial barriers and directly incentivize targeted behavior by making payment conditional on delivery in a health care facility. While cash transfer programs have increased delivery rates in such facilities and reduced rates of home births, they have not been shown to increase delivery rates in facilities that provide care of adequate quality.⁷

Nairobi, Kenya, is a novel and important environment in which to study maternal cash transfers. The maternity provider landscape in Nairobi is complex, with hundreds of facilities that vary widely in terms of quality and cost. Maternity care seeking is fragmented and unplanned. Pregnant women often switch providers several times and choose a delivery facility very late in pregnancy. Many deliver in facilities they did not want or intend to use, and many deliver in extremely low-quality facilities. Consistent with previous literature on patients in low-income countries,^{9–11} women in Nairobi express strong preferences for high-quality delivery care. However, women face many obstacles to delivering where they want, including difficulty choosing a provider in such a complex landscape, disagreement among family members about where to deliver, and arriving early enough in labor at their desired facility.

To determine whether cash transfers help women deliver where they want and in a high-quality facility, we conducted a randomized controlled trial in Nairobi that used two types of maternal cash transfers. The transfers were designed based on innovations from behavioral economics. The first innovation was to apply a label to an unconditional cash transfer, stating that the cash was intended to help the woman deliver in the facility of her choice. These labeled cash transfers (LCTs) can increase the salience and perceived importance of the targeted behavior, which in turn reduces the probability that the money will be diverted to other expenses—such as more immediate household needs or purchases that a spouse would prefer.¹² The second innovation was to design a conditional cash transfer that incorporated a “precommitment.” In this intervention, women received the LCT plus an additional cash transfer if they delivered in a facility to which they had committed during pregnancy, a transfer we call the “L-CCT.” Precommitment encourages active decision making in complex choice environments (where final decisions are often postponed or avoided) by incentivizing earlier, more deliberate planning and thought.¹³

Our randomized controlled trial tested wheth-

er maternal cash transfers, enhanced with low-cost “nudges” (a label and a precommitment), can help women deliver where they want and can, in turn, increase their use of high-quality delivery facilities and improve their experience of quality of care during delivery. This study is among the first to apply behavioral economic innovations to maternal cash transfers in low-income countries and rigorously measure the impact of cash transfers on the quality of the delivery facility used. While a number of demand-side financing programs have increased utilization of maternity facilities, most have not demonstrated improvements in maternal and newborn health.^{7,8} A common explanation is the poor quality of available maternity care, but evidence for this explanation is largely unavailable,¹⁴ and few studies have attempted to make innovations in the design of cash transfers to enhance their impact. Our study seeks to fill this gap and help policy makers improve the design of financial assistance for maternal and newborn health.

Study Data And Methods

SETTING AND POLICY CONTEXT Like many urban areas in low-income countries, Nairobi has grown rapidly, with a proliferation of informal settlements (“slums”) surrounding the city. High-quality maternity facilities are typically located outside of slums, which means that potentially costly travel is required to reach them. Delivery-related morbidity and mortality in the Nairobi slums are particularly high, despite the fact that more than 80 percent of women deliver in a health care facility, rather than at home or with a traditional birth attendant.¹⁵ This study was conducted with pregnant women living in twenty-four neighborhoods in Nairobi’s slums, roughly 12–15 kilometers from the city center.

Nairobi has hundreds of maternity facilities, including a wide variety of public, private for-profit, and private nonprofit facilities. The Kenyan public health system includes “health centers” and “dispensaries,” which offer basic maternity care; “secondary referral hospitals,” which are the first level of referral hospital and should be able to perform cesarean sections; and “tertiary hospitals,” which provide the highest level of care. Private providers are also varied, ranging from very small facilities (sometimes in a provider’s home) to large, well-equipped private tertiary hospitals. Nairobi also has nonprofit facilities known as “mission” facilities, which are run by religious organizations or NGOs. Kenya has a national policy of free delivery in public facilities, but patients often pay some fees there—usually in the form of ancillary fees for

food and so on.

STUDY PARTICIPANTS AND INTERVENTIONS The study took place in the period February–September 2015. Pregnant women in months 5–7 of gestation were recruited through community recruitment events, community health worker listings, and snowball sampling. Surveys were conducted at the woman’s household at baseline (months 5–7 of gestation), midline (month 8) and endline (2–4 weeks after delivery). Sections I and II of the online Appendix discuss recruitment, survey procedures, and data entry.¹⁶

The baseline survey captured demographic information, pregnancy history, and plans for delivery. Women listed all of the facilities they were considering for delivery and ranked them according to several measures of perceived quality and by their desire to deliver there. The women were asked again about their preferences and perceptions at midline. A random subsample of 25 percent of the women received a shorter version of these surveys that excluded questions about facility perceptions. This allowed us to explore and control for potential effects of extensive questioning about preferences on delivery facility choice. Endline surveys included detailed questions about the quality of care experienced during delivery.

We surveyed 553 women at baseline, 459 at midline, and 454 at endline. The primary reason for attrition was temporary relocation to be with family members. Of the 454 women followed to endline, 1 died, and 21 experienced a neonatal death and were not asked to complete a survey. Another 14 delivered either on the way to the facility or at home, with a traditional birth attendant, or could not remember where they delivered. Thus, our final sample consisted of 418 women.

Pregnant women were randomly assigned at baseline with equal probability to the control arm (women in this group received no cash transfer), the arm with an LCT, or the arm that received the LCT and a conditional cash transfer (L-CCT). Random assignment was stratified by gestational month, whether or not this was the woman’s first pregnancy, neighborhood, and survey type. The LCT was 1,000 Kenyan shillings (roughly US\$10) and was provided with the following message: “This is intended to help you deliver in the facility where you want to deliver.” Women in both intervention arms were given the transfer in the eighth month of gestation. At that time, women in the L-CCT arm were asked to commit to using a particular delivery facility and state a backup option in case of an emergency. Another transfer of 1,000 Kenyan shillings was given at endline to those women who delivered at their precommitted facility. A detailed

We found important improvements in women’s use of high-quality delivery facilities as a result of the cash transfers.

description of our recruitment, survey, intervention procedures and stratification, and an analysis of attrition are available in Appendix Exhibits 1–5 and Sections I–V.¹⁶

FACILITY SURVEY Most assessments of the facilities used by study participants for delivery were conducted in the period June–November 2016, but assessments of four facilities were conducted in June 2017. Seventy-nine of the ninety-two facilities where women in the analysis sample delivered were in Kiambu or Nairobi County and were targeted for assessment; sixty-four facility assessments were completed. The primary reasons for noncompletion were facility administrative delays and permanent facility closure.

We developed the assessment instrument based on similar tools previously validated in low-income countries. The assessment consisted of interviews with facility staff members and direct observation of the facility’s supplies, records, and physical structure and condition. The assessment instrument contained modules on staffing, essential supplies, and referral systems and process measures of routine and emergency care (Appendix Sections VI and VII contain more detail on the assessment instrument).¹⁶

OUTCOME MEASUREMENT AND ANALYSIS The first outcomes we report are whether the mother delivered at the facility she most wanted and perceived as having the highest quality, and whether the cash transfers influenced the mode of transport or distance traveled to the facility.

We also report outcomes based on women’s perceptions of the quality of care during delivery. Measures of patient-perceived technical quality of care at the facility were based on Likert scales and capture the mother’s perception of the availability of drugs, supplies, and equipment; knowledge and competence of the health care workers; and cleanliness of the facility. Measures of patient-perceived nontechnical quality included an

Cash transfer programs that aim to improve maternal and newborn health must foster the increased use of technically competent care.

indicator for any experience of disrespect or abuse, as well as Likert scales for the communication skills, friendliness, and respectfulness of health care workers. All Likert scale variables were converted into binary variables, with 1 used to indicate good or excellent quality, as described in Appendix Section VIII.¹⁶ Technical and nontechnical quality indices were constructed by taking the average of all individual components.

Our outcomes also included whether the delivery facility met the standards for care in three domains—routine, basic emergency, and comprehensive emergency care—for both obstetric and newborn care. These measures were based on performance indicators that have been defined in the literature on maternal and newborn care, which were contained in the facility assessments.¹⁷ Routine care includes indicators such as whether infection control is practiced and partographs (graphical records used to monitor labor progression) are routinely used. Basic emergency care captures practices that all facilities should provide, such as parenteral antibiotics. Comprehensive emergency care includes both basic and more specialized care, such as cesarean sections and oxygen administration, that only secondary and tertiary referral hospitals are expected to provide. Precise definitions of each quality standard are provided in Appendix Exhibit 7 and Section VII.¹⁶ We created six binary outcome variables that indicated whether the woman delivered in a facility that met the standards for each of the three domains, separately for obstetric and newborn care.

Our final analysis used a forest plot to explore associations between women's perceptions of nontechnical quality and measures of facility quality, facility level, and ownership type. Coefficients were generated from ordinary least squares regressions of the nontechnical quality

index on facility-level variables, as described in Appendix Exhibit 13.¹⁶

We ran multivariate ordinary least squares regressions of our outcomes with binary variables for the treatment arms as the main independent variables and stratification variables adjusted for. We clustered standard errors at the facility level for outcomes that varied only by facility. Appendix Exhibits 11, 12, and 14–16 present the results of several sensitivity analyses, including logistic regressions and multiple imputation for women with missing data on facility quality.¹⁶

ETHICAL APPROVAL AND TRIAL REGISTRATION AND IMPLEMENTATION The study was approved by Institutional Review Boards at AMREF Health Africa and the Harvard T. H. Chan School of Public Health. Implementation of the randomized controlled trial was conducted in collaboration with Jacaranda Health, and facility assessments were conducted in collaboration with Innovations for Poverty Action–Kenya. The trial was registered in the AEA RCT Registry (Trial No. AEARCTR-0000563).

LIMITATIONS Our study had a number of limitations. First, this was a pilot study with a modest sample size that was further limited by attrition, which constrained our statistical power. The analysis was thus unable to explore differences in impact between the two types of cash transfers, and our results focused on comparisons of each cash transfer type to the control arm. Statistical power to potentially detect small or modest benefits of the cash transfers was also constrained. While attrition in the L-CCT arm was somewhat lower than in the other arms—and reasons for attrition differed somewhat across arms—we found no systematic differences across arms in the characteristics of women in the analysis sample. However, unmeasured confounders resulting from attrition may have caused bias. Furthermore, the scope and timeline of the project did not allow for a population-representative sample to be recruited, so our sample might not be fully representative of women in the Nairobi slums.

Second, since the L-CCT intervention bundled a cash transfer and a precommitment feature, we are unable to say conclusively how much of the overall impact of the L-CCT was caused by each of these features. In other work, we found evidence that the L-CCT did not increase overall spending and led to earlier and more comprehensive planning for delivery than was the case in the control arm, which suggests that the precommitment feature is important.¹⁸ The design of the L-CCT is similar to that of cash transfer programs combining cash payments during delivery with conditional payments after verification of targeted behavior.⁸

Finally, our study could have only limited relevance to rural areas, where home delivery is more common and choice of providers more limited. Our results are relevant to urban populations where facility delivery is the norm and state capacity for regulation is limited. Such populations are a high priority for maternal and newborn health policy, as nearly a billion people worldwide live in urban slums, and delivery-related mortality and morbidity are particularly high in these populations.¹⁹

Study Results

On average, women in our analysis sample were 25.5 years old and pregnant with their second child (Exhibit 1). Nearly 90 percent of the women were married, and 68 percent had had some secondary or postsecondary schooling. Sixty percent reported that they could not afford 1,000 Kenya shillings (roughly US\$10) for treatment or medicine if someone in the household became ill, but the great majority reported having an improved source of drinking water, improved

toilet facility, electricity, and mobile phone. Women in the L-CCT arm were somewhat more likely than those in other arms to be followed to endline, but characteristics of the sample appeared to be balanced, and the few significant differences across arms do not suggest any systematic bias (see Appendix Exhibits 1–4).¹⁶

At baseline, women were considering an average of 2.9 facilities for delivery (Exhibit 1). Seventy percent of the women most wanted to use the facility that they ranked highest in perceived overall quality. Most women also reported a preference for delivery at the facility they perceived to be best able to handle complications and to have the friendliest staff.

Last-minute decisions and deviations in delivery facility choice were common in our sample. Only 59 percent of women in the control arm delivered in a facility that they had been considering in their eighth month of gestation (Exhibit 2). The L-CCT increased this probability by 18 percentage points. Only one-third of the women in the control arm delivered in their most-wanted facility, and the L-CCT increased this probability by 14 percentage points. The L-CCT also significantly increased the probability of delivery in the facility that was perceived to have the highest quality and that was perceived as best able to handle complications. The LCT had no significant positive effect on these outcomes and even had a negative effect on delivery in the most wanted facility.

Women in our sample appeared to face significant constraints to traveling outside of their neighborhood for delivery. Of the women in the control arm, 22.5 percent delivered within two kilometers of their neighborhood, and 30 percent walked to their delivery facility (Exhibit 2). The L-CCT reduced the probability of delivering at such a close location by 10 percentage points and reduced the probability of walking to the delivery facility by 12 percentage points. The LCT had no significant impact on transportation mode and had a negative impact on the probability of delivery within two kilometers of the woman's neighborhood. Very similar results were found in the sensitivity analysis using logistic regression (Appendix Exhibit 11).¹⁶

In all three study arms, overall reports of perceived technical quality were high (Exhibit 3). The LCT had no significant effect on patient-reported technical quality. The L-CCT had inconsistent effects on women's perceived technical quality and virtually no effect on the overall index.

The LCT did not have a significant effect on the overall index of nontechnical quality (Exhibit 3). The L-CCT significantly increased both the prob-

EXHIBIT 1

Study participants' characteristics at baseline and the facility they preferred for delivery, in Kenya

	Mean or percent
PARTICIPANTS' CHARACTERISTICS	
Mean maternal age (years)	25.5
Mean income from paid work in past month (US dollars) ^{a,b}	\$20.73
Mean number of pregnancies	2.1
Married	88.5%
Some secondary or postsecondary education	68.2%
"Difficult" or "very difficult" to pay roughly \$10 ^a for treatment or medicines if a household member became ill ^c	59.9%
Any prenatal care received at baseline	89.2%
Improved source of household drinking water	89.2%
Improved household toilet facility	88.5%
Electricity in household	93.1%
Owns mobile phone	91.4%
Radio in household	78.5%
DELIVERY FACILITY PREFERENCES	
Mean number of facilities considered for delivery	2.9
Most wanted facility also rated highest in terms of respondent-perceived: ^d	
Quality	69.6%
Ability to handle emergencies or complications	64.4%
Friendliness of health care workers	70.3%

SOURCE Authors' analysis. **NOTES** Baseline was months 5–7 of gestation. There were 418 respondents except where indicated. Appendix Sections I–IV provide details on surveying and the construction of the analysis sample (see Note 16 in text). ^aAmount converted from Kenyan shillings to US dollars using the April 2017 conversion rate of 0.0097. ^b412 respondents, because of missing values. ^c416 respondents, because of missing values. ^d303 respondents, because some participants received a short version of the survey that did not include these questions. Appendix Exhibits 1–4 explore sample characteristics in each study arm and reasons for attrition (see Note 16 in text).

EXHIBIT 2
Impact of the interventions on characteristics of delivery facilities used, distance to facility, and transportation to facility, in Kenya

	Mean in control arm (%)	Percentage-point difference between mean in control arm and mean in:	
		LCT arm	L-CCT arm
Patient delivered in a facility that at midline she:			
Was considering ^a	59.2	0.5	17.9***
Most wanted ^b	32.2	-10.8*	14.2**
Perceived as having the highest quality ^c	42.5	3.6	17.2**
Perceived as best able to handle emergencies or complications ^c	32.2	4.8	14.2**
Patient delivered in a facility <2 km from neighborhood of residence ^d	22.5	8.2*	-9.7**
Mode of transportation to facility			
Walked	29.8	-3.4	-12.0**
Took a bus	29.0	-3.1	15.8***
Took a taxi	27.5	6.6	1.1

SOURCE Authors' analysis. **NOTES** The results are for 418 respondents to an endline survey (that is, two to four weeks after delivery) who reported delivering an infant in a health facility, except where indicated. See Appendix Section II for survey procedures (see Note 16 in text). The two interventions were a labeled cash transfer (LCT) and a cash transfer that combined labeling and a commitment by the recipient to deliver in a desired facility (L-CCT), as explained in the text and in detail in the Appendix Section V (see Note 16 in text). Midline was month 8 of gestation. Regression specifications are provided in Appendix Section IX (see Note 16 in text). A sensitivity analysis using logistic regression is presented in Appendix Exhibit 11 (see Note 16 in text). ^a393 respondents, because of missing values. ^b391 respondents, because of missing values. ^c282 respondents, because some participants received a short version of the survey that did not include this question. ^d415 respondents, because of missing values. Distance measured from the centroid of the neighborhood of residence. * $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$

ability of reporting good communication skills by the health care workers (by 14 percentage points) and the overall nontechnical quality index (by 7 percentage points). Both the LCT and the L-CCT had a significant effect on the probability of not experiencing abuse or disrespect—a change of 7 percentage points, which equates to nearly a 40 percent reduction in disrespect and abuse.

Based on our technical assessment, overall facility quality was quite poor, with only 48 percent of facilities meeting standards for routine obstetric care and 28 percent or fewer meeting standards for the other dimensions of care quality (see Appendix Exhibit 8).¹⁶ Of the women in the control arm, 56.4 percent delivered in a facility that met routine obstetric care standards, 33.6 percent delivered in a facility that met basic emergency obstetric care standards, and 31.8 percent delivered in a facility that met comprehensive emergency obstetric care standards (Exhibit 3). We found no significant effects of either intervention on the quality of facilities used for obstetric care.

Regarding the assessed quality of newborn care, 48.2 percent of women in the control arm delivered in a facility that met standards for routine newborn care. Both the LCT and the L-CCT significantly increased that fraction:

62.7 percent of women in the LCT arm and 58.2 percent of women in the L-CCT arm delivered in such a facility.

Roughly a third of the women in the control arm delivered in facilities that met standards for basic emergency newborn care, and 30 percent delivered in facilities that met the standards for comprehensive emergency newborn care. The LCT did not change these percentages significantly, but the L-CCT increased both of them significantly, by about 15 percentage points. Compared to the control arm, both the LCT and the L-CCT decreased the probability of delivering in a mission facility. Appendix Exhibit 9 presents the impact of the LCT and L-CCT for each individual component of assessed facility quality.¹⁶

We found similar results in sensitivity analyses when we used logistic regression and imputed missing values for facility quality. These results are found in Appendix Exhibits 12 and 14.¹⁶

Exhibit 4 explores associations between the patient-reported nontechnical quality index and indicators of facility-assessed quality. Women delivering in facilities that met standards for comprehensive emergency obstetric care reported 9.5 percentage points lower nontechnical quality than women delivering in other facilities—a significant difference. We found a

EXHIBIT 3

Quality of care experienced by patients and quality of delivery facilities in Kenya, by study arm

	Mean in control arm (%)	Percentage-point difference between mean in control arm and mean in:	
		LCT arm	L-CCT arm
PATIENT-REPORTED FACILITY QUALITY OF CARE			
Technical metrics			
Good availability of drugs, supplies, and equipment ^a	85.5	2.4	6.8*
Good health care worker knowledge and competence	88.5	2.7	-5.1
Very clean	83.2	1.9	2.7
Technical quality index (average of all components)	85.8	2.4	1.2
Nontechnical metrics			
Good respectfulness of health care workers	82.4	4.2	5.4
Good communication skills of health care workers ^a	68.7	6.2	14.1***
Good friendliness of health care workers	82.4	4.2	1.1
Never disrespected or abused at the facility	81.7	7.1*	7.3*
Nontechnical quality index (average of all components)	78.8	5.5	7.0**
PATIENTS DELIVERING AT A FACILITY THAT MEETS STANDARDS FOR:^b			
Routine obstetric care	56.4	1.7	-4.0
Basic emergency obstetric care	33.6	-1.0	-4.5
Comprehensive emergency obstetric care	31.8	-0.5	-2.7
Routine newborn care	48.2	14.5**	10.0*
Basic emergency newborn care	31.8	4.1	14.6***
Comprehensive emergency newborn care	30.0	4.2	15.1***
FACILITY LEVEL			
Health center/dispensary	36.6	1.7	-3.3
Secondary referral hospital	36.6	-2.0	-6.0
Tertiary referral hospital	26.7	0.3	9.4
FACILITY OWNERSHIP			
Public	64.9	2.4	9.0
Private	19.8	6.6	0.8
Mission	15.3	-9.0**	-9.8**

SOURCE Authors' analysis. **NOTES** The results are for 418 respondents to an endline survey (that is, two to four weeks after delivery) who reported delivering an infant in a health facility, except where indicated. For facility-level outcomes, standard errors were clustered at the facility level. Extensive methodological notes on variable construction and regression specifications are available in Appendix Sections VII-IX and Appendix Exhibit 7 (see Note 16 in text). Means of these variables for each study arm are presented in Appendix Exhibit 10 (see Note 16 in text). Sensitivity analyses using logistic regression and multiple imputation for missing values are presented in Appendix Exhibits 12 and 14 (see Note 16 in text). ^a417 respondents, because of missing values. ^b363 respondents, because some delivery facilities could not be assessed. **p* < 0.10 ***p* < 0.05 ****p* < 0.01

similarly significant negative association between nontechnical quality and delivering in a facility that met standards for basic emergency obstetric care. Nontechnical quality of care was not significantly related to routine obstetric care or any of the dimensions of newborn care quality. Women who delivered in the lowest level of health facilities reported 7.2 percentage points higher nontechnical quality than women who delivered in higher-level facilities.

Discussion

We found that a cash transfer that incorporated both labeling and precommitment (the L-CCT) increased the probability that women would de-

liver in facilities they wanted and in facilities that met standards for routine and emergency newborn care. The L-CCT also induced women to travel farther outside of the slums for delivery and increased women's reports of nontechnical quality experienced during delivery. Notably, our estimates show large reductions in the experience of disrespect and abuse, a primary objective of the modern maternal health policy agenda.²⁰ However, the L-CCT did not significantly cause women to increase their likelihood of using higher-level facilities, facilities that met standards for assessed obstetric care, or facilities with higher overall patient-perceived technical quality. These promising but mixed results suggest that a larger study of the L-CCT, with more

power to detect improvements in quality and health outcomes, is warranted.

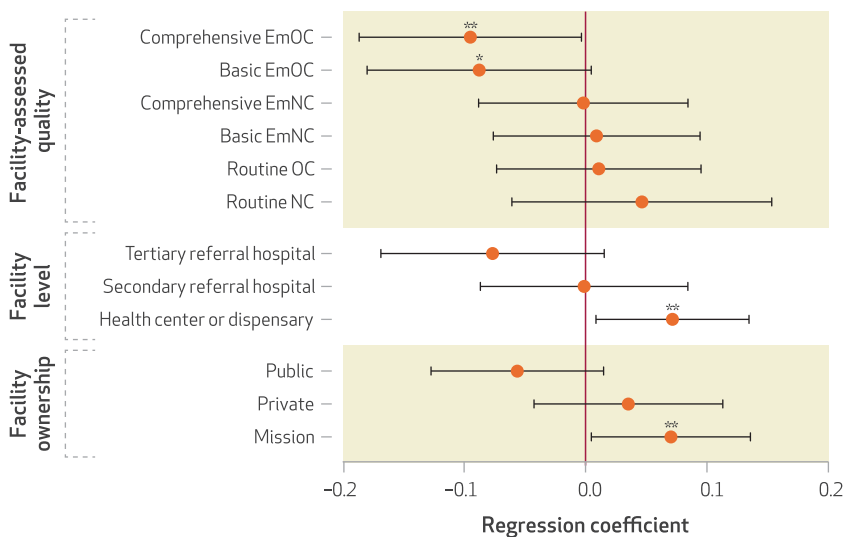
Previous studies of LCTs in low-income countries have found significant effects on parental investment in children's education and financial savings.^{12,21} The LCT in our study did lead to some improvements in quality—such as an increase in the use of facilities that met standards for routine newborn care and decreases in disrespect and abuse—but had no significant effects on other outcomes.

While the L-CCT appears to be beneficial along a number of measured outcomes, it could be challenging to administer at scale. However, the use of mobile phone platforms to transfer money should increasingly diminish the cost and complexity of administering cash transfer programs—including making it easier to verify care-seeking behavior. Ninety-six percent of Kenyan households have access to an M-Pesa mobile money account,²² and such platforms are increasingly used to deliver cash transfers.²³

We found important improvements in women's use of high-quality delivery facilities as a result of the cash transfers, but many women are still delivering in extremely low-quality facilities. Notably, only about half of the women in the control arm delivered in a facility that met even minimal standards for routine obstetric care, such as practicing proper infection control. Furthermore, the interventions did not increase the use of facilities that provided acceptable emergency obstetric care, which is an important link in the pathway between demand-side financing policies and maternal morbidity and mortality. This result could be because women have stronger preferences for facilities that can provide high-quality care for their newborns than for facilities offering such care for themselves. It could also be because, as demonstrated in Exhibit 4, women face some trade-offs with respect to the quality of emergency obstetric care and the interpersonal aspects of patient treatment within facilities. If women have strong preferences for kind and respectful care, this could limit the ability of demand-side financing mechanisms to encourage delivery in more technically equipped facilities. Women may also lack information about technical facility quality, so cash transfers may need to be combined with reliable information. Finally, the cash transfers might not have been large enough to help women reach the highest-quality care.

EXHIBIT 4

Factors associated with patient-reported nontechnical quality of delivery facilities in Kenya



SOURCE Authors' analysis. **NOTES** The figure shows the results of ordinary least squares regressions of the nontechnical quality index on the independent variables shown. The coefficients in the figure can be interpreted as the percentage-point difference in the nontechnical quality index for women who delivered in facilities with versus without the characteristic shown in each row. The error bars indicate 95% confidence intervals. Bars that do not cross 0 on the coefficient axis indicate a significant relationship between the index and the relevant independent variable. The results are for respondents to an endline survey (that is, two to four weeks after delivery) who reported delivering an infant in a health facility. Data on facility quality (collected through facility assessments) on emergency obstetric care (EmOC), emergency newborn care (EmNC), obstetric care (OC), and newborn care (NC) are available for 363 women. Data on facility level and ownership are available for 418 women. See Appendix Sections VII and VIII and Appendix Exhibit 7 for details on the construction of dependent and independent variables (see Note 16 in text). See Appendix Section IX for details on regression specification (see Note 16 in text). Coefficients from this exhibit are presented in Appendix Exhibit 13, and a version of this exhibit with missing values imputed is presented in Appendix Exhibits 15 and 16 (see Note 16 in text). * $p < 0.10$ ** $p < 0.05$

Conclusion

Poor quality of maternity facilities in low-income countries is a primary driver of maternal and newborn mortality. We found that cash transfers designed with both labeling and precommitment (an L-CCT) can increase the use of higher-quality delivery facilities and lead to improvements in women's experiences of interpersonal quality of care. However, the majority of patients continue to deliver in very low-quality facilities. Cash transfer programs that aim to improve maternal and newborn health must foster the increased use of technically competent care. Improving both technical and nontechnical aspects of care should be a policy goal, and women should not be forced to choose between these two important priorities when they give birth. ■

Some of the results in this article were presented at the International Health Economics Association Congress, Revolutions in the Economics of Health Systems, Boston, Massachusetts, July 9, 2017. No manuscripts, slides, or results

were circulated or made publicly available. This study was supported by a Grand Challenges Explorations grant from the Bill & Melinda Gates Foundation, a grant from the Center for Effective Global Action, a Burke

Fellowship from the Harvard University Global Health Institute, a Research Enabling Grant from Harvard University, and a grant from the Lab for Economic Analysis and Policy at Harvard University.

NOTES

- 1 World Health Organization. Trends in maternal mortality: 1990 to 2013: estimates developed by WHO, UNICEF, UNFPA the World Bank, and the United Nations Population Division [Internet]. Geneva: WHO; c 2014 [cited 2017 Sep 21]. p. 55. Available from: http://apps.who.int/iris/bitstream/10665/112682/2/9789241507226_eng.pdf?ua=1
- 2 You D, New JR, Wardlaw T. Levels and trends in child mortality: report 2012: estimates developed by the UN Inter-Agency Group for Child Mortality Estimation [Internet]. New York (NY): UNICEF; c 2012 [cited 2017 Sep 21]. Available from: http://www.childmortality.org/files_v20/download/Levels%20and%20Trends%20in%20Child%20Mortality%20Report%202012.pdf
- 3 Kruk ME, Leslie HH, Verguet S, Mbaruku GM, Adanu RMK, Langer A. Quality of basic maternal care functions in health facilities of five African countries: an analysis of national health system surveys. *Lancet Glob Health*. 2016;4(11):e845–55.
- 4 National Coordinating Agency for Population and Development. Kenya Service Provision Assessment Survey 2010 [Internet]. Nairobi: National Coordinating Agency for Population and Development; 2011 May [cited 2017 Sep 21]. Available from: <https://dhsprogram.com/pubs/pdf/SPA17/SPA17.pdf>
- 5 Abuya T, Warren CE, Miller N, Njuki R, Ndwigwa C, Maranga A, et al. Exploring the prevalence of disrespect and abuse during childbirth in Kenya. *PLoS One*. 2015;10(4):e0123606.
- 6 Koblinsky M, Moyer CA, Calvert C, Campbell J, Campbell OMR, Feigl AB, et al. Quality maternity care for every woman, everywhere: a call to action. *Lancet*. 2016;388(10057):2307–20.
- 7 Hunter BM, Harrison S, Portela A, Bick D. The effects of cash transfers and vouchers on the use and quality of maternity care services: a systematic review. *PLoS One*. 2017;12(3):e0173068.
- 8 Glassman A, Duran D, Fleisher L, Singer D, Sturke R, Angeles G, et al. Impact of conditional cash transfers on maternal and newborn health. *J Health Popul Nutr*. 2013;31(4, Suppl 2):48–66.
- 9 Kruk ME, Hermsilla S, Larson E, Mbaruku GM. Bypassing primary care clinics for childbirth: a cross-sectional study in the Pwani region, United Republic of Tanzania. *Bull World Health Organ*. 2014;92(4):246–53.
- 10 Cohen J, Golub G, Kruk ME, McConnell M. Do active patients seek higher quality prenatal care? A panel data analysis from Nairobi, Kenya. *Prev Med*. 2016;92:74–81.
- 11 Leonard KL. Active patients in rural African health care: implications for research and policy. *Health Policy Plan*. 2014;29(1):85–95.
- 12 Benhassine N, Devoto F, Duflo E, Dupas P, Pouliquen V. Turning a shove into a nudge? A “labeled cash transfer” for education. *Am Econ J Econ Policy*. 2015;7(3):86–125.
- 13 Schwartz J, Mochon D, Wyper L, Maroba J, Patel D, Ariely D. Healthier by precommitment. *Psychol Sci*. 2014;25(2):538–46.
- 14 Souza JP, Gülmezoglu AM, Vogel J, Carroli G, Lumbiganon P, Qureshi Z, et al. Moving beyond essential interventions for reduction of maternal mortality (the WHO Multicountry Survey on Maternal and Newborn Health): a cross-sectional study. *Lancet*. 2013;381(9879):1747–55.
- 15 Beguy D, Elung'ata P, Mberu B, Oduor C, Wamukoya M, Nganyi B, et al. Health and demographic surveillance system profile: the Nairobi Urban Health and Demographic Surveillance System (NUHDSS). *Int J Epidemiol*. 2015;44(2):462–71.
- 16 To access the Appendix, click on the Details tab of the article online.
- 17 Gabrysich S, Civitelli G, Edmond KM, Mathai M, Ali M, Bhutta ZA, et al. New signal functions to measure the ability of health facilities to provide routine and emergency newborn care. *PLoS Med*. 2012;9(11):e1001340.
- 18 Cohen J, Lofgren K, McConnell M. Precommitment, cash transfers, and timely arrival for birth: evidence from a randomized controlled trial in Nairobi Kenya. *Am Econ Rev*. 2017;107(5):501–5.
- 19 Ezech A, Oyebode O, Satterthwaite D, Chen YF, Ndugwa R, Sartori J, et al. The history, geography, and sociology of slums and the health problems of people who live in slums. *Lancet*. 2017;389(10068):547–58.
- 20 Miller S, Lalonde A. The global epidemic of abuse and disrespect during childbirth: history, evidence, interventions, and FIGO's mother-baby friendly birthing facilities initiative. *Int J Gynaecol Obstet*. 2015;131(Suppl 1):S49–52.
- 21 Dupas P, Robinson J. Why don't the poor save more? Evidence from health experiments. *Am Econ Rev*. 2013;103(4):1138–71.
- 22 Suri T, Jack W. The long-run poverty and gender impacts of mobile money. *Science*. 2016;354(6317):1288–92.
- 23 GSMA. Landscape report: mobile money, humanitarian cash transfers and displaced populations [Internet]. London: GSMA; 2017 May [cited 2017 Sep 21]. Available from: https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2017/05/Mobile_Money_Humanitarian_Cash_Transfers.pdf