

Bypassing primary care facilities for childbirth: a population-based study in rural Tanzania

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Accepted 6 January 2009

In an effort to reduce maternal mortality, developing countries have been investing in village-level primary care facilities to bring skilled delivery services closer to women. We explored the extent to which women in rural western Tanzania bypass their nearest primary care facilities to deliver at more distant health facilities, using a population-representative survey of households ($N=1204$). Using a standardized instrument, we asked women who had a delivery within 5 years about the place of their most recent delivery. Information on all functioning health facilities in the area were obtained from the district health office. Women who delivered in a health facility that was not the nearest available facility were considered bypassers. Forty-four per cent (186/423) of women who delivered in a health facility bypassed their nearest facility. In adjusted analysis, women who bypassed were more likely than women who did not bypass to be 35 or older (OR 2.5, $P \leq 0.01$), to have one or no living children (OR 2.2, $P = 0.03$), to have stayed in a maternity waiting home prior to delivery (OR 4.3, $P \leq 0.01$), to choose a facility on the basis of quality or experience (OR 2.1, $P \leq 0.01$), to have a high level of trust in health workers at the delivery facility (OR 2.7, $P \leq 0.01$), and to perceive the nearest facility to be of low quality (OR 3.1, $P \leq 0.01$). Bypassing for facility delivery is frequent among women in rural Tanzania. In addition to obstetric risk factors, a major reason for this appears to be a concern about the quality of care at government dispensaries and health centres. Investing in improved quality of care in primary care facilities may reduce bypassing and improve the efficiency and effectiveness of the health system in providing coverage for facility delivery in rural Africa.

Keywords Maternal health services, facility delivery, quality of care, developing countries

KEY MESSAGES

- Research has found that a high proportion of people bypass their nearest primary care facilities to seek care in higher level government facilities or private facilities. Bypassing is costly and inefficient for the individuals and the health system.
- More than 40% of women who chose to deliver in health facilities in a poor, rural district of Tanzania bypassed their nearest health facility, choosing to deliver at the government hospital or mission facilities.
- Perceived poor quality of care at nearby primary care facilities, as well as older age, fewer children, and staying at a maternity waiting home, were significantly associated with bypassing.

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Introduction

Every year approximately 529 000 women die in pregnancy or around the time of childbirth, with the majority of deaths taking place in sub-Saharan Africa (Blum *et al.* 2006). Most of these deaths can be attributed to low rates of skilled birth attendance and inadequate use of emergency obstetric care (Ronsmans and Graham 2006). There is consensus in both the peer-reviewed literature and in the global public health practice

community that most women should deliver in well-equipped and staffed clinics with capacity for basic emergency obstetric care (e.g. active management of third stage, oxytocic drugs to prevent haemorrhage, vacuum extraction) (WHO 2005; Koblinsky *et al.* 2006).

Many developing countries have designated village-level primary care facilities—variously called dispensaries, maternities or health centres—as the main point of care for uncomplicated delivery (Barnum and Kutzin 1993; Sanders *et al.* 1998; Campbell *et al.* 2006). These are often run by non-physician clinicians, such as clinical officers or nurse midwives who are trained to attend deliveries and to refer women with complications to hospitals (Mullan and Frehywot 2007). This pyramidal structure of health care delivery, with many primary-care facilities close to communities and district hospitals designated as referral centres, is seen as an efficient way to expand service coverage in resource-constrained countries with few hospitals and doctor shortages (Koblinsky *et al.* 2006).

However, research on health care utilization for common illness and preventive care in developing countries suggests that patients frequently bypass first-level facilities in favour of higher-level health centres and hospitals—this despite substantial additional time and financial costs. For example, three population-based studies found that half or more of survey respondents bypassed the nearest (usually lowest level) facility: for antenatal care, immunization and child illness in Kenya (Audo *et al.* 2005), and for outpatient care of episodic common illnesses in Sri Lanka (Akin and Hutchinson 1999) and Namibia (Low *et al.* 2001). Bypassing is seen as a powerful expression of people's preference for health care, and high rates of bypassing have important implications for health system efficiency and actual (versus planned) coverage of health services (Leonard *et al.* 2002). The extent of bypassing for facility delivery in the developing world—which is fundamentally different from preventive and curative care—is not known.

Tanzania is a low-income country in sub-Saharan Africa with a population of 34 million. The most recent estimate of the maternal mortality ratio (MMR) is 950 per 100 000 live births—in line with other countries in sub-Saharan Africa and over 100 times higher than in developed countries (WHO *et al.* 2007). One of the poorest countries in the world, Tanzania spends only US\$7.27 per capita on health (National Bureau of Statistics, Tanzania and Macro International Inc. 2007). In rural Tanzania, village-level dispensaries are designated as the main point of preventive and curative care, including uncomplicated delivery. Dispensaries are typically staffed by one primary care provider—a nurse, clinical officer and/or maternal and child health (MCH) aide—although posts are frequently unfilled and absenteeism is common due to a severe human resource shortage (Kurowski *et al.* 2007). Health centres, the next level of care, are equipped to provide more complex treatment, including inpatient care. Surgery and referral-level care are provided by district and regional hospitals. The private sector—mainly faith-based organizations or missions—provides approximately one-third of all health services in Tanzania (National Bureau of Statistics, Tanzania and Macro International Inc. 2007).

Despite the low levels of health spending, the government of Tanzania, together with local churches, has established

an extensive network of health facilities, with a strong focus on dispensaries. In 2006, there were 4679 dispensaries in the country (government and private) versus 481 health centres and 193 district-level hospitals (National Bureau of Statistics, Tanzania and Macro International Inc. 2007). As a result, an estimated 90% of the population lives within 10km of a health facility—in rural areas, usually a dispensary (National Bureau of Statistics, Tanzania and Macro International 1997). However, there are concerns about the quality of care available in dispensaries and health centres. A recent study in Tanzania found that only 13% of dispensaries provided services 24-hours a day with at least one provider, and that important obstetric equipment was frequently missing (National Bureau of Statistics, Tanzania and Macro International Inc. 2007). Providers in rural areas have also been found to be less skilled than those in urban areas (Leonard and Masatu 2007). It is unclear how women's decisions about facility delivery are influenced by the trade-off between relatively good geographic access and potentially poorer quality of primary care facilities, and how this in turn affects utilization of nearby dispensaries and health centres for childbirth.

The aim of this population-based study was to explore the extent to which women in rural western Tanzania report bypassing the nearest government dispensaries and health centres to deliver at the district hospital or mission facilities. We also sought to identify respondent characteristics associated with the decision to bypass.

Methods

Study area and sampling

Tanzania's Kasulu District is situated within Kigoma Region along the country's western border and has a population of 630 000. The district is primarily rural with one main town, Kasulu (population 33 000), which houses the government district hospital (National Bureau of Statistics 2008). Most of the population belongs to the Muha tribe. Most people in the district are subsistence farmers. Villages within the district are connected by unpaved roads, ranging in quality from dirt paths (tertiary roads) to a relatively smooth, wide road from the regional capital, Kigoma, to Kasulu town (primary road). Many of the roads are impassable during the rainy season between March and May.

As in other rural Tanzanian districts, the majority of health facilities in Kasulu are dispensaries. There are 48 functioning government dispensaries equipped to attend obstetric deliveries. The district has six government health centres, and the Kasulu district hospital, which offers obstetric surgery, is the government referral centre for delivery complications. There are also nine functioning mission dispensaries, two mission health centres and two mission hospitals. In addition, district residents occasionally use two health centres located in refugee camps along the Tanzania-Rwanda border. The survey team obtained the name, location and ownership (government, mission or refugee) of all functioning health facilities from the Kasulu District Health Office.

We selected a three-stage population-representative cluster sample of households from Kasulu District, omitting Kasulu town. Fifty villages were chosen in the first stage, with

probability proportional to size, based on the 2002 Tanzania census. One subvillage (approximately 100 households) within each village was then randomly selected, and the leader of that subvillage provided a list of households from which 35 households were selected using random systematic sampling. Inclusion criteria limited participants to women over the age of 18 with a delivery within the previous 5 years. The National Institute for Medical Research in Tanzania and the Institutional Review Board at the University of Michigan provided ethics clearance. Informed consent via signature or thumbprint was obtained from all respondents.

Questionnaire content and fielding

Questionnaires and consent documents were developed in English then translated into Swahili and back translated. Questionnaire content was based on the available literature related to access to and barriers to maternal health care utilization in Africa, and focus groups with Tanzanian health providers. The questionnaires were pretested with rural women living in an adjacent district. Questionnaires included information related to household composition, characteristics and assets (indicators of socio-economic status/wealth), childbirth history, knowledge and perception of the local health care system, and barriers to health care utilization. Information was collected on the women's perception of the quality of care at their nearest dispensary, health centre and hospital using a Likert scale ranging from 'excellent' to 'poor'. A similar Likert scale was used to assess women's trust in health workers at their delivery facility. Lastly, a detailed, to-scale district map was used to determine road distances between sample villages and all health facilities.

The questionnaire was administered in June and July 2007. Face-to-face interviews were conducted by two teams of trained interviewers fluent in Kiswahili and English. Each team also had at least one interviewer fluent in Kiha. Interviews lasted approximately 30 minutes. The quality of the interviewers' work was monitored by a supervisor who observed two or more interviews per day.

Statistical analysis

Bypassers were defined as women who delivered their most recent child at a health facility other than the nearest facility to their village of residence. The nearest health facility was identified based on the shortest distance from the respondent's village along recognized roads. Non-bypassers were defined as women who delivered their most recent child at the health facility nearest to their village of residence.

A relative index of wealth was constructed based on the method developed by Filmer and Pritchett using reported ownership of household assets (Filmer and Pritchett 2001). We used principal components analysis (PCA) to define weights for ownership of specific assets. Women were then categorized into five wealth quintiles from poorest (quintile 1) to least poor (quintile 5). Four dichotomous 'reasons for choosing delivery facility' variables were created from responses to a question in which women were asked to supply all reasons for choosing their delivery facility from a list. This same 'reasons for choosing delivery facility' variable was used to identify women who were referred to the facility they ultimately

delivered in. In addition, each woman rated her own health on the day of the survey. The cost of each woman's most recent delivery was calculated by asking about specific costs for doctor's fees, drugs, medical tests, transport, maternity waiting home services, and other (specified) costs, and summing these for a total.

We calculated univariate statistics for demographic variables, health and health system perception variables. We performed bivariate logistic regression between bypasser status and a large range of potential determinants of bypassing: age, education, wealth, distance to Kasulu town, previous facility delivery, stay at maternity waiting home, number of antenatal care visits, perceived quality of care at nearest facility, trust in health workers at delivery facility, and perceived importance of facility delivery. We then performed multivariable logistic regression to estimate adjusted associations between potential determinants and bypasser status. The variables selected for the multivariable model were either significant in the bivariate analysis or shown to be significant in previously published studies. We did not include referral by provider in the multivariable model because of collinearity with risk factors, such as advanced age. In addition, we explored differences between bypassers and non-bypassers in various characteristics of their deliveries, such as distance to delivery facility and cost of delivery.

Results

Of the 1322 eligible respondents recruited for the study, 1205 (91.1%) women completed questionnaires. Of the 117 non-responses, 112 were due to failure to find the respondent at home despite repeated attempts and 5 were refusals to participate. One woman did not provide information on her location of delivery and as a result was excluded from the analysis. Table 1 provides summary statistics for the women surveyed. Seventy-one per cent of the women were between the ages of 18 and 35. Although 60.3% had completed primary school (the equivalent of 7 years of education), only 0.2% had any secondary education. The vast majority of respondents were farmers or fisherwomen (98.5%), Christian (91.1%) and of Muha ethnicity (98.3%). Most (74.5%) lived on a secondary or tertiary road, and 76.1% lived in a village with a functioning health facility. While 99.3% of the women made at least one antenatal care visit for their most recent pregnancy, only 36.4% delivered their most recent child in a health facility. It is worth noting that 59.8% of women who lived in a village with a functioning health facility delivered their most recent child at home. Furthermore, 449 (61.4%) of the 731 women delivering in the home had a government dispensary or health centre in their village (data available from authors).

Figure 1 is a flowchart illustrating how women were distributed according to delivery location. Of the 441 women who delivered their most recent child in a health facility, 237 (53.7%) delivered at their nearest health facility (non-bypassers) while 186 (42.2%) bypassed their nearest health facility. A further 18 women (4.1%) could not be classified: 3 did not give specific information about the facility of delivery and 15 were transferred from one facility to another during labour due to complications, with no information about the first facility. The final sample for analysis was 423 women.

Table 1 Socio-demographic and health care utilization characteristics of a population-based sample of women from Kasulu District, western Tanzania, 2007 ($N=1204$)^a

Characteristics	<i>n</i>	(%)
Demographics		
Age		
<25	288	(23.9)
25–34	567	(47.1)
≥35	343	(28.5)
Education		
No schooling	331	(27.5)
Some primary	146	(12.1)
Completed primary	724	(60.1)
Some secondary or more	3	(0.2)
Occupation farmer or fisher	1186	(98.5)
Currently married	1153	(95.8)
Ethnicity Muha	1184	(98.3)
Religion		
Christian	1097	(91.1)
Muslim	89	(7.4)
Number of living children		
0–1	155	(12.9)
2–4	539	(44.8)
≥5	501	(41.6)
Quality of road in village		
Primary	307	(25.5)
Secondary or tertiary	897	(74.5)
Household assets		
Electricity	7	(0.6)
More than 2 meals per day	134	(11.1)
At least 1 mosquito net	824	(68.4)
Health care		
Distance to nearest health facility		
In village	916	(76.1)
0.1–4.9 km	78	(6.5)
≥5 km	210	(17.4)
Antenatal care visits		
0	8	(0.7)
1–2	197	(16.4)
≥3	998	(82.9)
Location of delivery		
Home ^b	731	(60.7)
Government dispensary	100	(8.3)
Government health centre	61	(5.1)
Government hospital	72	(6.0)
Mission health facility ^c	205	(17.0)
On the way to a health facility	32	(2.7)
Total births in a facility		
0	439	(36.5)
≥1	758	(63.0)

^aTotals may not add up to 1204 due to missing values.

^bOf the 731 women, 717 gave birth in their own home, 11 in another's home, and 3 in a field.

^cOf the 205 women, 86 gave birth in a mission dispensary, 71 in a mission health centre, and 48 in a mission hospital.

Only nine bypassers (4.8%) delivered in a government dispensary or health centre, with the remainder delivering at the government hospital or in mission facilities.

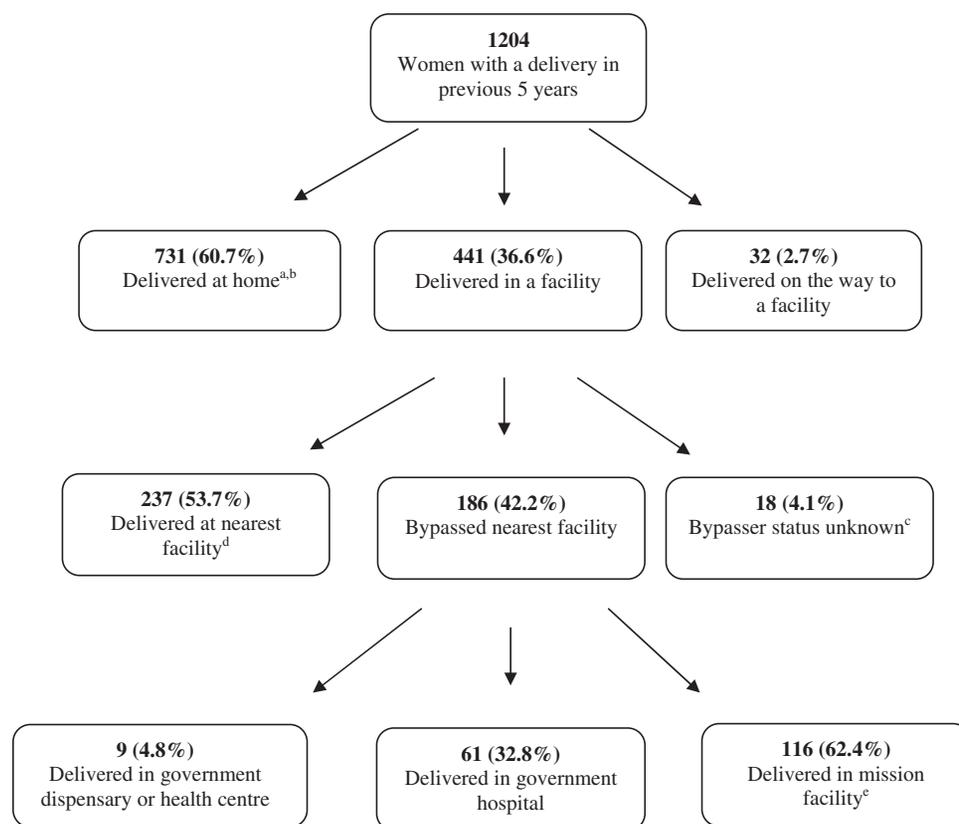
Table 2 shows bivariate associations between potential determinants of bypassing and bypasser status. Women who bypassed their nearest health facility for delivery were not significantly different from women who delivered at their nearest facility in terms of age, socio-economic status, education, number of antenatal care visits, and distance from Kasulu town. We found significant associations between bypassing and number of living children (0–1: OR 2.1, $P=0.04$, compared with 2–4 children), moderate, bad or very bad self-reported health (OR 1.9, $P=0.03$), stay at a maternity waiting home (OR 3.4, $P\leq 0.01$), reason for choosing delivery facility (closest to home: OR 0.03, $P\leq 0.01$; presence of the best providers in the area: OR 2.5, $P\leq 0.01$), perceived quality of care at their nearest facility (OR 1.6, $P=0.05$), and trust in the workers at the facility they ended up delivering at (OR = 1.6, $P=0.04$). Table 2 also permits the calculation of the rate of bypassing of government facilities: among the 303 women for whom the nearest facility was a government primary care facility (dispensary or health centre), 151 (49.8%) bypassed it.

Table 3 summarizes differences in characteristics of the delivery between bypassers and non-bypassers. There were significant associations with bypasser status and the following: delivery facility (government hospital: OR 1788.2, $P\leq 0.01$; mission dispensary: OR = 21.8, $P\leq 0.01$; mission health centre: OR 15.2, $P\leq 0.01$; mission hospital: OR 35.8, $P\leq 0.01$), transportation to the delivery facility (bicycle: OR 3.0, $P\leq 0.01$; car: OR 36.6, $P\leq 0.01$; public transport: OR 155.1, $P\leq 0.01$, compared with walking), time of travel (OR 6.7, $P\leq 0.01$), distance travelled (OR 2.3, $P\leq 0.01$), having been referred by a provider (OR 52.8, $P\leq 0.01$), and preference for future delivery in a hospital (OR 6.0, $P\leq 0.01$). While referral from a health provider was strongly associated with bypassing, only 18.3% of bypassers reported being referred.

Table 4 shows the results of the multivariable analysis. In terms of pregnancy risk factors, bypassers were more likely to be over the age of 35 (OR 2.5, $P\leq 0.01$), to have one or fewer children (OR 2.2, $P=0.03$), and to have stayed in a maternity waiting home (OR 4.3, $P\leq 0.01$), while they were less likely to have five or more living children (OR 0.5, $P=0.04$). Other significant predictors of bypasser status include: a reason for choosing delivery facility related to best providers, drug availability, recommendation by a relative/friend, or a good previous experience (OR 2.1, $P\leq 0.01$), perceived less than very good quality of care at the nearest facility (OR 3.1, $P\leq 0.01$), and high trust in health workers at the delivery facility (OR 2.7, $P\leq 0.01$). Women's perception of the importance of facility delivery was not significant in predicting bypassing.

Discussion

We found that more than 4 in 10 women in a rural district of Tanzania who delivered in a health facility bypassed their nearest facility to deliver their baby elsewhere. The frequency of bypassing rose to nearly 50% when the nearest facility was a government primary care facility—dispensary or health centre. Sixty-two per cent of bypassers selected mission facilities and



^a Three women included in this group delivered in a field near their homes.

^b 422 had a dispensary in their village, 81 had a health centre in their village, 15 had a hospital in their village, and 213 had no health facility in their village.

^c Three women did not provide information about the type of the facility where they delivered; 15 women were transferred during labour to higher-level facilities due to complications.

^d 152 women delivered at government health centre or dispensary, 0 at government hospital; 71 women delivered at mission dispensary or health centre, 14 at mission hospital.

^e 84 women delivered at a mission dispensary or health centre and 32 at a mission hospital.

Figure 1 Place of delivery and extent of bypassing of government dispensaries in a population-based sample of women from Kasulu District, Western Tanzania, 2007

33% selected the government district hospital, with only 5% choosing to deliver at a government dispensary or health centre, despite the fact that government dispensaries and health centres comprise 77% of all the health facilities in the district.

Women who chose to bypass faced substantial obstacles. The women in the sample as a whole were comparatively poor; virtually none had electricity and only 11% reported having more than two meals per day. Women who bypassed travelled an average of 20 km farther (40 km roundtrip) and were 36 times more likely to have to use a car to get to a health facility than women who did not bypass. The high use of mission facilities also meant substantial additional costs given that mission facilities charge for delivery whereas delivery care in government facilities is exempt from official user fees, although under-the-table payments are sometimes charged (Mamdani and Bangser 2004). The total costs of delivery (including medical and transport costs) were substantially higher among bypassers than non-bypassers (mean of 8500 TZS versus 3200

TZS). Lastly, bypassing for delivery is logistically complex as women must either travel while in labour or plan in advance to relocate to a distant village or town to await labour (e.g. in the maternity waiting home or at the home of relatives). Bypassers also incur a substantial opportunity cost due to longer time away from their other children and farming work. In light of these difficulties, the high frequency of bypassing documented here is remarkable.

These findings are consistent with some of the available research on bypassing in the developing world. For example, Audo *et al.* (2005) reported that between 46.3% and 59.5% of mothers interviewed in a rural district in Kenya bypassed the lowest level municipal (government) facility in favour of district or provincial hospitals when seeking antenatal care, child immunization or other child health services. Akin and colleagues also found very high levels of bypassing in a mixed urban and rural district of Sri Lanka in 1992, where 66.5% of survey respondents with a minor or major illness in

Table 2 Bivariate associations between respondent and nearest health facility characteristics and bypasser status for a population-based sample of women from Kasulu District, Western Tanzania, 2007^a

	Non-bypassers		Bypassers		OR	P-value
	(n = 237)	(%)	(n = 186)	(%)		
Risk factors						
Age						
<35	174	(73.4)	137	(73.7)	ref	
≥35	63	(26.6)	49	(26.3)	1.0	0.96
Number of living children						
0–1	36	(15.2)	51	(27.4)	2.1	0.04
2–4	106	(44.7)	73	(39.2)	ref	
≥5	94	(39.7)	59	(31.7)	0.9	0.79
Self-reported health						
Very good or good	205	(86.5)	146	(78.5)	ref	
Moderate, bad or very bad	30	(12.7)	40	(21.5)	1.9	0.03
Number of antenatal care visits						
<4	106	(44.7)	93	(50)	ref	
≥4	131	(55.3)	93	(50)	0.81	0.38
Stayed at a maternity waiting home						
No	123	(51.9)	45	(24.2)	ref	
Yes	113	(47.7)	141	(75.8)	3.4	≤0.01
Total births in a facility						
1–2	130	(54.9)	122	(65.6)	ref	
≥3	106	(44.7)	61	(32.8)	0.6	0.06
Demographic factors						
Wealth ^b						
1 st quintile	44	(18.6)	35	(18.8)	ref	
5 th quintile	47	(19.8)	35	(18.8)	0.9	0.84
Education						
No schooling	61	(25.7)	45	(24.2)	ref	
Some schooling	176	(74.3)	141	(75.8)	1.1	0.71
Distance from Kasulu town ^c , mean (SD)	3.8	(1.6)	3.6	(1.9)	0.9	0.60
Nearest facility ^d						
Government dispensary	94	(39.7)	97	(52.2)	ref	
Government health centre	58	(24.5)	54	(29.0)	0.9	0.83
Mission	85	(35.9)	35	(18.8)	0.4	0.16
Perception factors						
Reasons for choosing delivery facility ^e						
Closest to home	211	(89.0)	32	(17.2)	0.03	≤0.01
Best doctors, nurses, other staff in the area	49	(20.7)	74	(39.8)	2.5	≤0.01
Has drugs	20	(8.4)	28	(15.1)	1.9	0.07
Recommended by relative/friend or good previous experience	50	(21.1)	54	(29.0)	1.5	0.13
Perceived quality of care at nearest facility						
Excellent or very good	138	(58.2)	88	(47.3)	ref	
Good, fair or poor	91	(38.4)	91	(48.9)	1.6	0.05
Trust in health workers at delivery facility						
Low	95	(40.1)	54	(29.0)	ref	
High	140	(59.1)	129	(69.4)	1.6	0.04
Stated importance of delivering in a facility						
Less than very important	48	(20.3)	26	(14.0)	ref	
Very important	189	(79.7)	160	(86.0)	1.6	0.12

^aData are n (%) unless otherwise specified.^b1st quintile corresponds to 'poorest' and 5th quintile corresponds to 'least poor'.^cMeasured in 10 km.^dThere were no individuals for whom the nearest facility was a government hospital.^eResults based on a question allowing multiple responses. Each reason given analysed independently as a dichotomous variable.

Table 3 Bivariate associations between characteristics of the delivery and bypasser status for a population-based sample of women from Kasulu District, Western Tanzania, 2007^a

	Non-bypassers		Bypassers		OR	P-value
	(n=237)	(%)	(n=186)	(%)		
Delivery facility						
Government dispensary	94	(39.7)	6	(3.2)	ref	
Government health centre	58	(24.5)	3	(1.6)	0.8	0.84
Government hospital	0 ^{b,c}	(0.0)	61	(32.8)	1788.2	≤0.01
Mission dispensary	36	(15.2)	50	(26.9)	21.8	≤0.01
Mission health centre	35	(14.8)	34	(18.3)	15.2	≤0.01
Mission hospital	14	(5.9)	32	(17.2)	35.8	≤0.01
Travel to delivery facility						
Mode of transportation						
Walking	143	(60.3)	43	(23.1)	ref	
Bicycle	88	(37.1)	80	(43.0)	3.0	≤0.01
Car (personal or borrowed)	3	(1.3)	33	(17.7)	36.6	≤0.01
Public transportation	0 ^{b,c}	(0.0)	23	(12.4)	155.1	≤0.01
Time of travel, ^d mean (SD)	0.7	(1.1)	2.1	(2.3)	6.7	≤0.01
Distance and cost						
Distance to delivery facility, ^e mean (SD)	0.5	(4.8)	20.9	(28.3)	2.3	≤0.01
Cost of delivery, ^f mean (SD)	3.2	(12.9)	8.5	(14.4)	1.1	0.12
Referred to facility by provider						
No	236	(99.6)	152	(81.7)	ref	
Yes	1	(0.4)	34	(18.3)	52.8	≤0.01
Satisfaction after delivery						
Less than very satisfied	87	(36.7)	56	(30.1)	ref	
Very satisfied	149	(62.9)	130	(69.9)	1.4	0.19
Preference for location of future delivery						
Dispensary	92	(38.8)	43	(23.1)	ref	
Health centre	113	(47.7)	57	(30.6)	1.1	0.86
Hospital	23	(9.7)	64	(34.4)	6.0	≤0.01

^aData are n (%) unless otherwise specified.^b0.5 added to cells in calculation of β .^cYates continuity correction in calculation of P value.^dMeasured in hours.^eMeasured in km.^fMeasured in 1000 TZS.

the past month reported bypassing their nearest health facility. In particular, primary care facilities that were the planned entry point into the health care system were bypassed more often than chosen (Akin and Hutchinson 1999). On the other hand, in a 1994 study in a rural district of Tanzania, Leonard *et al.* (2002) found that approximately 12.6% of facility visits for common medical conditions (adult and child) represented bypassing of a closer facility. This figure is lower than ours, possibly due to higher density of health facilities in the district Leonard and colleagues studied, and thus greater availability of preferred facilities nearby—as suggested by the authors' finding that the average patient travelled only 2.8km farther (one-way) to bypass (Leonard *et al.* 2002) This study was conducted 13 years ago and it is possible that the higher prevalence of bypassing observed in our study reflects an increase in bypassing behaviour in Tanzania. This can only be confirmed by longitudinal research.

Factors associated with higher obstetric risk, such as age over 35, having no previous living children, and having stayed at a maternity waiting home, were associated with bypassing. However, risk factors do not tell the whole story. First, only 18% of all bypassers reported being referred to the higher-level facility by a provider. Second, even controlling for obstetric risk, several other factors emerged as important predictors of bypassing. These were largely related to quality of care. For example, in multivariable analysis we found that stronger preference for quality (best provider, drugs, etc.), lower perceived quality of care at the nearest facility, and greater trust in health workers at the facility selected for delivery were all associated with higher odds of bypassing. Living near a mission facility, which have been shown by other researchers to provide better equipment and have more trained providers, reduced the odds of bypassing (Leonard and Masatu 2007). These findings suggest that perceived quality of both technical

Table 4 Multivariable associations between participant and nearest health facility characteristics and bypasser status for a population-based sample of women from Kasulu District, Western Tanzania, 2007 (*n* = 387)

	OR	P-value
Risk factors		
Age		
<35	ref	
≥35	2.5	≤0.01
Number of living children		
0–1	2.2	0.03
2–4	ref	
≥5	0.5	0.04
Self-reported health		
Very good or good	ref	
Moderate, bad or very bad	1.6	0.16
Number of antenatal care visits		
<4	ref	
≥4	0.8	0.39
Stayed at a maternity waiting home		
No	ref	
Yes	4.3	≤0.01
Demographic factors		
Wealth		
1 st quintile	ref	
5 th quintile	1.0	0.93
Education		
No schooling	ref	
Some schooling	1.0	0.91
Distance from Kasulu town	0.7	0.05
Nearest facility ^a		
Government dispensary	ref	
Government health centre	0.6	0.37
Mission facility	0.2	0.02
Perception factors		
Reason for choosing facility: best provider, drugs available, recommended by relative/friend, or good previous experience		
No	ref	
Yes	2.1	≤0.01
Perceived quality of care at nearest facility		
Excellent or very good	ref	
Good, fair or poor	3.1	≤0.01
Trust in health workers at delivery facility		
Low	ref	
High	2.7	≤0.01
Stated importance of delivering in a facility		
Less than very important	ref	
Very important	1.4	0.24

^aThere were no individuals for whom the nearest facility was a government hospital.

(drugs, equipment) and non-technical (trust in health workers) aspects of health care have a major influence on women's choice of delivery facility.

Although we did not collect data on the quality of care at the health facilities in the study district, other researchers have documented quality concerns at government dispensaries and health centres in Tanzania, particularly in rural areas. For example, a 2006 national facility survey found that only 7% of dispensaries had all basic delivery room infrastructure (bed, examination light, visual and auditory privacy). Private (including mission) facilities (of all levels) scored much better than government facilities on this indicator, with 34% having all of the inputs versus 6% of government facilities. Only 35% of dispensaries (government and private) had any emergency transportation—a barrier to referral for emergencies that may motivate some women to bypass (National Bureau of Statistics, Tanzania and Macro International Inc. 2007).

In addition, as noted earlier, few dispensaries operate 24 hours per day (despite the expectation that the provider can be called at any hour in case of emergency). The lack of 24-hour services at government dispensaries may have also contributed to bypassing in our study. However, the impact of this on the decision to bypass was likely limited as women labouring at night would have a very difficult time finding transport to allow them to travel to a more remote facility, and thus would be more likely to deliver at home than bypass.

In a recent study of the quality of care at government and non-governmental (primarily mission) facilities in Tanzania, Leonard and Masatu (2007) found worse practice quality (e.g. accuracy of diagnosis and appropriateness of management) among clinicians in rural government facilities than in urban or peri-urban government facilities, whereas rural clinicians at non-governmental facilities performed as well as their urban counterparts. Qualitative work has also found that poor quality of care—both technical (e.g. equipment, drugs) and non-technical (e.g. provider attitude)—at primary care facilities is commonly reported by Tanzanian women (Gilson *et al.* 1994; Mamdani and Bangser 2004).

Other researchers have also found that bypassing is tied to perceived and objectively observed quality of care at the bypassed and chosen facility. For example, Akin and Hutchinson (1999) reported that in Sri Lanka, facilities with fewer doctors and drugs and in poor structural condition were more likely to be bypassed, controlling for individual characteristics. Similar results were reported in Namibia, where it was found that patients who bypassed were motivated by issues of quality (better facilities and staff), as well as access (facility proximity and hours of operation) (Low *et al.* 2001). Leonard found that patients tended to bypass facilities that overused injections and overprescribed drugs, and those that had poor consultation practices, as measured by trained observers. This suggests that bypassers have an accurate perception of several important dimensions of care quality. The most frequent reasons for bypassing municipal facilities given by women in Kenya were: poor care (37% of respondents), lack of drugs (30.4%), and lack of laboratory services (21.2%) (Audo *et al.* 2005).

We did not find any association between wealth and education and bypassing. Although this may seem surprising

given the cost and effort involved in travelling to a farther facility, Akin and Hutchinson (1999) also reported no differences in bypassing the nearest government primary care facilities between poorest and least poor groups in Sri Lanka. Audo *et al.* (2005) found that more educated women tended to bypass municipal facilities in greater numbers than less educated women, but this may have been confounded by distance as more educated women lived closer to town and thus closer to the preferred urban hospitals. Our study population was also relatively homogeneous in terms of asset ownership and demographic characteristics (ethnicity, occupation, etc.), which may in part explain the lack of association between wealth and bypassing.

Women living further from Kasulu Town—the site of the government District Hospital—were somewhat less likely to bypass. Women with five or more living children were less likely to bypass, perhaps indicating a lower perception of risk (despite higher actual risk) and greater comfort with delivering in a primary care facility. There were no differences in the perception of health benefits of facility delivery between bypassers and non-bypassers.

Our study has several limitations. We do not have data on observed or objective quality of care in the government and mission facilities in the study district. Future research combining a population-based with a facility-level survey would be valuable to compare perception of quality with actual quality. However, studies confirm poor quality is problematic in rural health facilities in Tanzania and that patients are generally well aware of quality deficiencies (Leonard *et al.* 2002; Leonard and Masatu 2007). In addition, other researchers point out that women's perceptions of quality—the focus of this study—are an important determinant of their behaviour, separate and apart from observed quality (Mrisho *et al.* 2007).

As with other work on bypassing, our analysis was focused on women who used the health system rather than the larger group who did not. However, data from women who delivered in the home support the notion that primary care facilities are not serving this population effectively: 61% of women who delivered at home had a dispensary or health centre in their village. It is likely that at least some of them weighed the quality of care at the dispensary and chose instead to deliver with a traditional birth attendant or relative.

Our findings have several important policy implications. First, the high rates of bypassing in a resource-poor country such as Tanzania are concerning as bypassing shifts health care expenditure away from direct health care costs and into indirect costs such as transport. Bypassing among the poor imposes a particularly large financial burden on the most vulnerable families putting them at risk of deepening poverty. Second, the high rate of bypassing of government dispensaries and health centres combined with high rates of home deliveries in villages with these facilities suggests that the current primary care facilities are not meeting the needs of rural women.

In essence, we document here that in rural western Tanzania broad availability of primary health care facilities does not translate into utilization of these facilities for childbirth. This highlights the challenge facing Tanzania and other countries with high maternal mortality in scaling up facility deliveries to meet the maternal health Millennium Development Goal.

This work, together with a growing body of research on patient preferences for health care, suggests that quality is a crucial determinant of women's decision on place of delivery. Investing in improved quality of care in primary care facilities—from provider skills and attitudes to better drug supply—could reduce the financial and logistical burden of bypassing on families and improve overall health system efficiency, while expanding access to life-saving maternal health services.

Acknowledgements

This work was supported by the William Davidson Institute of the Ross School of Business at the University of Michigan and by the Averting Maternal Death and Disability Program (AMDD) of the Mailman School of Public Health at Columbia University. AMDD is funded by the Bill and Melinda Gates Foundation. The funders had no role in the study design, data collection, analysis, interpretation, writing of the paper or the decision to submit the article for publication.

MEK, GM, CWM and SG jointly designed of the study and coordinated the fieldwork. MEK and SG supervised data entry and analysis. PCR led the data analysis. MM assisted in study design and the interpretation of results. All co-authors made critical revisions of the manuscript. The authors declare they have no conflict of interest.

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