Traditional beliefs and learning about maternal risk in Zambia

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Maternal mortality remains high in many parts of the developing world; in sub-Saharan Africa, the average maternal mortality ratio is estimated to be 546 per 100,000 live births (Alkema et al., 2016). Preventive measures such as adequate birth spacing and pre- and post-natal health services can reduce maternal mortality risk, particularly among women known to be at high risk of birth complications. Nevertheless, reproductive health services remain scarcely utilized in many settings, even when the cost of services is low (UNICEF and World Health Organization, 2015).

While often presumed to be driven by individuals underestimating returns to reproductive health services, low take-up may also stem from systematic underestimation of maternal mortality and morbidity risk. Why would individuals in high mortality settings underestimate the risk of dying or experiencing health complications in childbirth? One possibility is that the large heterogeneity in individual risk of maternal mortality leads individuals to systematically underestimate personal risk when they have incorrect information on risk factors. In particular, the likelihood that a woman experiences birth complications varies widely across individuals, and is related to biological-demographic factors that include parity, maternal age, pre-existing

health conditions, and idiosyncratic physical characteristics such as skeletal mass and pelvic width (Say and Pattinson, 2011). While maternal deaths are observable, it may be harder for individuals to learn about specific risk factors associated with maternal mortality.

Moreover, traditional beliefs about sources of risk could further impede social learning about maternal health risk levels and correlates. In Zambia, as in many parts of Africa, marital infidelity by either spouse is seen as a primary cause of health complications during delivery (Nsemukila et al., 1999). In cases of obstructed or prolonged labor, women are expected to confess infidelity to avoid dying in labor. This superstition also discourages women from seeking medical help when complications arise because of the stigma such actions carry (Nsemukila et al., 1999).

The widespread belief that women die in childbirth because of infidelity impedes social learning in two ways. First, because infidelity is not well observed, its possibility confounds an individuals' ability to correctly attribute maternal deaths observed in the community to true underlying risk factors. As a result, individuals who believe that both medical risk factors and infidelity are possible causes of death, but are uncertain of their relative importance, will learn more slowly about risk factors and may indefinitely underestimate personal risk. Since most individuals simultaneously hold traditional and non-traditional beliefs about health risk, the degree of distortion depends on the strength of the traditional belief.

Second, traditional beliefs that blame the victim generate incentives to hide indicators of risk. Women fearing accusations of unfaithfulness will be unlikely to share experienced maternal morbidity with other women or even their spouses, which further

interferes with social learning.[1]

While the idea is compelling, we know almost nothing about the accuracy of perceptions of maternal mortality risk and beliefs about the underlying causes, least of all about the learning process through which incidents of maternal morbidity inform current beliefs. This paper examines novel data on perceptions of maternal mortality risk and seeks evidence that traditional beliefs inhibit learning about maternal risk. Our data were gathered from a setting with relatively high maternal risk and strong traditional beliefs about the role of infidelity. We first document patterns of risk perceptions by gender, and then investigate how beliefs about maternal mortality risk correlate with own experience with birth complications, and how superstitions about maternal mortality interfere with this learning process. In other words, do men and women update their beliefs about personal risk based on their past birth experiences, and does adherence to traditional beliefs about maternal risk slow this process?

I. Data

Our study sample comprises 2132 married individuals of child-bearing age residing in the catchment area of a health center located in the poor suburbs of Lusaka, Zambia, including 1244 women and 888 men.[2] The 2014 survey gathers novel data on beliefs about maternal mortality risk and risk factors, as well as fertility preferences and attitudes towards contraception.

We first look at gender differences in perceptions of maternal risk levels and risk factors. In interpreting these differences, it is important to keep in mind that, because we sampled couples, men and women in our sample differ along dimensions other than gender that are typical of mean spousal differences in this setting (see Table A1).[3]

[1]Note that men's beliefs about risk also contribute to demand for preventive care, and men are even less likely to receive accurate information on experiences.

[2]Inclusion criteria placed on the *wife* in each couple are: aged 18 to 40; no diabetes, heart diseases or high blood pressure; not sterile or undergone a hysterectomy; not given birth in past 8 weeks; not currently pregnant.

[3]Higher male attrition may also contribute to gender

[Insert Table 1 here]

To measure perceived risk, respondents were asked to use the ladder approach to rate their own or wife's likelihood of experiencing health complications if she were currently pregnant.[4] On average, women cited a significantly higher probability (43 percent) of experiencing complications relative to their husbands (35 percent). As shown in Appendix Table A1, lower perceived risk was also associated with other, potentially causal, differences in fertility preferences: Men exhibited significantly higher demand for children and lower desired birth spacing than women, and had more negative attitudes towards contraception.

Our survey also measured perceived risk factors associated with maternal mortality using the following two approaches. First, we elicited respondents' perceived likelihood of complications during childbirth for hypothetical women who varied in terms of biological risk factors, including adequate birth spacing (more than two years), parity (fewer than 4 children), and maternal age (under 40). As shown in Table 1, men and women both correctly associated lower probabilities of complications with all three factors. Women, however, associated higher risk variability with each factor. The perceived reduction in mean risk for women with adequate birth spacing relative to the population average was 46 percent among women versus 41 percent among men; for low parity it was 31 percent among women versus 18 percent among men; and for maternal age it was 16 percent among women versus 9 percent among men.

Our second approach to gauging perceived risk factors was to first ask respondents to name, without prompting, factors contributing to maternal health risk. For both genders, infidelity was the most cited factor, and a significantly higher share of men relative to women cited infidelity as a risk factor (56 percent versus 44 percent).[5]

differences, but patterns persist among households with both (Appendix Table A2).

[4]See Appendix Table A3 for exact wording on all questions discussed here.

[5]Other commonly cited factors were the woman's

Respondents were then asked to allocate a relative weight to three categories of maternal risk: underlying health conditions, use of health care services, and infidelity. We elicited this weight by having respondents allocate 30 buttons across the three categories. The distribution of infidelity weights is shown in Figure 1, which reveals wide variation in beliefs regarding the importance of infidelity across both men and women. On average, men assigned a significantly higher weight to infidelity relative to the two other categories of risk factors (33 percent compared with 30 percent), and a higher share of women (nearly 10 percent relative to 5 percent) assigned zero importance to infidelity.

Finally, respondents were asked to recall their own experiences with birth complications, as well as cases of complications that affected those around them. On average, 15 percent of individuals report experiencing childbirth complications at least once, and the rate is slightly higher for men, consistent with their higher reported fertility. Given the broad definition of "complication" and limited available data on the incidence of maternal morbidity, it is impossible to assess the accuracy of these beliefs. However, it is worth noting that the rates of complications reported by men and women are comparable, which suggests that either men generally learn about their wives' birth experiences, or else that women underreport complications in survey data.

[Insert Figure 1 here]

The difference in reported observations of maternal complications compared with maternal deaths is striking. The fraction of respondents that report any incidence of maternal complications within the family (14 percent) is only slightly higher than the fraction that report any incidence of maternal death. Clearly these rates should be far more divergent given that the majority of delivery complications are not lethal. The pattern is consistent with limited information leakage on birth complications, which

is likely driven by the stigma from superstition about causes of maternal mortality, which certainly confounds individuals' ability to accurately assess morbidity risk from the experiences of family members.

Not surprisingly, the distance between friends' experience with birth complications and maternal mortality is even narrower, consistent with even greater barriers to information transmission across families. In fact, while respondents report knowing more friends than family members who died in childbirth (presumably because they have more friends to observe), they report knowing *fewer* friends who experienced complications in childbirth.

With respect to gender differences in knowledge of maternal health incidents, male and female reports are closer than one might anticipate given separate gender spheres that are likely to limit men's knowledge of reproductive health events. Although a slightly higher share of women reported knowing of incidents of complications among friends and family, the gender difference is only significant for maternal mortality episodes among friends.

II. Estimation

We now look at the relationship between individuals' assessment of current maternal mortality risk and past obstetric performance. The outcome in all Table 2 estimates is self-assessed likelihood of experiencing complications were a wife to give birth now, which is regressed on the binary indicator of having experienced birth complications.[6] Since estimates of personal risk should incorporate knowledge of idiosyncratic health status, we anticipate that risk is more salient for women who have had past birth complications, so hypothesize a positive correlation between perceived current personal risk and past complications. Because individual health conditions generate a high degree of serial correlation in birth outcomes, past birth complications are a strong predictor of maternal risk (Ford et al., 2007). The absence of an association

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overall health, age (too young and too old), failure to seek care, and failure to deliver at a health facility.

[6]Specifically, whether the respondent faced complications in at least one birth involving a biological child.

between birth history and current maternal health would indicate either a failure to update beliefs because the individual attributes the complications to her own indiscretions or a negligible amount of updating because the individual believes that underlying health risk has little influence on outcomes. In this manner, the strength of the correlation will depend on the importance assigned to infidelity relative to health factors.

This motivates us to look at the relationship between current risk assessment and personal beliefs about infidelity in a difference-in-difference specification. The specification in equation 1 interacts infidelity beliefs, inf_i, with the binary indicator of experienced birth complications, $comp_i$. "Infidelity beliefs" is a binary variable indicating whether a respondent spontaneously cited infidelity when asked to list factors that put women at risk for complications during childbirth. Although beliefs about causes of maternal mortality may in fact be endogenous to experiences with maternal mortality, this is less likely to be a concern with the binary indicator of believing that infidelity plays any role at all.

$$(1) \quad y_i = \alpha + \beta_0 \cdot comp_i +$$
$$\beta_1 \cdot (comp_i \cdot inf_i) + \beta_2 \cdot inf_i + \epsilon_i$$

With this regression, we test the hypothesis that current expected maternal risk is less influenced by actual information on risk when traditional beliefs are strong.

[insert Table 2 here]

As shown in columns (1) and (3) of Table 2, for both men and women past birth complications have a significantly positive correlation with perceived probability of complications. Individuals who experience a birth complication on average update their likelihood of experiencing complications again by 6 to 9 percentage points, or 18 to 20 percent. Moreover, in columns (2) and (4), the coefficient estimates on the interaction between past complications and infidelity beliefs ($\hat{\beta}_2$) suggest that only those men and women who do not believe infidelity to play a strong role in birth com-

plications exhibit a positive correlation between birth history and current risk assessment. Men and women with modern beliefs about maternal risk on average update their likelihood of reexperiencing complications by 12 to 13 percentage points, or 30 to 36 percent. Meanwhile, those with strong infidelity beliefs appear to disregard entirely past birth complications when assessing future risk.[7] This pattern is consistent with infidelity beliefs confounding the learning process from experienced complications.

The regression results are robust to the inclusion of covariates, including age, education, number offspring, household income, health status, religiosity, and knowledge of maternal health events.

III. Conclusion

In many contexts, lack of awareness of risk factors reduces health-promoting behaviors, and reproductive health is no exception. Moreover, in this domain, superstitious beliefs about risk factors for maternal death are widespread and appear to hinder learning about risk. Hence, while increasing access to maternal care has dramatically reduced maternal mortality in countries such as Sri Lanka and Malaysia, widespread underestimation of personal risk could limit the efficacy of similar policies in settings in which traditional beliefs are prevalent (Rogo, Oucho and Mwalali, 2006). Indeed, past research has found increased risk of maternal mortality among couples who adhere to traditional beliefs (Ujah et al., 2005). While some of this correlation may be spurious, it is possible that systematic differences in personal risk assessment underlie it, and that raising awareness of risk factors could dramatically increase the efficacy of information campaigns promoting reproductive health and family planning.

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[7]Note that past birth complications may simply be correlated with other signals of health risk potentially observable to a woman, but this does not significantly change the interpretation of patterns.

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Table 1—Baseline Characteristics

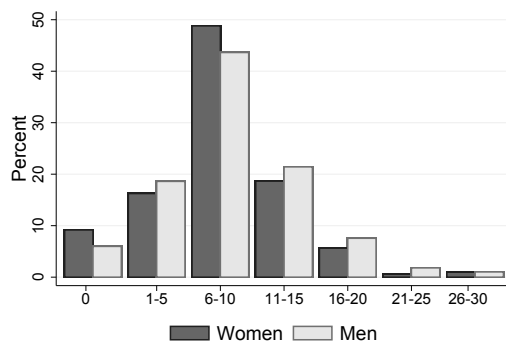|	Women	Men	S.E.
Perceptions of risk of birth complications			
Likelihood of complications	0.434	0.356	(0.015)***
Two years after delivery	0.236	0.211	(0.010)**
Less than four children	0.298	0.291	(0.010)
Younger than 40 years old	0.366	0.324	(0.011)***
Infidelity weight	0.304	0.330	(0.008)***
Infidelity belief	0.444	0.558	(0.022)***
Experience with birth complications			
Past birth complications	0.144	0.172	(0.016)*
Family member experienced complications	0.144	0.129	(0.015)
Family member died from complications	0.092	0.083	(0.012)
Friend experienced complications	0.132	0.126	(0.015)
Friend died from complications	0.197	0.102	(0.016)***
Observations	1241	886	

Figure 1. Buttons assigned to infidelity as a cause of maternal mortality, out of 30 buttons, as opposed to poor health or lack of antenatal care

TABLE 2—PERSONAL LIKELIHOOD OF COMPLICATIONS IF CURRENTLY PREGNANT

	Women		Men	
	(1)	(2)	(3)	(4)
Past birth complications	0.085***	0.124***	0.064**	0.127***
	(0.028)	(0.036)	(0.029)	(0.041)
Complications x infidelity belief		-0.106*		-0.127**
		(0.059)		(0.057)
Infidelity belief		0.052**		-0.004
		(0.022)		(0.024)
cons	0.423***	0.401***	0.346***	0.348***
	(0.011)	(0.015)	(0.012)	(0.018)
N	1236	1223	878	875

Notes: Linear probability models. *, **, *** indicate 10, 5, and 1 percent significance respectively.