A profile of women at the highest risk of maternal death in Pakistan

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Traditionally, health interventions implemented in Pakistan have been designed to increase the supply of maternal health services, but have not focused on reaching the poorest women or on providing high-quality services. Demand-side barriers to the utilization of health services are substantial in Pakistan, as are supply-side constraints to the provision of quality health care. This study uses data from the Pakistan Demographic and Health Survey 2006–07 to develop a profile of the poorest women in Pakistan in order to understand demand-side barriers to accessing maternal health care. The study shows stark differences in human capital, material and demographic resources between the poorest women and other women. It illustrates how these differences translate into low levels of service utilization among the poorest women. The purpose of the study is to stimulate a discussion of both the difficulty and the importance of reaching the poorest women with high-quality maternal health interventions. The findings from several pilot projects in Pakistan suggest that the poorest women can be reached at disproportionately higher rates than non-poor women through targeted, community-based, interventions. Evidence-based approaches, which have the potential to overcome financial and socio-cultural barriers to service utilization, should be scaled up as soon as possible. However, measures should be taken to ensure that the quality of care provided through these interventions is adequate and able to lead to significant reductions in mortality.

Keywords Health systems research, inequity, maternal death, Pakistan, poverty, service utilization

KEY MESSAGES

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- The poorest women can be reached at disproportionately higher rates than non-poor women through targeted, community-based, interventions.

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- Measures should be taken to ensure that the quality of care provided through health interventions is adequate and able to lead to significant reductions in mortality.
Background

Infant and maternal mortality levels in Pakistan have remained high and resistant to change (Agha 2000; Bhutta et al. 2004). Data from the Pakistan Demographic and Health Survey show that neonatal mortality increased from 51 deaths per 1000 live births in 1990–91 to 55 deaths per 1000 live births in 2012–13 (National Institute of Population Studies and ICF International 2013). In terms of reductions in the level of maternal and infant mortality, Pakistan's performance is poor when compared with that of its South Asian neighbours.

When compared with 1990 levels, several South Asian countries achieved dramatic improvements in maternal and child mortality by 2010 (WHO 2010). Maternal mortality declined dramatically in Nepal from 770 deaths per 100,000 live births in 1990 to 170 in 2010, enabling Nepal to reach its Millennium Development Goals (MDG) target 5 years ahead of schedule. Under-five mortality also fell dramatically in Nepal, from 141 deaths per 100,000 live births in 1990 to 50 in 2010, with the MDG target of 47 well within reach over the next 5 years. Similarly, Bangladesh experienced dramatic declines in maternal and child mortality between 1990 and 2010, meeting its child mortality target of 48 deaths per 1000 live births (down from 143 in 1990) 5 years ahead of schedule. Bangladesh is also well on its way to meeting its maternal mortality target by 2015: between 1990 and 2010, maternal mortality declined from 800 to 260. Conversely, Pakistan—which had lower levels of maternal and child mortality than both Nepal and Bangladesh in 1990—remains off-course in meeting MDG targets. At 87 deaths per 1000 live births in 2010, child mortality in Pakistan is far higher than the 2015 MDG target of 41. Although Pakistan's maternal mortality ratio fell to 260 deaths per 100,000 live births by 2010, rapid improvements in quality of service delivery will be needed for this ratio to fall closer to the MDG target of 120 (WHO 2010).

Frameworks for analysing the determinants of maternal mortality have organized determinants in terms of the availability of emergency obstetric care, socioeconomic factors, access to transportation and cultural perceptions and beliefs. McCarthy and Maine (1992) concluded that the determinants of maternal mortality must operate through three intermediate outcomes: pregnancy, serious complications of pregnancy or childbirth and the outcomes of complications—death or disability. Thaddeus and Maine (1994) narrowed the focus to factors that influence the interval between the onset of obstetric complications and their outcome: they looked closely at the delay in the decision to seek care, the delay in arrival at the health facility and the delay in the provision of adequate care. Thus, distance, cost and quality have been identified as critical determinants of maternal health outcomes. Studies in Pakistan have emphasized the importance of these factors to varying degrees.

Two Pakistani studies which examined the drivers of maternal mortality reached differing conclusions regarding the causes of maternal death in Pakistan. The first study, conducted in the rural areas of Khyber-Pakhtunkhwa and Balochistan, found that the staffing patterns at peripheral health facilities (i.e. the number of doctors available) and the accessibility of essential obstetric care (i.e. distance from the district to a facility with the full range of emergency obstetric care services) had a significant impact on maternal mortality (Midhet et al. 1998). The authors concluded that better staffing of peripheral health facilities and improved access to emergency obstetric care could reduce the risk of maternal mortality in Khyber-Paktunkhwa and Balochistan. The second study, which examined the causes of maternal death at a major teaching hospital in Karachi, found that most mothers who died during childbirth were not from distant areas; rather, most maternal deaths were of women who lived 6–8 km from the hospital, in a city where transportation is readily available (Jaffrey and Korejo 1993). Study findings indicated that approximately one-third of those maternal deaths were due to financial constraints; another third were the result of socio-cultural barriers (e.g. family reluctance to take woman to the hospital); and one-fifth were caused by inadequate maternal health services (e.g. delay at the maternity home in referring a mother or time lost in transferring the mother to a secondary care facility). Jaffrey and Korejo (1993) concluded that economic factors were fundamental in preventing women from obtaining both routine and emergency care, and that sociocultural barriers were substantial and likely to be very difficult to overcome.

A recent analysis uses case studies of maternal death in Pakistan to demonstrate how poverty and social exclusion combine to produce a lethal mix of barriers to accessing health services (Mumtaz et al. 2011). The study demonstrates that even when health services are available, poor and socially excluded women belonging to heavily indebted families are unable to utilize emergency health care. Mumtaz et al. (2011) concluded that although improving the physical availability and quality of services is necessary, these improvements are not likely to be sufficient to ensure that women at the highest risk of maternal death have access to maternal health services during emergencies. Mumtaz et al. (2011) argue that focused efforts to meet the needs of the most impoverished and geographically isolated women are necessary because an expansion of health services may not lead to an increase in access to services amongst the poorest women.

The explanations offered for the underlying determinants of maternal death in Pakistan by these aforementioned studies lead to differing approaches to preventing maternal deaths in the country. The Midhet et al. (1998) study supports: (i) an intervention approach with a greater emphasis on improving the quality of services available at peripheral facilities and (ii) the establishment of strong transport links with referral facilities. The Jaffrey and Korejo (1993) study highlights the importance of removing financial barriers that isolate poor women from seeking care from the formal health sector and a need for greater emphasis on educating women and their families on the risks of maternal death. The Mumtaz et al. (2011) study emphasizes the need to identify and ensure health service access to women from families living in conditions of extreme poverty and indebtedness, families that are at the lowest rung of the socio-economic status hierarchy in their village. In such contexts, patriarchal values predominate and the low perceived value of women contributes to inaction when emergency care is needed.

The quality of maternal health service delivery remains poor in Pakistan. A study in the Punjab found that the process of
care provision as per accepted World Health Organization determined standards is not observed even in tertiary care facilities and basic supplies such as iron and folate tablets, broad spectrum antibiotics, oxytocics, gloves and sutures are often not available at primary or secondary care facilities (Fikree et al. 2006). A recent assessment conducted in Sindh found that the minimum staff requirement, as proposed by the National Maternal and Child Health Program, was not met at a majority of facilities. The absence of skilled staff, lack of availability of medicines and inadequate observation of service delivery protocols, including in infection prevention, were a major problem (Technical Resource Facility 2012).

The purpose of this study is to profile the poorest Pakistani women and to describe the resources that they have at their disposal to access maternal health services. The study findings should inform the development of maternal health interventions that are responsive to the needs of vulnerable women who are largely ignored by the current health system. This study describes the social and economic resources available to the poorest women, their patterns of childbearing and their utilization of maternal health services.

Methods

Data
The data used for the analysis is from the 2006/2007 Pakistan Demographic and Health Survey (PDHS), which is a nationally representative sample of ever-married women between the ages of 15 and 49. The sample size for the 2006–07 PDHS is 10,023 (National Institute of Population Studies and Macro International Inc. 2008). The survey is based on a two-stage stratified random sample of households from the four provinces of Pakistan: Punjab, Sindh, Khyber-Pakhtunkhwa and Balochistan. Punjab is the largest and most-developed province of Pakistan, with nearly 58% of the population of the country. The most-urbanized province, Sindh, comprises about 24% of the population of Pakistan and includes the megacity of Karachi as well as some of the least-developed districts in Pakistan. Khyber-Pakhtunkhwa comprises 13% of the population of the country. Balochistan, the largest province in terms of land area, is the least-developed province in the country, with only 5% of the population of the country. According to the United Nations estimates, the population of Pakistan reached 183 million in 2013, having increased nearly 5-fold from its base level of 37.5 million in 1950 (around the time that the country gained independence from British rule).

Measures
A key variable of interest in this study is household wealth. Because of the difficulty of measuring income, health surveys conducted in developing countries often use a wealth index based on possession of assets and amenities. Binary variables measuring the availability of household assets (e.g. television, motor car, bicycle), material used for household construction (i.e. what the walls, roof and floor are made of) and household amenities (e.g. flush toilet, availability of piped water) are used in creating the wealth index. Principle component analysis is conducted as a second step. In the final step, wealth quintiles are developed to categorize the population into five equal groups, ranging from the poorest to the wealthiest households (Rutstein and Johnson 2004). This wealth index is created routinely and included in DHS data sets. Several studies have shown that this index is a reliable measure of household wealth and has predictive value when looking at health service utilization (Montogomery et al. 2000; Filmer and Pritchett 2001).

For the present analysis, the wealth index created as part of the 2006–07 PDHS data file is used as the primary measure of poverty. Women in the first quintile (i.e. the poorest 20% of the population) are compared with women in the second to fifth quintiles (i.e. the remaining 80% of the population). While there is considerable variation in the middle to upper income quintiles, combining these four quintiles is consistent with the objective of this study—to compare the poorest women to less poor women.

To present a profile of the poorest Pakistani women, women in the first/poorest quintile are compared with all other women in terms of: (i) their own and their husbands’ personal resources in terms of literacy, education and occupation, (ii) the demographic structure of the households they live in, (iii) their experience with childbearing and child loss and (iv) their use of health services.

Statistical analysis
In accordance with the aim of this study—to describe the profile of the poorest married women of reproductive age in Pakistan—bivariate analysis is conducted to determine whether there are statistically significant differences between women in the first quintile and women in the second to fifth quintiles. Because the PDHS 2006–07 comprises of a multi-stage clustered sample, the survey suite of survey commands in STATA was used to estimate the correct standard errors for statistical tests (Kohler and Kreuter 2009). The STATA tabulate command was used to conduct chi-square tests of independence for categorical variables, while the regress command for simple regression was used for continuous variables. The level of statistical significance was set at $P < 0.05$.

Results

Human capital
Table 1 compares women in the first/poorest quintile with women in the second to fifth quintiles in terms of human capital. Lack of formal schooling is nearly universal among women in the first quintile (95%), when compared with 58% of women in the second to fifth quintiles. Only 6% of the poorest women can read part or a whole sentence, when compared with 43% of women in the second to fifth quintiles. About 31% of the women in the first quintile are agricultural employees while only 8% of women in the other quintiles work in agriculture.

About 64% of women in the first quintile have husbands with no formal schooling, when compared with 28% of women in the other four quintiles. Approximately, 71% of women in the first quintile have husbands who are agricultural employees or
unskilled manual laborers when compared with 38% of women in the second to fifth quintiles.

**Household demographic structure**

Table 1 also compares the demographic structure of households in which the poorest women live to that of households in which women in the second to fifth quintiles live. Women in the first quintile are more likely than women in the second to fifth quintiles to be the wives of heads of household (64 vs 53%). They are more likely to be younger (31.4 vs 32.6 years), to live in households that are smaller in size (8.1 vs 9.0 household members) and to have a slightly higher number of children below five years (1.6 vs 1.5). Overall, these findings suggest that the women in the first quintile are more likely than women in the second to fifth quintiles to live in nuclear households and in households in which there is a greater dependency of children on adults.

**Marriage and childbearing patterns**

Table 2 compares marriage and childbearing patterns of women in the first/poorest quintile with those of women in the second to fifth quintiles. Women in the first quintile marry at younger ages than women in the second to fifth quintiles (17.3 vs 18.7 years). However, the difference in ages at first birth is not as large as the difference in age at first marriage (19.9 vs 20.6 years). Women in the first quintile have a larger number of children ever born (4.3 vs 3.8) and a slightly larger number of living children (3.6 vs 3.4). This difference is partially explained by the poorest women experiencing more child death than women in the second to fifth quintiles (0.6 vs 0.4 child deaths). The poorest women have a higher rate of childbearing over the last 5 years (1.1 vs 0.9 births). Generally, these findings reflect a pattern of earlier initiation of childbearing and higher fertility and mortality among the poorest women.

**Residence and exposure to the Lady Health Workers programme**

Table 3 compares women in the first/poorest quintile with women in the second to fifth quintiles in terms of their marriage and childbearing experiences.
less likely than other women to have been visited by an LHW or another fieldworker in the last 12 months (16 vs 27%).

**Use of health services**

Table 4 shows differences in use of maternal health services between the women in the first/poorest quintile and women in the other quintiles. There is a large difference between the poorest women and women in the second to fifth quintiles in the percentage that make an antenatal care (ANC) visit (41 vs 72%). Moreover, these two groups of women make ANC visits for very different reasons. Among the poorest women who make an ANC visit, 71% do so because of a problem with their pregnancy; among women in the second to fifth quintiles who make an ANC visit, 59% do so for a routine check-up. During an ANC visit, Pakistani women are generally not told about signs of pregnancy complications and where to go in case complications occur\(^a\). Women in the first quintile are less likely to be told about complications that might occur in pregnancy than women in the second to fifth quintiles (15 vs 23%). Only one in seven women in the first quintile deliver in a health facility, when compared with nearly half of women in the second to fifth quintiles (15 vs 44%). The Caesarean sections rate among the poorest women is one-fifth that for other women (2 vs 10%). These findings demonstrate the inability of the poorest women to access both primary and emergency services. Current use of contraception is also significantly lower among the poorest women when compared with women in the other four quintiles (15 vs 31%).

**Discussion**

This study profiled the poorest women in Pakistan to describe the resources that they have at their disposal to access maternal health services. A fundamental question that drove this study was whether the poorest Pakistani women are being reached by maternal health services. Two studies have shown that even when health services are available, the poorest Pakistani women do not utilize them (Jaffrey and Korejo 1993; Mumtaz et al. 2011). Other studies have shown that when women are able to utilize services, the quality of care provided is poor (Fikree et al. 2006; Technical Resource Facility 2012).

The analysis found stark differences between women in the first quintile and women in the second to fifth quintiles in terms of human capital, earlier initiation of childbearing, higher child mortality and lower utilization of maternal health services. Moreover, not only is the utilization of health services very low among the poorest women, their reasons for use of maternal health services are often different from those of

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**Table 3** Women in the first quintile when compared with women in the second to fifth quintiles in terms of residence and exposure to the LHW Programme

<table>
<thead>
<tr>
<th>Location</th>
<th>Women in the second to fifth quintiles (n = 8079)</th>
<th>Women in the first quintile/ poorest (n = 1944)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural</td>
<td>59.7%</td>
<td>95.1%</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Urban</td>
<td>40.3%</td>
<td>4.9%</td>
<td></td>
</tr>
<tr>
<td>Region</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sindh</td>
<td>21.3%</td>
<td>35.3%</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Baluchistan</td>
<td>3.6%</td>
<td>8.9%</td>
<td></td>
</tr>
<tr>
<td>Punjab</td>
<td>60.6%</td>
<td>46.7%</td>
<td></td>
</tr>
<tr>
<td>KP</td>
<td>14.5%</td>
<td>9.2%</td>
<td></td>
</tr>
</tbody>
</table>

**Table 4** Women in the first quintile when compared with women in the second to fifth quintiles in terms of use of maternal health services

<table>
<thead>
<tr>
<th>At least 1 ANC visit</th>
<th>Women in second to fifth quintiles (n = 8079)</th>
<th>Women in the first quintile/ poorest (n = 1944)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>72.2%</td>
<td>40.6%</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>No</td>
<td>27.8%</td>
<td>59.4%</td>
<td></td>
</tr>
</tbody>
</table>

**Reason for first ANC visit**

<table>
<thead>
<tr>
<th>Problem</th>
<th>Women in second to fifth quintiles (n = 8079)</th>
<th>Women in the first quintile/ poorest (n = 1944)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Routine check up</td>
<td>41.4%</td>
<td>71.3%</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

**During any ANC visit, told about signs of pregnancy complications and where to go in case complications occur\(^a\)**

<table>
<thead>
<tr>
<th>Yes</th>
<th>Women in second to fifth quintiles (n = 8079)</th>
<th>Women in the first quintile/ poorest (n = 1944)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>22.8%</td>
<td>14.7%</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

**Delivered in a health facility**

<table>
<thead>
<tr>
<th>Yes</th>
<th>Women in second to fifth quintiles (n = 8079)</th>
<th>Women in the first quintile/ poorest (n = 1944)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>77.2%</td>
<td>85.3%</td>
<td></td>
</tr>
</tbody>
</table>

**Caesarian section**

<table>
<thead>
<tr>
<th>Yes</th>
<th>Women in second to fifth quintiles (n = 8079)</th>
<th>Women in the first quintile/ poorest (n = 1944)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>56.2%</td>
<td>85.5%</td>
<td></td>
</tr>
</tbody>
</table>

**Current use of a contraceptive method**

<table>
<thead>
<tr>
<th>Yes</th>
<th>Women in second to fifth quintiles (n = 8079)</th>
<th>Women in the first quintile/ poorest (n = 1944)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>22.8%</td>
<td>14.7%</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

\(^a\)These frequencies are based on women who made at least one ANC visit (520 women in the poorest quintile and 3151 women in the other four quintiles).
women with greater resources. For example, while routine ANC visits are relatively common among women in second to fifth quintiles, the majority of women in the first quintile only make an ANC visit when they have a problem with their pregnancy. These findings indicate that preventive use of ANC among the poorest Pakistani women is much lower than previously thought.

Additionally, these findings support the conclusions drawn by Mumtaz et al. (2011) that the needs of the most geographically, economically and socially vulnerable women go beyond simply expanding health services provision. This study demonstrates that there are very substantial differences in access to information, ability to use information and geographic isolation between the poorest women and other women. An approach that focuses on increasing the availability and quality of maternal health services may be effective in reaching a majority of the population but may not succeed in reaching the poorest women. If the lowest income segment of the population does indeed contribute disproportionately to maternal deaths in Pakistan, it is important to have elements in the service provision approach which differentially reach out to the poorest women with high-quality maternal health services.

Programme planners should scale up tested approaches, which have the greatest likelihood of reaching women in the poorest population segments. There is evidence from pilot projects implemented in Pakistan that the poorest women can be reached at a disproportionately higher rate through certain types of community-based interventions. Demand side financing interventions which have used vouchers to lower financial barriers to accessing maternal health services have shown significantly higher increases in the utilization of health services by the poorest when compared with the least poor Pakistani women (Agha 2011). These interventions have targeted the poorest women and distributed vouchers for ANC, safe delivery and postnatal care visits for redemption at Lady Health Visitor-managed private health facilities in poor urban and rural areas (Bashir et al. 2009). A formal evaluation of one such project, which used a robust research design, demonstrated a significant reduction in inequities in institutional delivery in rural union councils in Jhang district in the Punjab. The evaluation showed that the differential in institutional delivery between the poorest women (i.e. the first quintile) and the least poor women (i.e. the fifth quintile) reduced dramatically by 17% points in intervention union councils over a 1-year period. During the same period, there was no significant reduction in the differential in institutional deliveries in comparison union councils (Agha 2011). At the same time, there is a need to proceed with some care in the implementation of demand side financing interventions: while these interventions have been effective in reaching the poorest women with maternal health services, there has been no investigation of whether the quality of services delivered to the poorest women through these interventions was adequate. It is important to recognize that making services available and ensuring their utilization, while necessary, may not be sufficient in reducing maternal mortality in a country like Pakistan where the quality of service provision is known to be very poor (Fikree et al. 2003; Technical Resource Facility 2012). Hence, future interventions should be designed to demonstrate both improvements in quality of care and increased coverage among the poorest women. Increased coverage at low levels of quality is unlikely to be sufficient in reducing maternal mortality in Pakistan.

High-impact interventions which reach the poorest women through community-based distribution are likely to be important in contexts such as Pakistan where the deployment of skilled birth attendants in remote rural communities has been very slow. The lack of skilled birth attendance has resulted in women in remote communities continuing to die during childbirth. To reach women in remote rural communities, the use of life-saving drugs such as misoprostol by women who deliver at home has been proposed as a major strategy. Advocates argue for training community-based birth attendants, women themselves or other community members to use misoprostol in order to prevent postpartum haemorrhage (Prata et al. 2013). Studies have shown that approaches used to distribute misoprostol through community-based health workers result in substantial increases in coverage (Smith et al. 2013). Greater emphasis is needed on implementing projects that target the poorest women and their families in rural areas, as well as in low-income urban areas. Establishing community-based mechanisms for delivering high-impact interventions and increasing financial access to high-quality emergency obstetric care are likely to remain of critical importance in improving maternal health outcomes in Pakistan.

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