Does child gender determine household decision for health care in rural Thatta, Pakistan?

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ABSTRACT

Background In South Asia, gender disparity in child mortality is highest in Pakistan. We examined the influence of child gender on household decision regarding health care.

Methods Prevalence ratios were calculated for 3740 children aged 1–59 months from 92 randomly selected villages of rural Pakistan using a cluster-adjusted log-binomial model. Level 1 variables included child and household characteristics and level 2 included village characteristics.

Results There were 25 more girl deaths than boys per 1000 live births (95% CI: 13.9, 48.6) among post-neonates and 38 more among children aged 12–59 months (95% CI: 10.5, 65.5). However, in adjusted analysis, gender was not a significant predictor of illness reporting, visit to health facilities, choice of provider, hospitalization and health expenditure. Significant predictors of health care were child’s age, illness characteristics, number of children in the family, household socio-economic status and absence of girls’ school in the village.

Conclusions Differential care seeking for boys and girls is not seen in Thatta despite clear differences in mortality ratios. This calls for more creative research to identify pathways for gender differential in child mortality. Factors identified as influencing child health care and amenable to modification include poverty alleviation and girls’ education.

Keywords children, gender, health services

Background

Gender disparity in child mortality is greatest in Pakistan among eight South Asian countries accounting for 50% more deaths among girls than boys between their first and fifth birthdays.1 This excessive girl mortality after neonatal period is of concern, despite biological advantage of females over males.3,4 In Pakistan, life expectancy at birth for females is greater (66 years) compared with males (64 years).5 However, gender disparity in health leads to a male biased adult sex ratio (106:100).5

Seeking timely health care can prevent child mortality, particularly from diarrhoea and respiratory infections for which effective low-cost treatments are available. Most studies from South Asia, with a few exceptions,²² have consistently shown that boys are favoured in the use of health services, choice of care provider, referral or hospitalization and health expenditure.

Conceptual frameworks for determinants of health-care seeking in developing countries proposed by Kroeger,²¹ and Pokhrel and Sauerborn²² include gender as one of its determinants. The framework developed by Pokhrel and Sauerborn²² provides four decisions for care seeking: (i) illness reporting, (ii) care seeking, (iii) provider choice, and (iv) health expenditure, all determined by characteristics of individuals, households and health systems. In this study, we adapted this framework (Fig. 1) by including: (i) hospitalization (due to its association with severe and potentially fatal illnesses) as one of the outcome measures and (ii) illness characteristics and maternal health status among determinants of health care. Relevant studies from squatter settlements of Karachi,¹¹ Rawalpindi General Hospital,²³ Pakistan Demographic and Health Survey

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(1990/91) and Pakistan Integrated Household Survey (1991) did not utilize any such conceptual frameworks. In this study, we examine gender as a determinant of health-care decisions in specific conceptual and analytical frameworks.

Material and methods

Data source
We used data (collected between November 1992 and February 1993) from a rural district (Thatta) of Sindh province by the Aga Khan University, Karachi. This survey provided baseline information on health and nutrition status and use of government health services to be used in evaluating a health system improvement project. The data include relevant measures of our conceptual framework. The more recent Pakistan Social and Living Standard Measurement Survey (2006–07) and Pakistan Demographic Health Survey (2007) lack information about determinants of health care such as illness duration, maternal health status, distance from health facility and availability of transport and about outcome measures, such as hospitalization and health expenditure. Moreover, these data are still relevant as Thatta has not shown significant improvement in health and developmental indicators over time. This includes infant mortality ratio/1000 live births of 78 in 1992–93 and 91 in 2003–04, underweight prevalence of 48% for children under three in 92–93 and of 49% for children under five in 2003–04, an adult (≥15 years) literacy level of 32% in both 1992–93 and 2004–05 and concrete housing for 17% of population in 1992–93 and 19% in 2004–05.

Study site
Thatta is a predominantly rural district 60 km east of Karachi. Its 1.1 million people are predominantly Muslim and speak Sindhi. The public health-care system consists of 49 basic health units (BHUs), 12 rural health centres (RHCs), 5 taluka (district subdivision) hospitals and 1 district headquarter hospital. These are plagued by inadequate staffing and supplies. The BHUs charge a nominal fee of only 2 Pakistani Rupees (PR) (US $0.06; 1 US $ = 30 PR-1993) but are closed after 14:00 h. The private sector has an unknown number of clinics and hospitals. Its routine out-patient services cost 15–50 PR (US $0.50–1.6) and usually available during evening hours. Most hospital visits are referrals, although direct visits are permissible.

Survey sampling
From a total of 43 rural administrative units (union councils) of Thatta, 12 were included in the survey because they were accessible and had complete enumeration lists of their villages. Ninety-nine villages within 5 km of a primary health-care (PHC) unit were selected using a simple random sampling from these lists so as to provide 250 households per PHC unit. Only 9% of households refused to participate. From selected villages, all households (2276) were
surveyed and all children aged 1–59 months (3740) were included.

**Data collection**

Mothers were asked about their age, literacy status (ability to read and/or write a short simple statement) and number of live children. Their health status during the year preceding the interview was assessed through a series of questions about illness symptoms lasting for >2 weeks. Children’s age was calculated using a calendar listing important local events, festivals and moon cycles in the last 5 years.

The five stages in health-care seeking were measured as (i) the recent most child illness reported by mother during the past year; (ii) formal care sought at a health facility; (iii) provider choice; (iv) hospitalization for at least a day and (v) health expenditure (total cost of consultation, medicine, investigation and transport) per illness day. Stages (iii)–(v) are conditional on care sought at a health facility. We categorized expenditure per illness day <20 PR as low and ≥20 PR as high based on data distribution (median) and for better interpretability. The cut point of 20 was approximately the median expenditure for subjects who received care at a health facility.

Illness type was assessed by a series of symptom-related questions and coded as ‘pneumonia’ (fever and cough with fast breathing or fast-moving ribs during breathing), ‘measles’ (fever with rash), ‘whooping cough’ (fever with whooping cough), ‘upper respiratory illnesses’ (fever with cough, cold or sore throat), ‘ear infection’ (fever with ear pain), ‘other fever’ including malaria, poliomyelitis or meningitis, ‘diarrhoea’ (three times or more loose or watery stools in 24 h) or ‘other illnesses’. Illness duration was assessed as number of days from illness recognition till reported recovery, death or the interview date.

Three indicators of household socio-economic status (SES) (i.e. type of house, land ownership and per capita average monthly household income divided at its median) were combined to create a single measure. Subjects were grouped as low, middle or upper SES if all three, any two or at most one of three indicators reflected economic disadvantage. Village headmen provided information about presence of girls’ school and transport availability during emergency. Village distance by the shortest possible road route to the nearest health facility was measured (in kilometres) using vehicle odometer.

Categorization of the study variables is listed in Table 1.

Mortality ratios were calculated according to World Health Organization standards as gender-specific deaths during a year divided by gender-specific live births for neonates (new born to 29 days old), post-neonates (completed 1 to completed 11 months old) and early childhood (12–59 months old). Neonates were excluded from further analyses because neonatal deaths are often determined by genetic factors and prenatal care whereas gender disparity in mortality grows with children’s age and is often determined by behaviour.

To account for unequal selection probabilities and to reduce bias in variance estimation, weights were calculated as inverse of sample selection probabilities. Differences in mortality ratios between girls and boys were examined. Because of relatively common outcomes measures (with a prevalence of >10%), we calculated adjusted prevalence ratios using SAS Proc Genmod with the binomial distribution and the log-link function. We adopted COPY method when the log-binomial model did not converge. Clustering at the village level was accounted for by the use

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Categories</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Child characteristics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>Post-neonates or early childhood</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>Girl or boy</td>
<td></td>
</tr>
<tr>
<td>Illness cause</td>
<td>Diarrhoea, respiratory, other causes or fever</td>
<td></td>
</tr>
<tr>
<td>Illness duration</td>
<td>≥ 15 days or ≤ 14 days</td>
<td></td>
</tr>
<tr>
<td>Illness severity</td>
<td>Fatal or non-fatal illnesses</td>
<td></td>
</tr>
<tr>
<td>Hospitalization</td>
<td>Yes or only visit to a dispensary, a clinic or a PHC</td>
<td></td>
</tr>
<tr>
<td>Choice of care provider</td>
<td>Public or private</td>
<td></td>
</tr>
<tr>
<td>Household characteristics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal age</td>
<td>&gt;30 or ≤ 30 years</td>
<td></td>
</tr>
<tr>
<td>Maternal literacy</td>
<td>Illiterate or literate</td>
<td></td>
</tr>
<tr>
<td>Number of live children</td>
<td>≥ 4 or ≤ 3</td>
<td></td>
</tr>
<tr>
<td>Poor maternal health</td>
<td>Yes or no</td>
<td></td>
</tr>
<tr>
<td>Household SES</td>
<td>Low, middle or upper</td>
<td></td>
</tr>
<tr>
<td>Village characteristics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distance from the nearest health facility</td>
<td>&gt;3 or ≤ 3 km</td>
<td></td>
</tr>
<tr>
<td>Transport available</td>
<td>No or yes</td>
<td></td>
</tr>
<tr>
<td>A girls’ school</td>
<td>Absent or present</td>
<td></td>
</tr>
</tbody>
</table>

*The last category of each variable served as the reference group.

*Excluded from the model for reported illness.

*The category of respiratory illnesses included children with pneumonia, measles, whooping cough, upper respiratory illnesses and ear infections.

*Included only in the model for health expenditure.

*Included only in the models for hospitalization and health expenditure.

*Included only in the model for illness reporting and visit to a health facility.
of cluster identity for village level variables in a repeated statement using Proc Genmod. We did not account for clustering at the household level as there was only one sick child per household in 95.5% of the surveyed households.

Five multivariate models were estimated for each of the five outcomes as follows: (i) gender and village variables; (ii) village variables only; (iii) child and village factors; (iv) child and household factors; and (v) gender, village, and significant child and household variables identified in crude and model 4 analyses. In the final model, gender and village variables were retained. The remaining variables were entered in a forward manner. Variable with the smallest \( P \)-value (<0.05) was entered first, followed by addition of one variable at a time, retaining ones with \( P \)-value < 0.05 and removing ones with \( P \)-value > 0.05. We present the results of generalized estimating equations from the final model.

**Study results**

About one-fifth (19.4%) of 3740 children were reported ill (Fig. 2), of whom 10.6% died. The most commonly reported illness was fever (40.1%) followed by respiratory illnesses (18.5%) and diarrhoea (15.7%) (Table 2). Among sick children, illness duration was 14 days or less for two-thirds (63.6%) and 3 months or less for 97.3% of subjects. About a third of sick children taken to a health facility visited public facilities, about 13% were hospitalized and for half of them daily expenditure was less than 20 PR (Fig. 2).

Most mothers were younger than 30 years (62.4%), illiterate (84.7%) and had four or more live children (54.6%). One-fifth of them (20.5%) reported illness. A majority were from households of middle SES (40.8%). Most villages (54.8%) were ≥3 km away from the nearest health facility, had no transport during emergency (71.7%) and no girls’ school (82.6%).

Among neonates, there were 20 more boy deaths than girl’s per 1000 live births. But, among post-neonates and 12–59 month old children, there were 25 and 38 more girl deaths than boy’s per 1000 live births, respectively (Fig. 3).

In unadjusted analyses, girls were less likely than boys (by 15%) to be reported ill (Table 3). In adjusted analysis, gender did not show significant association with any of the five outcomes (Table 4). Illness reporting was, however,
significantly greater for post-neonates and if mothers reported poor health. It was less if there were four or more live children. The use of health facilities was significantly reduced for illnesses of long duration, respiratory or other causes, low SES households and absence of girls’ school. Public facilities were visited more often for older children and low SES households. Hospitalization was significantly less in the absence of a village girls’ school. Health expenditure was significantly greater with fatal illnesses and less with public providers. Village distance to health facility and transport availability had no effect on health-care decisions.

**Discussion**

**Main study findings**

Girl children had significantly greater mortality than boys beyond their neonatal age, suggesting that behavioural factors may account for greater girl mortality. Prevalence ratios adjusted for significant confounders and cluster identity, however, did not show association of gender with illness reporting, care seeking, provider choice, hospitalization or expenditure, contrary to expectation. Possible reasons for this include (i) bias in reporting of care seeking or (ii) low study power (described later under the section Study limitation).

Greater illness reporting among infants suggests their greater illness susceptibility and concern for them among mothers. Greater use of health care for illnesses of short duration (<15 days) suggests that illnesses of long duration were not considered serious or that parents adapted to long-standing childhood illnesses. Greater care seeking for fever compared with respiratory or other illnesses could reflect greater anxiety over undefined fever or acceptance of common respiratory illnesses as an inevitable part of life.41 Parent’s capacity to protect their children, as measured by SES, influenced decisions to seek care and provider choice.

![Fig. 3 Age-specific mortality ratios (per 1000 live births) by gender (weighted estimates).](image)

**Table 3** Crude prevalence ratios for child health-care seeking (confidence intervals adjusted for clustered design)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Illness reporting</th>
<th>Facility use</th>
<th>Public provider</th>
<th>Hospitalization</th>
<th>Low expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Child characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>0.85 (0.76, 0.96)</td>
<td>0.97 (0.88, 1.08)</td>
<td>1.12 (0.91, 1.37)</td>
<td>0.66 (0.39, 1.12)</td>
<td>0.88 (0.73, 1.07)</td>
</tr>
<tr>
<td>Post-neonate</td>
<td>1.49 (1.29, 1.72)</td>
<td>1.17 (1.03, 1.33)</td>
<td>0.73 (0.54, 0.98)</td>
<td>1.28 (0.73, 2.27)</td>
<td>0.87 (0.72, 1.07)</td>
</tr>
<tr>
<td>Fatal illness</td>
<td>—</td>
<td>1.09 (0.83, 1.43)</td>
<td>0.86 (0.51, 1.44)</td>
<td>0.97 (0.36, 2.62)</td>
<td>0.05 (0.007, 0.35)</td>
</tr>
<tr>
<td>Ill for ≥15 days</td>
<td>—</td>
<td>0.59 (0.50, 0.72)</td>
<td>0.70 (0.40, 1.23)</td>
<td>1.63 (0.94, 2.81)</td>
<td></td>
</tr>
<tr>
<td>Diarrhoea</td>
<td>—</td>
<td>0.90 (0.79, 1.03)</td>
<td>0.64 (0.43, 0.97)</td>
<td>1.30 (0.67, 2.53)</td>
<td>0.84 (0.58, 1.19)</td>
</tr>
<tr>
<td>Respiratory</td>
<td>0.58 (0.48, 0.71)</td>
<td>0.91 (0.58, 1.42)</td>
<td>0.81 (0.28, 2.33)</td>
<td>0.95 (0.67, 1.13)</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>0.59 (0.47, 0.73)</td>
<td>0.90 (0.57, 1.42)</td>
<td>1.03 (0.51, 2.08)</td>
<td>0.85 (0.65, 1.12)</td>
<td></td>
</tr>
<tr>
<td>Hospitalization</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>1.20 (0.86, 1.68)</td>
</tr>
<tr>
<td>Public provider</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>1.39 (1.13, 1.71)</td>
</tr>
<tr>
<td><strong>Household characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother ≥30 years old</td>
<td>1.03 (0.92, 1.07)</td>
<td>0.96 (0.84, 1.09)</td>
<td>0.89 (0.66, 1.23)</td>
<td>1.09 (0.64, 1.85)</td>
<td>1.12 (0.90, 1.39)</td>
</tr>
<tr>
<td>Illiterate mother</td>
<td>0.87 (0.73, 1.05)</td>
<td>0.92 (0.80, 1.05)</td>
<td>1.04 (0.66, 1.63)</td>
<td>0.87 (0.39, 1.91)</td>
<td>1.28 (1.01, 1.61)</td>
</tr>
<tr>
<td>≥ 4 live children</td>
<td>0.87 (0.78, 0.98)</td>
<td>1.14 (0.97, 1.34)</td>
<td>0.87 (0.68, 1.12)</td>
<td>1.35 (0.84, 2.17)</td>
<td>0.98 (0.81, 1.19)</td>
</tr>
<tr>
<td>Poor maternal health</td>
<td>1.88 (1.62, 2.20)</td>
<td>0.97 (0.90, 1.05)</td>
<td>—</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>Low SES</td>
<td>0.94 (0.74, 1.19)</td>
<td>0.88 (0.71, 1.09)</td>
<td>1.50 (0.98, 2.29)</td>
<td>1.41 (0.67, 2.94)</td>
<td>1.19 (0.89, 1.61)</td>
</tr>
<tr>
<td>Middle SES</td>
<td>1.09 (0.91, 1.31)</td>
<td>0.90 (0.76, 1.06)</td>
<td>1.19 (0.84, 1.71)</td>
<td>0.84 (0.41, 1.75)</td>
<td>1.18 (0.90, 1.55)</td>
</tr>
<tr>
<td><strong>Village characteristics</strong></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Health facility at ≥3 km</td>
<td>1.15 (0.89, 1.47)</td>
<td>0.96 (0.81, 1.14)</td>
<td>1.35 (0.85, 2.16)</td>
<td>1.19 (0.66, 2.17)</td>
<td>1.13 (0.89, 1.43)</td>
</tr>
<tr>
<td>No transport</td>
<td>1.17 (0.88, 1.55)</td>
<td>0.91 (0.76, 1.09)</td>
<td>1.09 (0.67, 1.75)</td>
<td>0.65 (0.36, 1.17)</td>
<td>0.96 (0.74, 1.24)</td>
</tr>
<tr>
<td>No girls’ school</td>
<td>0.92 (0.72, 1.16)</td>
<td>1.24 (1.06, 1.45)</td>
<td>1.25 (0.71, 2.12)</td>
<td>0.48 (0.27, 0.83)</td>
<td>0.89 (0.69, 1.14)</td>
</tr>
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</table>
Parents of young and high SES children tended to choose private over public services with consequent increase in cost. As expected, fatal illnesses were associated with greater expenditure. Association of a girls’ school with greater use of health care and hospitalization suggests that villages with a girls’ school are likely to give importance to girls’ education and possibly also to their health.

These findings need to be understood in the ‘local’ context of Thatta consisting of predominantly poor and largely illiterate agricultural families who lack access to emergency transportation. Though a network of public and private providers is available, quality care cannot be assured.

**What is already known?**

Gender disparity in post-neonatal mortality observed in Thatta is similar to observations from Nepal, Bangladesh, India, and Pakistan. Our illness reporting (19%) for a 1 year period was less than the recent report of 17% for a 2 week period. This could be due to recall bias or low awareness among mothers at the time of survey about common childhood illnesses that might have improved following implementation of a community-based lady health worker programme in 1994. Similarly, the use of health facility (58.6%) was less than the recent estimate (91%) suggesting improvement in health-care use over time. Under-utilization of public facilities, despite nominal costs is similar to observations from Nepal, India, Sri Lanka, Vietnam and a local survey. This could possibly be due to perceived low quality of care at public facilities. Greater care seeking for fever compared with respiratory or other illnesses is similar to observations in rural Guatemala and Nairobi slums.

The lack of association between gender and illness reporting could be due to similar risk among boys and girls to common childhood illnesses. No gender difference in care seeking in Sri Lanka and Kerala, India is consistent with low child and girl mortality in these areas due to improved women status and literacy. The studies from Nepal and India do not provide explanation for no gender difference in illness reporting and care seeking. Our observations is inconsistent with most reports from South Asia that show gender influence on the use of health facility, provider choice, referral and health expenditure.
What does this study add?
Our study is unique in that its conclusions are based on the most appropriate measure of association (prevalence ratio) suitable for common outcome measures and with cluster correlation taken into account. Studies based on odds ratios tend to overestimate common outcomes. Assessment of household decisions in a fairly comprehensive conceptual framework suggest that age and illness characteristics that make children vulnerable, poor maternal health, low SES and family size predict illness reporting and affect health care. An interesting finding is the influence of a contextual factor, the absence of girls’ school on low use of health facility and hospitalization, suggesting villages with poor development indicators may be at risk of low health-care use.

Study limitations
This study is based on retrospective interview data and hence bears potential for biases. Greater mortality ratios among girls could be due to less reporting of girl births and greater reporting of girl deaths. Similarly, inaccurate age assessment could lead to under or overestimation of age-specific mortality ratios. Chronic (e.g. malnutrition and chronic cough) and highly prevalent conditions (e.g. diarrhoea) could possibly be under-reported. Reliability of the respondent’s recall would vary with time of event occurrence, illness severity and visits frequency. The 1-year recall period was a compromise to obtain sufficient events for analysis. Hence, recall errors are possible and the reported health expenditure cannot be verified. Our predictive model did not control for health beliefs and quality of care, which may play a role in determining health-care use. Selected union councils though belonged to seven of nine talukas (subdivisions of the district) their inclusion because of convenience could affect generalizability of the results. Excluded union councils may be worse with regard to prevalence of childhood illnesses and access to health care.

It is also possible that the failure to find a significant gender effect (after adjustment for other variables) could be due to low power. If care seeking was 20% more for boys than for girls then the power for concluding a gender effect was 88% for illness reporting, 100% for facility use, 63% for visit to a public provider, 25% for being hospitalized and 79% for low health expenditure. The power is very low for hospitalization and fairly low for choice of provider and health expenditure. The power was high enough to detect a 20% increase for males in illness reporting and facility use. However, our estimates for Thatta indicate that if there is a gender difference for these two outcome variables, then it is less than 20%. Choice of public provider and low health expenditure appear to also have a smaller effect in addition to low power. Hospitalization was the only variable that had an observed gender difference of more than 20%. Unfortunately, it also had very low power. Thus, even if there is a large gender difference in Thatta for hospitalization, our power was too low to detect it.

Implications for public health policy and research
Concerted efforts are needed to improve utilization of public health facilities by introducing fundamental changes in health-care delivery systems as proposed in the recent Devolution Plan of Government. The significant effect of number of children in the family on illness reporting, suggests continued need for the effective family planning services in rural areas. The significant effects of household SES and girls’ school suggest that poverty alleviation and educational development may improve health-care utilization.

The question of the causes of differential survival by gender remains unanswered and open for further research. To improve our understanding of pathways for gender differential in child survival, we suggest inclusion of (i) factors such as birth interval, sibling gender, illness episodes, delay in care seeking, visit frequency, health beliefs and quality of care in the conceptual framework; (ii) additional evidence from facility records; (iii) use of appropriate sample size; and (iv) qualitative research.

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