

Full Length Research Paper

Evaluating primary healthcare service revitalization interventions through a knowledge, practice and coverage survey in earthquake-affected areas in Pakistan

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The study evaluated a primary healthcare service revitalization project in the 2005 earthquake affected areas in northern Pakistan by comparing the 2010 endline survey results with the 2007 baseline. A two-stage stratified sampling was used to sample 3,000 households in Bagh district of Azad Jammu and Kashmir. The data indicates significant improvements in majority of the indicators including use of tetanus toxoid injections during pregnancy, postnatal care coverage, mothers' knowledge of danger signs in newborns, immunization coverage for children and infant and under-5 mortality rates. The endline survey child mortality rates in the intervention area are close to Pakistan's Millennium Development Goals (MDG) target for 2015, which indicates that revitalizing health systems can lead to considerable improvement in primary healthcare in Pakistan. Carrying out a before and after comparison in absence of a matching control group is an important limitation of this evaluation; nevertheless, the study clearly signifies the importance of health system reform in a post-disaster setting. Further research could consider the sustainability of the intervention without donor support and allow for time-series analysis of public health indicators.

Key words: Earthquake, primary health, revitalization, intervention, evaluation, Pakistan.

INTRODUCTION

On 8 October 2005, a devastating 7.6 magnitude earthquake shattered northern Pakistan, resulting in over 73,000 deaths and at least 69,000 severe injuries (Sullivan and Hossain, 2010; Halvorson and Hamilton, 2010; Elnashai, 2006). Mansehra and Bagh were among

the worst affected districts. In both districts, about 80% of the healthcare infrastructure was destroyed or severely damaged (PRIDE, 2008). People who survived the earthquake were in immediate and long-term need of healthcare. Providing basic healthcare services became

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difficult with the completely devastated primary healthcare system (Chan and Griffiths, 2009).

In August 2006, the United States Agency for International Development (USAID) launched a four-year project namely Primary Healthcare Revitalization, Integration and Decentralization in Earthquake-affected Areas (PRIDE). It was implemented by a consortium led by the International Rescue Committee (IRC) with Management Sciences for Health (MSH) and Jhpiego as key partners. Family planning, reproductive health and child health were the three key intervention areas. The project aimed to strengthen management capacities of district health authorities, improve access to quality primary healthcare services, increase participation of communities in health service management and improve household level knowledge and care-seeking behaviours (PRIDE, 2008).

In 2007, the Population Council conducted a knowledge, practice and coverage (KPC) survey in intervention districts with the aim to generate baseline estimates on key health indicators. The survey was carried out in 1,496 households of Mansehra and 1,473 households of Bagh (Afridi et al., 2007). Three years later, as the project was coming to a close, Oxford Policy Management (OPM) conducted an endline survey to generate estimates of the same indicators that were reported in the baseline survey. The same design and methodology were used in both surveys in order to provide a comparative analysis and to see any identifiable trend in the key health indicators where the project had intervened.

MATERIALS AND METHODS

Study site

It was planned that the endline survey would be carried out in both Mansehra and Bagh districts. However, in early 2010, the security situation in Mansehra seriously deteriorated and the survey team had to draw the entire sample from Bagh. Bagh is a district in Azad Jammu and Kashmir with a population of about 500,000 and land area of 1,368 square-kilometres (Figure 1).

Sample size and sampling

The sample size calculation during the baseline survey estimated that 3,000 households would be sufficient to detect a significant change in key indicators at 95% confidence. A two-stage randomized cluster sampling strategy was adopted. In the first stage, 120 randomly selected primary sampling units (PSUs) are enumeration blocks in the urban domain, and villages in the rural domain. All households in each PSU were listed. In the second stage of sampling, 25 households were selected from each PSU by systematic random sampling.

Data collection instruments

Three sets of questionnaires were used. The household questionnaire

captured information on demographic and socioeconomic characteristics of the household. The women questionnaire captured core indicators on contraception, reproductive and child health. The semi-structured community questionnaire was administered to a group of community leaders to capture general information about the community, availability of health services, involvement of the community in health planning, design and management at local levels, and perceptions towards changes in the quality of services in government health facilities.

Data collection

Six survey teams collected the data within four weeks. Prior to that, they received eight days' training, including field tests. Each team was composed of one female team leader, five female interviewers and one male interviewer. Strong quality-control processes were maintained. Randomly sampled subsets of households were re-interviewed using a shorter version of the questionnaire to validate the quality of collected data.

Data management and analysis

Data were double-entered using CSPro, and pre- and post-entry checks were carried out. Data analysis was done using statistical package for social sciences (SPSS) and Stata. Descriptive statistics were used to generate the data tables. To check the statistical significance of differences in key indicators, the baseline and endline survey results data were compared at the 95% confidence level. A p-value < 0.05 was considered significant. Confidence intervals and p-values were generated taking the cluster size and design effect into account. The infant mortality rate (IMR) and the under-5 mortality rate (U5MR) were calculated by the direct mortality estimation method using life tables (Rutstein and Rojas, 2006).

Ethical considerations

Participation in this survey was voluntary and informed verbal consent was obtained from all respondents. They were informed that they could skip any questions they did not wish to answer and had the right to withdraw from the interview at any time. Respondents were not offered incentives of any kind to take part in the survey. No biological sample was obtained as part of the survey. Data were kept strictly confidential, with only the researchers associated with data management and analysis having access. Personal identifiers were not revealed in any form in the report or dissemination.

RESULTS

This article summarizes the findings of the endline survey. The endline estimates are compared with the baseline estimates collected through the baseline survey carried out in 2007. The baseline results reported in this article are taken from the baseline survey report (Afridi et al., 2007).

Demographic characteristics

In the endline survey, 2,955 households were interviewed



Figure 1. Map of Pakistan showing the study area.

and results were compared with the data collected from the 1,473 households interviewed in Bagh in the baseline survey (Table 1). The total number of household members in the endline survey was 21,165, and of them 10,600 (50%) were female (Figure 2). The mean household size was 7.2 and the mean \pm standard error (SE) age of household members was 25 ± 0.13 years. A total of 2,437 ever-married women of reproductive age (15 to 49 years) were interviewed in endline among whom 2,343 (96%) were currently married. The mean age of marriage was 19 years, with 185 (8%) women having married below the age of 15 years. In baseline, out of the 1,483 ever-married women, 182 (12%) married below the age of 15 years.

Family planning

In endline, a total of 2,343 currently married women of reproductive age were interviewed regarding their family-planning practices, and results were compared with the 1,421 counterparts of baseline. The surveys did not find much change in respondents' knowledge of contraception. Knowledge of female sterilization, oral contraceptive pills and injectable contraceptives was more than 90% in both surveys. Knowledge of condom use had slightly

improved from 77 to 80%. Less than 30% of respondents in both surveys were aware of male sterilization and contraceptive implants. In the endline survey, 26% of currently married women were using some form of (modern or traditional) contraceptive method, including 22% who were using modern methods. The rate of use of modern methods was 18% during the baseline survey. Condoms (8%), female sterilization (5%), injectable contraceptives (4%) and intrauterine devices (3%) were the most common modern contraceptive methods. Both surveys found government health facilities to be the most common source of contraceptive materials (52% in baseline and 47% in endline).

In the baseline survey, 11% of respondents reported receiving their last contraceptive from Lady Health Workers (LHWs); in endline, this increased to 27% (p -value < 0.01). Dependence on private facilities for contraceptive supplies declined significantly from 25 to 19% (p -value < 0.05). Respondents who were not using any contraceptive method were asked about their future intentions regarding the use of contraception. A statistically significant change was noticed, with 71% of non-users in the endline survey expressing intentions for future use, compared to 65% in the baseline survey (p -value < 0.01). Women who reported either that they did not want any more children, or that they wanted to delay their next birth but were not using any contraception, were considered to have an unmet need for family planning. While the unmet need for spacing had dropped, the overall unmet need for family planning had increased (Figure 3).

Reproductive health

In the endline survey, 1,203 currently married women of reproductive age who had had a live birth during the preceding three years were interviewed. In baseline, 703 respondents took part in this part of survey. Seventy-four percent of eligible women had at least one antenatal care (ANC) visit in endline compared to 70% in baseline (p -value = 0.3). The subsequent ANC visit rates gradually declined both in the baseline and endline surveys, and were 29 and 30%, respectively for the fourth ANC visit. Half of the respondents of the baseline survey reported visiting private facilities for ANC. This figure had dropped to 37% in the endline survey (p -value < 0.01). More care-seekers sought ANC visits for preventive reasons than for curative reasons (Figure 4). Half of the mothers had one tetanus toxoid (TT) injection during their last pregnancy in the baseline survey compared to 63% in the baseline survey (p -value < 0.01).

In the endline survey, 36% of deliveries were institutional, a rate which is 2% higher than the baseline

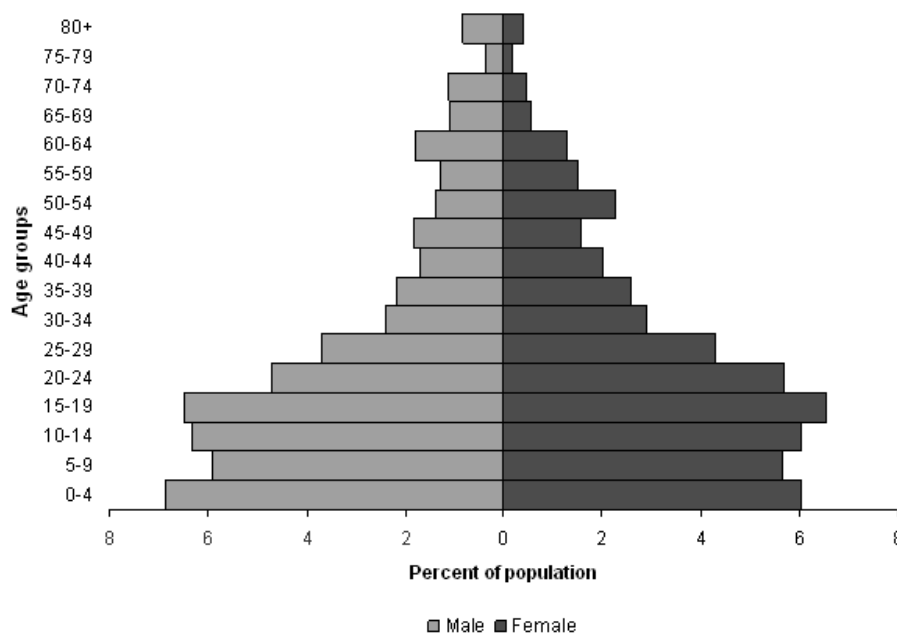


Figure 2. Population pyramid of Bagh district, 2010 from the endline survey.

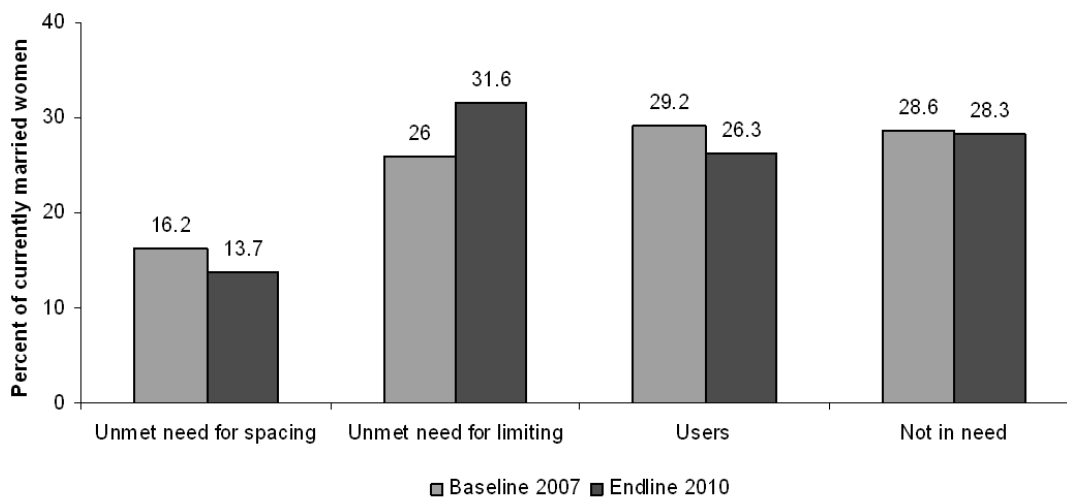


Figure 3. Unmet needs for family planning of currently married women of reproductive age.

survey (p-value = 0.3). In 461 and 769 home deliveries, respectively in baseline and endline, the use of a safe delivery kit increased from 11 to 16% (p-value < 0.05), the use of boiled thread to tie the cord increased from 7 to 13% (p-value < 0.01) and the use of a blade to cut the umbilical cord from 52 to 54% (p-value = 0.46). In the endline survey, 38% of deliveries were assisted by skilled birth attendants (physicians, nurses, midwives or lady

health visitors) compared to 36% in baseline.

One-third of the endline survey respondents reported that they had received postnatal care (PNC) in the endline survey compared to 25% in the baseline survey (p-value < 0.01). Mothers were significantly more knowledgeable about the danger signs in newborns; in the endline survey, 83, 72 and 48% knew one, two and three dangers signs, respectively compared to 58, 36 and 15%

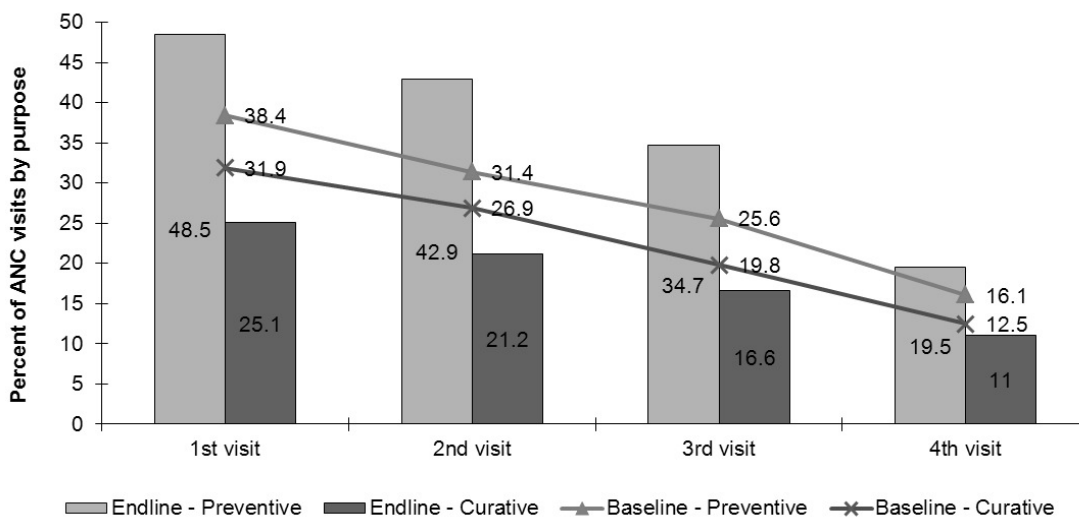


Figure 4. Proportion of antenatal care by preventive and curative purpose.

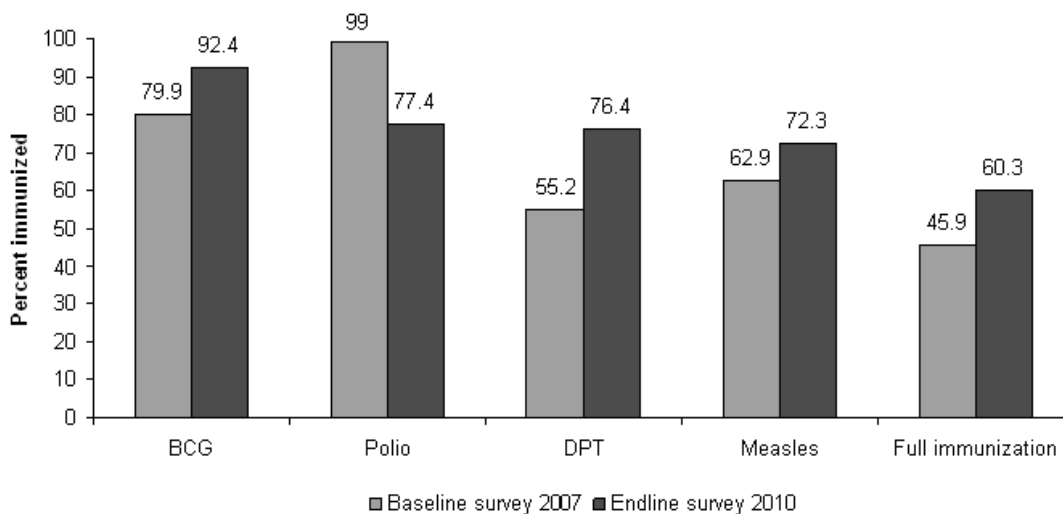


Figure 5. Immunization coverage of 12 to 23-month-old children.

in the baseline survey (p-value < 0.01).

Child health

The endline survey collected data on immunization of 368 children aged 12 to 23 months compared with 191 children at baseline. In the baseline survey, 88 (46%) of 191 eligible children were fully immunized compared to 222 (60%) of 368 eligible children in the endline survey

(p-value < 0.01). A child was considered fully vaccinated if she/he received one dose of bacille calmette Guerin (BCG) vaccine against tuberculosis, three doses of diphtheria, pertussis, tetanus (DPT) for diphtheria, pertussis and tetanus, three doses of oral polio vaccine (OPV) for polio, and one dose of measles vaccine. There were significant increases of individual coverage for the three vaccines (Figure 5); 13% for BCG (p-value < 0.01), 21% for DPT (p-value < 0.01), and 9% for measles vaccine (p-value < 0.05). However, the endline survey OPV

OPV coverage rate dropped by 22% (p-value < 0.01).

Mothers were asked about incidences of diarrhoea and pneumonia in their children. In the endline survey, 25% reported that their children had suffered from diarrhoea in the preceding two weeks, compared to 34% in the baseline survey. The diarrhoea was treated with oral rehydration therapy (ORT) in 64% of cases compared to 54% (p-value = 0.1) in the baseline survey. Mothers were also asked about the danger signs of diarrhoea; 80% knew at least one danger sign, a figure, 2% higher than in the baseline survey (p-value = 0.72). Although more than 90% of mothers, both in the baseline and endline surveys, had heard the term 'pneumonia', the majority of them were not aware of the symptoms of it; 53% were aware of fast breathing and 33% knew about chest in-drawing in endline, compared to 49 and 28%, respectively in baseline. There were significant reductions in childhood mortality rates. The calculated infant and under-5 mortality rates were 70 and 99, respectively per 1,000 live births per year during the baseline survey. These rates dropped to 44 for infants and 52 for under-5 children per 1,000 live births per year during the endline. Non-overlapping confidence intervals indicate that the differences were statistically significant.

DISCUSSION

In 2006, the earthquake-affected areas of Pakistan were in pressing need of rebuilding the healthcare system. Over the last few decades, there has been a worldwide interest in health systems reform for better equity and efficacy (Frenk, 1994). It is believed that there is a significant window of opportunity during a post-disaster period for revamping health systems (Clark, 2010). Better availability of resources from national and international sources and increased community acceptance are the key factors in favour of this opportunity. For example, the 1985 earthquake in Mexico City led to the reconstruction of a universal and equitable healthcare system (Soberon and Sepulveda, 1986). Nevertheless, there are many practical challenges in reviving a ruined health system. Even in the USA, the reform of the healthcare system in hurricane-affected Louisiana was controversial (Clark, 2010). It is also difficult to gauge the effectiveness of reforms and to assess their targeting efficiency. Two recent articles on the public health sector in earthquake-affected Haiti reflect this subjectivity. One states that:

"Fortunately, progress has been made in public health during the past year... the foundations of a functioning public health system are beginning to coalesce" (Dowell et al., 2011), while the other article noted, *"ten months after the earthquake in Haiti, the beleaguered public health system is worse than ever"* (DeGennaro et al., 2011).

This signifies the importance of independent evaluations to measure the success of health system reform, particularly in post-disaster settings where 'perceptions' and 'interpretations' widely vary. The PRIDE project implementers identified this need and funded the evaluation surveys to see the changes before and after the health system reforms in the intervention areas.

An overall look at the key indicators shows a positive trend in most of the areas of intervention during the project period (Table 2). This indicates that the project successfully revitalized, integrated and decentralized the primary healthcare system in the intervention areas. It also supports existing knowledge that reforming primary healthcare systems can have a significant impact on the health and wellbeing of communities. A group of researchers from the University of Michigan and the World Health Organization recently carried out a systematic review to see the contribution of primary care initiatives to health and health systems in 14 low- and low-middle-income countries and found evidence of three major benefits of primary health system reform (Kruk et al., 2010). Firstly, initiatives targeted to primary healthcare can improve access to healthcare, including among the poor, at a reasonably low cost. Secondly, they can reduce child mortality and, in some settings, reduce wealth-based disparities in mortality. Finally, primary care is the most effective platform for health-system strengthening (Kruk et al., 2010). The PRIDE interventions in the primary health sector in earthquake-affected Bagh district are in concurrence with the above conclusions, as evidenced by the increased rate of service utilization and reduced childhood mortality rates.

Out of 20 key indicators, 16 (80%) saw positive change from the baseline to the endline survey, with 11 (55%) of these being significant. The only key indicator that had a statistically significant negative change was the completed (three doses) polio vaccine coverage. It is unclear what caused this contrasting change in this particular vaccine. The universal (99%) adherence to three doses of polio vaccine reported in the baseline survey is unusual in the context and it may be possible that this data was misreported during the baseline survey.

A large decline was noticed in childhood mortality rates. The endline survey mortality rates were close to Pakistan's target MDG-4 target levels for 2015, which are 40 and 52 per 1,000 live births for infant and under-5 mortality rates, respectively (Government of Pakistan, 2004). Recent studies have identified Pakistan as having made insufficient progress in achieving MDG-4 (Bhutta et al., 2010). The mortality rates from the intervention district suggest that reforming the primary healthcare sector could enable Pakistan to achieve its health-related MDGs. The large changes in the mortality rates are concurrently optimistic and surprising, and the researchers spent substantial amounts of time and worked with senior

Table 1. Study population of baseline and endline surveys.

Parameter	Baseline survey 2007	Endline survey 2010
Clusters/PSUs	59	120
Urban blocks	3	8
Rural villages	56	112
Sampled households	1,500	3,000
Interviewed households	1,473	2,955
Household members	9,941	21,165

Table 2. Comparison of key indicators between the baseline and endline surveys with confidence interval (CI).

Indicator	Sub-indicator	Baseline survey 2007		Endline survey 2010	
		%	CI	%	CI
Contraceptive prevalence rate	Modern method	18.2	15.9-21.2	22.0	19.5-24.4
	Any method	29.2	26.2-32.4	26.3	23.8-28.8
Antenatal care	At least one visit	70.3	65.4-74.6	73.6	69.0-78.3
	Four or more visits	28.6	24.0-33.5	30.4	26.8-34.0
Tetanus toxoid injection in pregnancy	At least one injection*	50.2	44.8-55.7	63.4	59.5-67.3
	Two or more injections*	44.2	39.0-49.6	54.6	50.4-58.7
Delivery attendant	Skilled birth attendant	36.3	31.6-41.2	38.1	33.9-42.2
Postnatal visit	At least one PNC*	24.6	21.3-28.2	33.3	29.6-36.9
Knows danger signs in newborns	At least one sign*	58.0	52.9-62.5	83.3	80.4-86.2
	Three or more signs*	15.0	12.2-18.2	47.5	43.0-52.1
Immunization	Fully immunized*	45.9	38.1-53.9	60.3	54.9-65.7
	BCG*	79.9	73.3-85.2	92.4	89.7-95.1
	Polio**	99.0	95.8-99.8	77.4	72.7-82.1
	DPT*	55.2	47.2-62.8	76.4	71.4-81.3
	Measles*	62.9	55.3-69.9	72.3	68.0-76.6
Danger signs of diarrhoea	ORT in last bout	54.2	45.6-62.7	63.9	57.0-70.9
	Mother knows one sign	80.2	75.4-83.4	78.4	74.9-81.9
Pneumonia	Mother had heard about it	91.4	88.3-93.8	90.9	88.6-93.2
Mortality rates (per 1,000 live births)	Infant mortality rate*	69.8	57.9-81.7	43.7	34.0-53.4
	Under-5 mortality rate*	99.4	81.7-117.1	52.3	38.5-66.1

demographers to rule out possible data and analytical errors. The researchers came to the agreement that the data were properly collected, the sample size was sufficient and the analyses were correct. Several factors may have influenced this unusual decline. There could have been high perinatal and infant mortalities during and

just after the earthquake, resulting in a relatively higher baseline survey rate. The unusual notch in the population pyramid for the 5 to 9 years age group supports this assumption (Figure 2).

There are some important limitations of this study. Firstly, an experimental design with control groups in both

the baseline and endline surveys could have allowed a more rigorous impact evaluation. Having a control group could be useful to determine the 'counterfactual', which is the outcome in the subject in the absence of the intervention (Khandker et al., 2010). However, since both the worst effected districts of the 2005 earthquake were included in the intervention, it would have been very difficult to find a matching control for this evaluation. Secondly, the project was designed to re-establish and then develop government-supplied health services provided out of fixed facilities. Services provided out of fixed facilities do not necessarily cover the whole population of a district. Thus, whilst the comparative analysis of baseline and endline survey data gave a useful view of the trends in key health indicators, it can only provide a general indication of the impact that the PRIDE project might have had. A facility-based survey combined with a population-based survey would have provided more comprehensive insights into project outcomes and impact. Comparing the baseline and endline survey results from both Bagh and Mansehra district would have been very useful which was not possible because of security conditions in Mansehra at the time of the endline survey.

The PRIDE project is a good example of the effective reform of primary healthcare and its subsequent effects on the health and wellbeing of the people. In July, 2010 the international agencies funding and coordinating the project handed over their roles to local authorities and withdrew their direct support on the project. There are concerns regarding sustainability of interventions after the withdrawal of donor support (Winter, 1993). On the other hand, there are arguments that flexibility and ownership increases without donor support (Victora et al., 2004). It would be useful to assess the sustainability of the PRIDE interventions in the project areas four years after the endline survey. A follow-up survey in 2013, using the same methodology in the same study area, could generate important information on trends in primary health indicators in the intervention areas and would also allow interesting time-series analysis of three sets of survey data at four-year intervals.

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ABBREVIATIONS

KPC, Knowledge, practice and coverage; **IRC**, international rescue committee; **PRIDE**, primary healthcare revitalization, integration and decentralization in earthquake-affected areas.

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