Health Transitions in Pakistan 2

Reproductive, maternal, newborn, and child health in Pakistan: challenges and opportunities

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Globally, Pakistan has the third highest burden of maternal, fetal, and child mortality. It has made slow progress in achieving the Millennium Development Goals (MDGs) 4 and 5 and in addressing common social determinants of health. The country also has huge challenges of political fragility, complex security issues, and natural disasters. We undertook an in-depth analysis of Pakistan's progress towards MDGs 4 and 5 and the principal determinants of health in relation to reproductive, maternal, newborn, and child health and nutrition. We reviewed progress in relation to new and existing public sector programmes and the challenges posed by devolution in Pakistan. Notwithstanding the urgent need to tackle social determinants such as girls' education, empowerment, and nutrition in Pakistan, we assessed the effect of systematically increasing coverage of various evidence-based interventions on populations at risk (by residence or poverty indices). We specifically focused on scaling up interventions using delivery platforms to reach poor and rural populations through community-based strategies. Our model indicates that with successful implementation of these strategies, 58% of an estimated 367 900 deaths (15 900 maternal, 169 000 newborn, 183 000 child deaths) and 49% of an estimated 180 000 stillbirths could be prevented in 2015.

Introduction

More than 90% of 7 million deaths globally in children younger than 5 years occur in only 40 countries, with most deaths occurring in just a few countries in south Asia and sub-Saharan Africa.[1] Pakistan is at the centre of a very volatile geopolitical region with several decades of conflict within the country and in the bordering areas. It is a fairly young but populous nation; the population has grown from 27 million at the time of independence in 1947 to an estimated 185 million people in 2012, and 36·7% of the population are younger than 14 years. Globally, the country has the third and second highest rates of newborn mortality and stillbirths;[2,3] its rate of progress in achieving the targets for the Millennium Development Goals (MDGs) 4 and 5 have been slow.[4] Although much of the health-related information from

Pakistan is assessed at an aggregate level, the country has a vast and diverse landscape of almost 800 000 km[2] and huge differences between its six provinces and the Federally Administered Tribal Areas in resources, access, and development. The disbandment in June, 2011, of the federal Ministry of Health and the constitutional devolution of health to the provinces[5] have placed a huge impetus on provinces for planning and action in relation to public health, especially reproductive, maternal, newborn, and child health (RMNCH).

Search strategy and selection criteria

We searched all electronic databases for information that was relevant to reproductive health and maternal and child health in Pakistan since Jan 1, 1960. We used a comprehensive search strategy with extensive hand searches and cross tabulation of reports and references to access grey literature. There were no language restrictions.

The search strategy was iterative and the final version included core terms ("maternal and child health" OR "maternal" OR "wom*" OR "mother*" OR "pregnan*" OR "infant*" OR "newborn*" OR "neonate*" OR "child*" OR "reproduct*" OR "family planning" OR "nutrit*" OR "maternal survival" OR "child survival") AND ("Pakistan" OR "Punjab" OR "Sindh" OR "North West Frontier Province" or "NWFP" OR "Khyber Pakhtunkhwa" OR "Baluchistan" OR "Pakistan province").

Key messages

- Despite periods of stable economy and the dividends of a young population, Pakistan's progress in achieving Millennium Development Goals (MDG) 4 and 5 for reproductive health and maternal and child survival, respectively, remains unsatisfactory.

- Progress in addressing key social determinants such as poverty, female education and empowerment, and undernutrition has been slow, and unfettered population growth eliminates economic and health gains.

- For health and development indicators, huge disparities exist between and within provinces, indicating the need for targeting and proactive strategies to reach poor and marginalised communities.

- Existing programmes such as the Lady Health Worker Programme, if improved and linked to functional primary care and secondary care facilities, are important strategies to achieve change in the short term but need to be coupled with improvements in quality of care in the health system.

- In the long term, Pakistan needs the political will to prioritise pro-poor and integrated reproductive, maternal, newborn, and child health services after devolution of health services to the provinces.

- Many gains are possible. A restricted repertoire of evidence-based interventions packaged to address reproductive, maternal, newborn, and child health issues have the potential to reduce the burden of maternal and child deaths by 57%, but need to be scaled up with strategies to overcome poverty and barriers to access.

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We undertook an in-depth analysis of available information to assess Pakistan's progress towards MDGs 4 and 5 and the principal determinants of health in relation to RMNCH and nutrition. We also assessed the feasibility of delivering health and nutrition interventions to address RMNCH and survival, with the aim of accelerating progress and making recommendations for change.

Data sources and analytical methods

We undertook a systematic review of available information pertaining to the state of maternal and child health in Pakistan since its independence. Our starting point was an in-depth review of recent situational analyses,[2,3,6–9] relevant policy documents, and official reports about progress towards the MDGs.[10] We undertook an electronic search of all published materials

Figure 1: Causes of maternal deaths (A), stillbirths (B) and deaths in children younger than 5 years (C) in Pakistan
Data are from the 2007 Pakistan Demographic and Health Survey.[21]

from Pakistan of relevance to RMNCH and nutrition and also searched the grey literature representing national and provincial level information of relevance.

Additionally, we obtained original data from several sources for secondary analysis of time trends in coverage of interventions. We analysed the National Nutrition Surveys for 1987,[11] 2001,[12] and 2011 separately.[13] For subnational analysis of district-based trends, we used all available recent Multiple Indicator Cluster Surveys (MICS) from Khyber Pakhtunkhwa,[14,15] Punjab,[16,17] Baluchistan,[18] and Sindh;[19] the data were pooled to make a district-level dataset of more than 168 000 households. Because methods of household poverty assessment differed between the MICS, a composite socioeconomic status index for each district was estimated using several variables, including a weighted average of household assets, education, net primary school enrolment, construction material for households, source of drinking water, sanitation facilities, and household utilities (source of cooking and lighting). Using standard methods, we extracted information about verbal and social autopsies from the Pakistan Demographic and Health Survey (PDHS) 2001[20] and 2007,[21] and associated information from the 2007 survey. PDHS 2007 was undertaken and analysed by teams of experts led by SNJ for maternal deaths and ZAB for deaths in children younger than 5 years and stillbirths.[21] The verbal autopsy information was further analysed to assess the underlying factors and delays associated with stillbirths, and maternal and child deaths. We specifically analysed the reported place of death and factors associated with delays in recognition, care-seeking, and care provision. We estimated the distribution of deaths by cause for each province and various asset quintiles from the weighted PDHS data using standard principal component analysis and the reported data for maternal, newborn, and postneonatal child deaths, and stillbirths during 2001–06 for each woman sampled. These data were then adjusted for the most recent estimates of child deaths in Pakistan[22] and the UN estimates of maternal deaths.[23] Information about coverage of interventions was obtained from the Pakistan Social and Living Standards Measurement Survey 2006–07.[24] Information about household coverage of interventions was obtained from the household-level information systems of the National Programme for Family Planning and Primary Health Care, also known as the Lady Health Worker (LHW) Programme (Hafeez A, unpublished) and also from two sequential external assessments in 2001[25] and 2009.[26] District-level human development rankings for Pakistan were obtained from the 2003 Pakistan Human Development Report.[27]

In addition to these national data sources, we evaluated the current database for coverage of various interventions that were available from WHO Global Health Statistics (2012)[28] and WHO and UNICEF's 2012 report[29] and compared these data with locally available information. We expanded the assessment of standard socioeconomic indicators for the district information in the pooled MICS
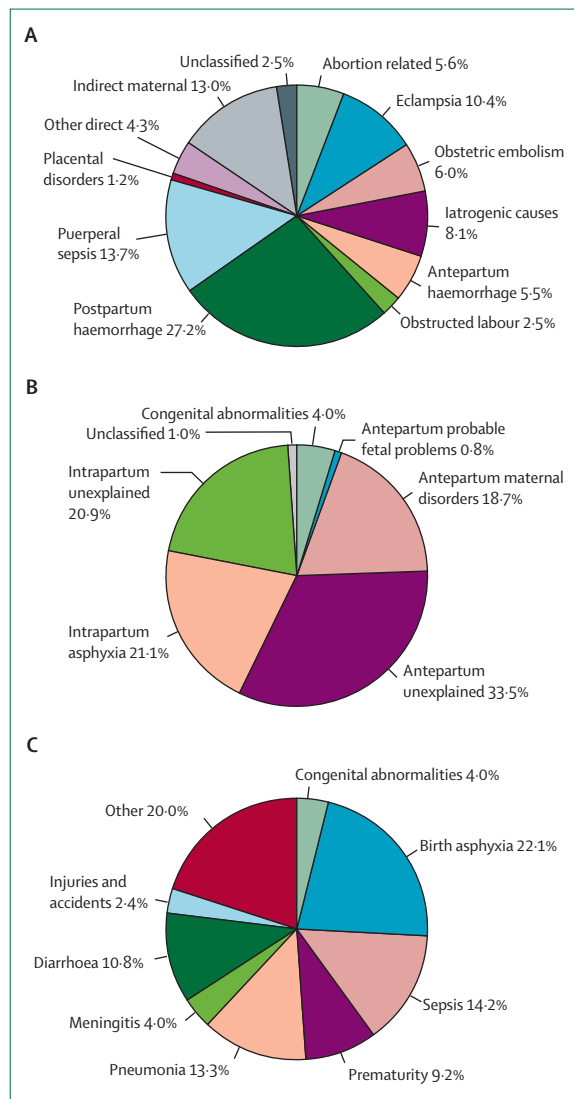
datasets[14–19] to create a district-specific multidimensional poverty index.[30]

Maternal and child mortality

Although there has been progress in terms of reduction in child mortality rates, trends indicate that Pakistan has begun to lag behind many regional countries in south Asia (appendix p 1).These data have been corroborated with the findings from PDHS 2007,[21] which indicate that although there has been some reduction in postneonatal infant and child mortality rates, newborn death rates have remained largely unaltered. 57% of all neonatal deaths occurred within the first 72 h after birth, most within the first 24 h (appendix p 2).

Until the PDHS 2007,[21] in which an extensive standardised verbal autopsy analysis was undertaken of maternal and child deaths in a representative national sample, very little information was available from representative settings about the cause-specific mortality in women and children in Pakistan. Figure 1 is a summary of the main causes of maternal deaths, stillbirths, and child mortality in Pakistan. Haemorrhage, hypertension during pregnancy, and infections accounted for 56·8% of all maternal deaths, and prematurity, asphyxia, and sepsis accounted for 45·5% of all deaths in children younger than 5 years during 2004–06 (figure 1).[21]

Of the various determinants of maternal and child mortality, poverty has received much attention. Although exact poverty head counts in Pakistan are difficult to ascertain,[31] there has been a notable increase in absolute poverty and income inequality after the most recent food price crises and the devastating floods in 2010 and 2011.[32] Poverty in turn is closely related to additional factors including female education and empowerment and belief systems that determine fertility, family size, household practices, and care-seeking behaviours. Poverty is more than mere income and assets, and can evoke a sense of fatalism and hopelessness. These dimensions of abject poverty are particularly notable for care during pregnancy and childbirth. In addition to the two times higher child mortality rate in women without primary education, findings for birth preparedness from the most recent PDHS[21] show that less than a third of families of women

in the poorest quintiles who gave birth had even discussed the place of birth or made appropriate financial arrangements. Of particular note is that despite increasing information and knowledge about modern methods of contraception and some increase in rate of contraceptive use, fertility rates have remained high (table 1) and population growth has continued unabated, outstripping resources and allocations for health.[33–35,37,38]

The relation of poverty and maternal and child mortality rates in Pakistan is complex and indicates not only the household behaviours and factors described above but also corresponding attributes and poor functionality of the health system. These differentials in poverty and development between various provinces and districts of Pakistan are notable and masked by national aggregates. Figure 2 shows the multidimensional poverty index for the districts of Pakistan and skilled birth attendance for the corresponding period[14–19] (adjusted R^2=0·52, p<0·0001). This figure draws attention to the wide socioeconomic differences between various parts of the country, particularly between Punjab and other provinces. A close correlation was noted between infant mortality rate and skilled birth attendance (R^2=–0·78), immunisation coverage rates (R^2=–0·52), and poverty ranking of various districts in Pakistan for 2003–08 from the analysis of the pooled MICS data (appendix p 3–4).[14,16,18,19] Although the relation suggests that poorer districts have higher mortality rates, differences in rates between some districts for the same levels of poverty and population were 50–100%, indicating resilience. Figure 3 shows the most striking evidence for the disparities in coverage of key interventions, with the widest differences for interventions requiring 24 h availability of functional health facilities and staff for maternal and newborn care such as skilled care provision and care for childhood diarrhoea and pneumonia.

Undernutrition is an important manifestation of poverty and has a close association with child mortality. Trends in nutrition status can be ascertained from sequential national nutrition and health surveys,[11–13,39–41] which indicate negligible change in stunting and wasting rates over the past several decades (figure 4).

Consistent with the analysis by Nishtar and colleagues,[5] we assessed the trends in the provision of human

	1984–85, PCPS[31]	1990–91, PDHS[20]	1994–95, PCPS[32]	1996–97, PFFPS[33]	2000–01, PRHFPS[34]	2003, SWRHFPS[35]	2006–07, PDHS[21]
Any method	61·5%	77·9%	90·7%	94·3%	95·7%	95·4%	95·9%
Modern methods	NA	77·2%	90·5%	93·4%	95·0%	95·0%	95·7%
Traditional methods	NA	25·7%	38·2%	54·3%	50·3%	45·4%	63·8%
Contraception prevalence (all methods)	9·1%	11·8%	17·8%	24·0%	28·0%	32·0%	30·0%
Total number of women interviewed	7405	6364	NA	7584	NA	8427	9556
Fertility rates for corresponding periods[36]	6·6%	6·1%	5·5%	5·2%	4·7%	4·5%	4·1%

NA=not available. PCPS=Pakistan Contraceptive Prevalence Survey. PDHS=Pakistan Demographic and Health Survey. PFFPS=Pakistan Fertility and Family Planning Survey. PRHFPS=Pakistan Reproductive Health and Family Planning Survey. SWRHFPS=Status of Women, Reproductive Health and Family Planning Survey.

Table 1: Trends in knowledge and practice of contraceptive methods by currently married women aged 15–49 years during 1984–2007
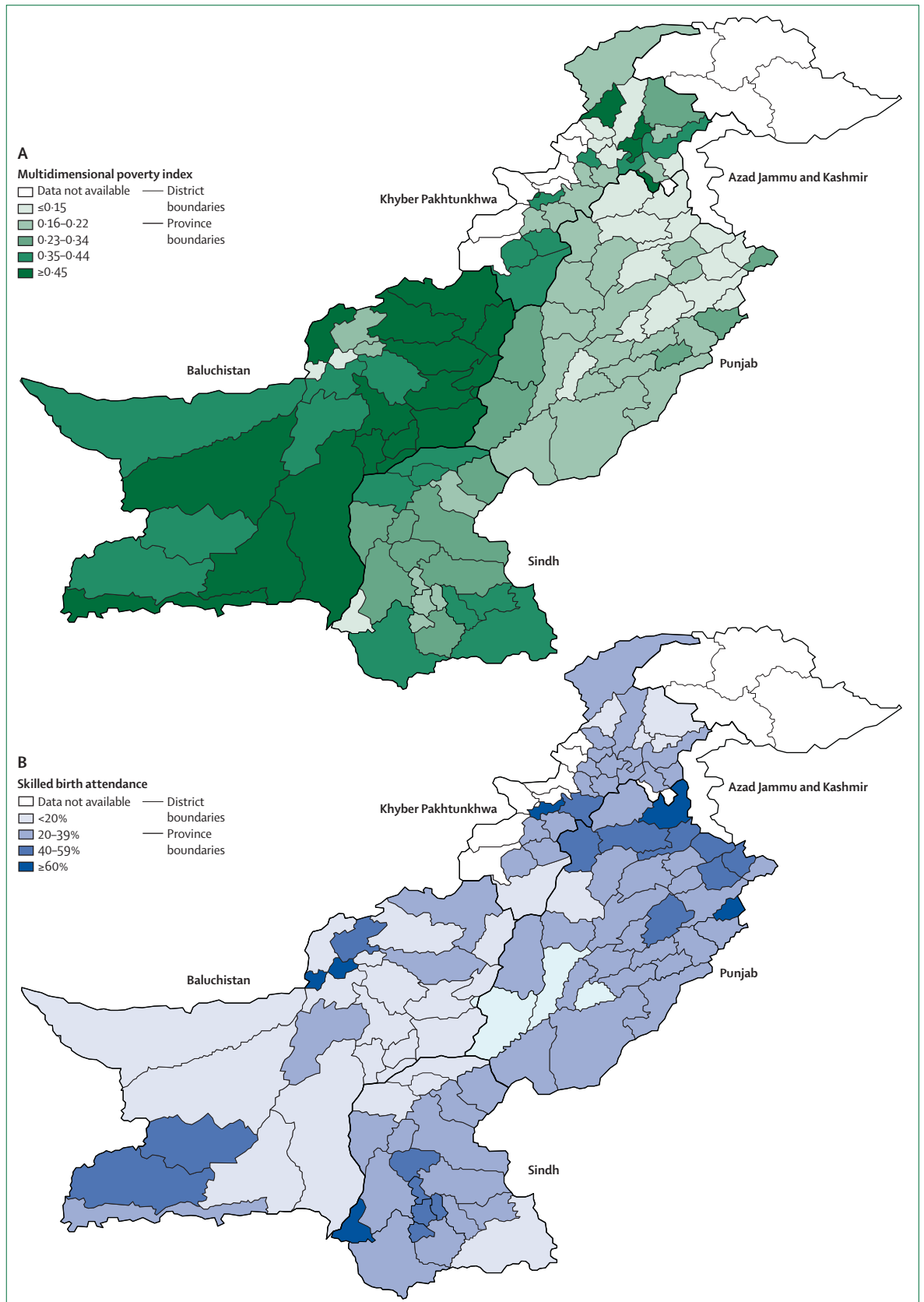
Figure 2: Coverage of the multidimensional poverty index (A) and skilled birth attendance (B) in the districts of Pakistan

Data are from UNICEF.[14,16,18,19]

resources for RMNCH. For example, of all health workers trained and available over the past two decades, the slowest rate of increase has been in the cadres of midwives and nurses (appendix p 6). Most of the trained physicians are employed in the main urban centres and cities and there are few trained female medical officers willing to serve in rural areas. The only main health worker cadre providing services to the rural population in Pakistan are trained public sector community health workers, the LHWs (panel 1).[25,26] The LHWs largely undertake promotive and preventive services but do not provide any obstetric care and very few attend deliveries. They spend as much as 30% of their time during national and subnational immunisation days on eradication of the poliovirus rather than their main task of preventive and promotive RMNCH services.[42]

Why has so little changed?

The status of RMNCH in Pakistan relates to the mismatch between progress between economic development, investments, and RMNCH and nutrition indicators compared with many other countries in the region or elsewhere with worse economies and development indicators. Even during periods of economic growth, the trajectory of gains in RMNCH has been slower than in many regional Asian countries and regions with similar or fewer resources—eg, Nepal,[43] Bangladesh,[44] and Asia Pacific;[45] even India despite its huge and diverse population has made better progress.[46] Pakistan has had several programmes over the years to address the status of RMNCH (appendix p 7). Of note was the initiation of the LHW Programme in 1994 to address RMNCH in primary care settings, especially in rural populations. In addition to several other standalone vertical programmes, the national Maternal, Newborn and Child Health (MNCH) Programme was launched in 2003 but had difficulties in relation to the rate of change in coverage of key interventions and integration with existing health programmes (panel 2). A legitimate question therefore is why has progress in RMNCH in Pakistan not been commensurate with investments? There are several reasons.

First, Pakistan has not had rapid progress in education, especially female education and more than 30% of the population (and 55% of women) remain illiterate.[47] Primary school dropout rates for girls remain high.[48] Pakistan's failure to increase literacy has a direct bearing on low rates of women's empowerment, few economic opportunities, and high rate of population growth.

The cycle of unfettered population growth and poor RMNCH outcomes has impeded progress in health and development. In the past, the Ministry of Family Planning and Ministry of Population Welfare and Health worked alone but in parallel and seldom in tandem. Although devolution to the provinces has created opportunities for integration, breaking down the isolation between hitherto parallel initiatives, such as the MNCH Programme, Expanded Programme on
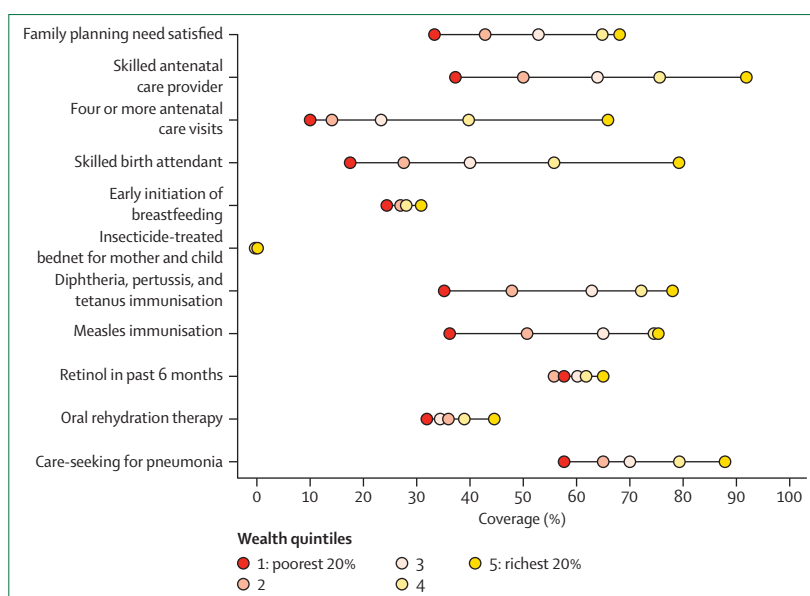
Figure 3: **Differences in coverage of key interventions by wealth quintiles**
Data from the 2006 Pakistan Demographic and Health Survey.[21] Coverage levels are shown for the poorest (red circles) to richest (yellow circles) quintiles. The longer the line between the two groups, the greater the inequality.
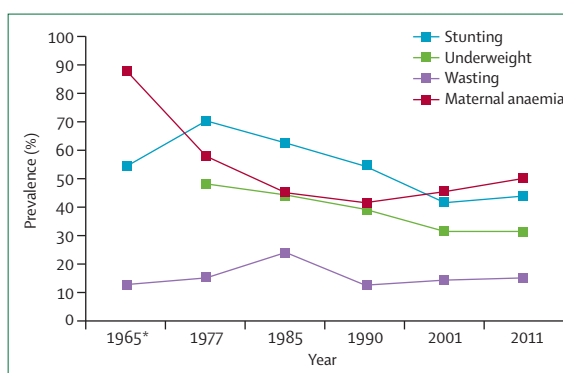
Figure 4: **Prevalence of maternal anaemia, and stunting and wasting in children younger than 5 years in Pakistan from 1965 to 2011**
Data are from the Planning Commission,[11,12] UNICEF,[13] Government of Pakistan,[39,40] and Pakistan Medical Research Council.[41] *Non-representative sample of women for assessment of maternal anaemia.

Immunization (EPI), and Malaria Control and Nutrition Support Programme, has proved quite challenging and, other than the Punjab, no other province has been able to integrate family planning with the health sector. Despite a reasonable spread of interventions and prioritisation within programmes, there is little awareness of inequities and focus on targeting. Most policy makers have focused on urban–rural differences in measuring indicators. Despite growing urbanisation and megacities, now representing almost 50% of the population in Sindh, there are no indicators for the status of people living in urban slums, often over a third of the megacity population.[36] Monitoring and evaluation were particularly poor and, other than periodic household surveys, Pakistan does not have a registration system for births

and deaths. The household-based registration during the LHW Programme is incomplete. Other than two sequential external evaluations from Oxford Policy Management,[25,26] few national programmes have had robust external assessments.

A key measure of the robustness of planning interventions is also the development and implementation of evidence-based intervention packages for RMNCH.[49] Tracking coverage of key interventions[50] and differentials[51] is a fundamental principle for the assessment of progress towards achieving the MDGs. Although some progress has been made with time (appendix p 8), the coverage for various interventions in Pakistan remains suboptimum, with large urban–rural differences.[21] The results of the PDHS 2006–07 show low coverage rates for various interventions, including skilled care at birth (38·8%),

postnatal visit within 24 h by a skilled provider (21·7%), and care-seeking for pneumonia (50·3%).[21]

Assessment of effective coverage and quality of care are important in both domiciliary and facility settings. Few indicators of quality of care exist at various levels of the health system in the public or private sector. Table 2 shows the analysis of various delays encountered by families in the verbal autopsies of maternal, newborn, and child deaths in the 2007 PDHS.[21] The verbal autopsy data show that even when people reached facilities or care providers, poor quality and provision of care was the main and consistent type of delay in all categories of maternal, newborn, and child deaths, emphasising the need to strengthen health systems and quality of care. Also notable is that although most people sought care for newborn and child illnesses within the formal health system, between 50–75% of all deaths for various categories of illnesses occurred at home (analysis of PDHS 2007;[21] appendix p 9).

Although health-system functionality can be assessed through a range of indicators, childhood immunisation services remain a key indicator of performance. Despite a robust programme for childhood immunisation that is well supported by GAVI Alliance processes (panel 3), national coverage of routine immunisations for children remains low. Measles vaccine coverage is estimated to be 59·9%, and 6·0% of children are not vaccinated.[21] This low coverage has been corroborated by data from vaccine coverage and serosurveillance studies[53] and was one of the most important factors contributing to the most recent outbreak of measles in Sindh and parts of Baluchistan and southern Punjab.[54]

Pakistan is one of three remaining countries with residual poliomyelitis. The national emergency plan for poliomyelitis eradication exists in parallel with routine immunisation services and has had serious quality issues in the past. Notwithstanding the above, the poliomyelitis emergency plan has encountered huge challenges with vaccination refusal by some of the population,[55] disinformation stemming from a fake US Central Intelligence Agency supported hepatitis vaccination campaign to track Osama bin Laden,[56] and the targeted terrorist attacks on polio health-care workers.[57]

Despite these challenges with poliomyelitis eradication and achievement of high rates of coverage of the EPI, Pakistan was able to include the pentavalent vaccine (containing hepatitis B and *Haemophilus influenzae* type b antigens) in its main EPI schedule with support from the GAVI Alliance in 2008, and has included the pneumococcal conjugate vaccine in its EPI schedule in 2012. However, the ability of EPI to include these new vaccines while struggling with coverage of basic vaccines, including measles, and obtaining reliable coverage data remain crucial issues.

Way forward for RMNCH

Despite all the difficulties, Pakistan has the potential to improve RMNCH by scaling up key interventions, particularly, after devolution, when there are enhanced

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Panel 1: National Programme for Family Planning and Primary Health Care

In 1994, the Government of Pakistan launched a programme for community health workers known as the National Programme for Family Planning and Primary Health Care. The programme, popularly known as the Lady Health Worker (LHW) Programme, aims to provide community-based preventive services through community engagement and education. The LHWs belong to the local community, have at least grade 8 standard education (≥8 years of education) at entry, and undergo a 3 month didactic training programme according to a standardised curriculum followed by a practical assessment and regular refresher courses. Each LHW serves a population of about 1000 people (150–200 households) in the community and extends her services in the catchment population through monthly home visits. The scope of work includes more than 20 tasks covering all aspects of maternal, newborn, and child care:

- Organise community by developing women's groups and health committees.
- Act as liaison between the formal health system and community.
- Register all eligible couples (married women aged 15–49 years).
- Disseminate health education messages about hygiene and sanitation.
- Provide condoms or oral contraceptive pills to eligible couples and refer clients needing intrauterine device insertions, injectable contraceptives, and surgical contraception.
- Coordinate with traditional birth attendants and local health facilities.
- Undertake nutritional interventions such as anaemia control, growth monitoring, and dissemination of information about the benefits of breastfeeding and weaning practices.
- Coordinate with the Expanded Programme on Immunization for promotion of immunisation of mothers against tetanus and children against nine vaccine-preventable diseases (BCG; diphtheria, pertussis, and tetanus; poliomyelitis; hepatitis B; *Haemophilus influenzae* type b; measles; and *Streptococcus pneumoniae*).
- Undertake prevention and treatment of non-serious ailment.

So far, nearly 100 000 health workers have been trained and deployed, covering about 60% of the population in rural areas. The LHW Programme focuses on community participation through service in the spirit of volunteerism, creation of awareness, and provision of primary health care. Estimated total cost incurred for each worker was PKR44 000 (US$517) per year. Although the programme has received good evaluations in two sequential external reviews,[25,26] with better health indicators in LHW covered areas, several challenges remain. Bottlenecks identified in effective programme performance include poor support from suboptimum functional health facilities, financial constraints, and political interference leading to management issues. The challenges of devolution, poor fiscal support to the provinces, and widespread call for regulation of services threaten the future sustainability of this programme.

Panel 2: Maternal, Newborn and Child Health (MNCH) Programme

The National Health Policy of Pakistan and the 10 year development plan (2001–11) envisaged health sector reforms as a prerequisite for poverty alleviation with a policy focus on shift from curative to promotive and preventive services through primary health care. The plan emphasised strengthening of the primary and secondary tiers of health services and focused on provision of high-quality health services.

The Ministry of Health commissioned its national MNCH Strategic Framework and developed the national MNCH Programme in 2005. The programme aims to improve the accessibility of high-quality and effective MNCH services for all, particularly poor and disadvantaged people, through development and implementation of sustainable provincial and district programmes. The programme is committed to achieve the Millennium Development Goals (MDGs) in MNCH, which include:

- Goal 4, reduce child mortality rate by two-thirds between 1990 and 2015, with specific targets to reduce infant mortality rate to 40 per 1000 livebirths and increase measles immunisation rate to more than 90% by 2015.
- Goal 5, improve maternal health by reducing the maternal mortality ratio (MMR) by three-quarters between 1990 and 2015. The specific target is to reduce MMR to 140 or less per 100 000 births, and to increase skilled birth attendance to 90% by 2015.

In addition to the MDGs, Pakistan envisages increasing, by 2015, the contraceptive prevalence to 55% and proportion of pregnant women receiving prenatal care from 31% to 100%, and reducing the total fertility rate from 3·9 to 2·1.

The national MNCH Programme was comprehensive and is aimed at strengthening, upgrading, and integrating ongoing interventions and introducing new strategies. Some of the core implementation strategies of the programme were:

- Increase demand for health services through targeted, socially acceptable communication strategies.
- Strengthen district health systems through improvement in technical and managerial capacity at all levels and upgrade institutions and facilities.
- Streamline and strengthen services for provision of basic and comprehensive emergency obstetric and newborn care.
- Integrate all MNCH-related services at the district level.
- Introduce a cadre of community-based skilled birth attendants.

Specific human resource development targets had been set for the national MNCH programme and have now been devolved to the provinces:
- Recruitment, training, and deployment of 12 000 community midwives (a new cadre).
- Recruitment of 324 midwifery tutors.
- Training of 15 000 health-care providers.

Additionally, infrastructure targets have been set:
- Upgrade of 5000 basic health units to provide preventive primary health care and family planning services.
- Organise 114 midwifery schools all over Pakistan.
- Strengthen and upgrade 650 health facilities to provide basic emergency obstetric and newborn-care services.
- Strengthen and upgrade 214 hospitals to provide comprehensive emergency obstetric and newborn-care services.

The programme budget is PKR19·9 billion for 2007–12. Although data suggest that between 50–75% of the stipulated targets have been achieved, the MNCH Programme performance has varied with large differences in progress between provinces and districts. Despite producing more than 5000 midwives, the programme's quality and practical experience of community midwives have been questioned. Key issues of regular supply of commodities and stock outs remain unaddressed and many rural facilities do not have qualified obstetricians in place. In Sindh, the integration of the MNCH Programme with a special programme of Norwegian assistance for MNCH has been suboptimum with inordinate delays and release of funds. Although programme funding is assured until the end of 2013, the future of the MNCH Programme and possible integration with other services after devolution to the provinces is still being negotiated.

opportunities for tailoring packages of interventions to specific contexts and scenarios. We assessed the effect of systematically increasing coverage of various evidence-based interventions on reducing the burden of maternal, fetal, newborn, and child deaths using the Lives Saved Tool (LiST). This software[58,59] is used to assess the effect of interventions based on estimates of effectiveness derived from *The Lancet* Series about child survival,[55] neonatal survival,[57] nutrition,[60] and stillbirths.[61,62]

Various packages of evidence-based interventions (appendix pp 10–11) were linked to the LiST model for Pakistan with cause-specific maternal, fetal, newborn, and child mortality estimates for the different provinces according to a range of socioeconomic quintiles, providing estimates of lives saved by interventions at the various levels of coverage.

We specifically focused on scaling up interventions and delivery platforms for maternal and newborn care, and case management of diarrhoea and pneumonia with demonstrated potential for reaching the poor and difficult to reach populations as assessed by location (urban or rural) and socioeconomic quintiles. We used LiST to evaluate the potential effect of various targeted intervention packages on maternal, newborn, child deaths, and stillbirths in the four major provinces (Baluchistan, Khyber Pakhtunkhwa, Punjab, and Sindh) at different levels of coverage, keeping the currently

For the **Lives Saved Tool** see http://www.jhsph.edu/iip/list

available coverage as the baseline levels. The intervention packages included evidence-based interventions that had already been tested at scale in Pakistan—ie, strategies for health promotion and maternal and newborn care employing community-based support groups and counselling[42,63,64] and community-based strategies for scaling up of diarrhoea and pneumonia management by LHWs.[65,66] For maternal illnesses, we modelled the benefits of strengthening strategies for early detection of problems

and prompt referral for basic and emergency obstetric care in functional secondary-care facilities.[67] In view of the need to address financial barriers affecting care and care-seeking, we also included strategies to incentivise care-seeking within the public and private sectors that included voucher schemes and conditional cash transfers.[68]

Figure 5 and table 3 show additional maternal and child lives that could be saved by cause (main categories of maternal, newborn, and child deaths) at 60%, 90%, and universal coverage (99%) compared with reported baseline coverage. Most of these deaths, especially in rural populations, are preventable and 58% of all-cause maternal, newborn, and child deaths can be averted by provision of evidence-based interventions reaching 90% coverage by 2015. These interventions should be delivered as optimised packages of care and appendix pp 12–15 summarises the combined effect of various intervention packages on maternal, fetal, newborn, and child deaths at 90% coverage, indicating that 213 916 (58%) of an estimated 367 900 maternal, newborn, and child deaths per year and 49% of an estimated 180 000 stillbirths could be prevented in 2015 with these approaches. Such targeting would prevent a large proportion of deaths in the poorest populations as affirmed by the estimated maternal, newborn, and child lives saved by these interventions in the poorest quintiles (appendix pp 15–16).

The issues discussed above do not take into account the challenges that are unique to RMNCH in Pakistan, especially in the past three decades. The war in Afghanistan and the Islamist insurgency in the north of

	Maternal deaths	Neonatal deaths	Child deaths (1–59 months)
Delay in recognition of severity of illness (no problem noted)			
Yes	37 (18·1%)	216 (20·1%)	257 (21·7%)
No	167 (81·9%)	859 (79·9%)	929 (78·3%)
Delay in decision making (no male members, travel for care not judged to be necessary)			
Yes	53 (33·5%)	133 (12·5%)	160 (13·5%)
No	105 (66·5%)	934 (87·5%)	1028 (86·5%)
Delay due to availability or cost of transport			
Yes	188 (80·0%)	69 (6·4%)	75 (6·3%)
No	47 (20·0%)	1001 (93·6%)	1112 (93·7%)
Delay in getting appropriate and prompt service from provider			
Yes	75 (72·8%)	565 (52·6%)	919 (76·9%)
No	28 (27·2%)	510 (47·4%)	276 (23·1%)
Total	247	1671	1413

Data are number or number (%), and are from assessment of verbal autopsies in the Pakistan Demographic and Health Survey.[21]

Table 2: Types of delays associated with maternal, newborn, and child deaths in Pakistan

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Panel 3: Expanded Programme on Immunization (EPI) and poliomyelitis eradication

The EPI was introduced in Pakistan in 1976 and was then expanded countrywide by 1978. Currently, the programme procures vaccines for about 5·8 million children and 5·9 million pregnant women. Additionally, a large number of children and women are also targeted to receive immunisation through different supplemental immunisation activities. The programme initially started with six antigens (BCG, diphtheria, pertussis, tetanus, polio, and measles) and then two new antigens (hepatitis B and *Haemophilus influenzae* type b) were added during the past decade. Pneumococcal conjugate vaccine has been introduced with GAVI Alliance support. More than 30 million children are targeted for every round of supplemental poliomyelitis immunisation activities and, in an effort to scale up, more than 3·4 million women of childbearing age (15–49 years) were given three doses of tetanus toxoid vaccine during 2009.

Pakistan has made substantial progress towards interrupting wild poliovirus circulation since the inception of the programme in 1994 until 2005 when the number of poliomyelitis cases fell from estimates of more than 20 000 per year to 28 confirmed in 2005. However, the progress halted from 2006 to 2011, compounded by large-scale population displacement after the floods of 2010 and the insurgency in

Federally Administered Tribal Areas and Baluchistan. In 2011, Pakistan reported 198 cases of wild poliovirus infection (196 type 1 and two type 3) from 64 infected districts, the largest number in the past decade. Of particular note is that of the reported cases in 2011, 31% reported that they did not receive a single dose of oral polio vaccine either as part of campaigns or routine immunisation, whereas another 26% reported receiving seven or more doses of the oral vaccine. With direct oversight from the federal government and the President and the Prime Minister's office, the poliomyelitis programme received much needed attention with a reduction in the number of cases to 57 in 2012 (55 type 1 and two type 3).[52] Vaccine-derived poliovirus has emerged in the past 6 months in Baluchistan and Karachi; it poses huge communication challenges to the country's population.

EPI has huge challenges in reaching all the people in need, especially the poor. Coverage differs substantially between provinces and between urban and rural populations. A national ranking of all districts throughout the country shows that most of the top 20 districts are in Punjab and the worst five are in Baluchistan. The rural–urban gap in immunisation against tetanus increased in Sindh from 38% in 2001–02 to 45% in 2006–07 and in Baluchistan from 28% to 36%, respectively.[20,21]

Pakistan have been especially hard on women and children. The home-grown Taliban and other obscurantists in the tribal areas and northern districts of Pakistan have targeted girls' schools, and female education and employment. In some instances, female health workers have been specifically targeted, hence, severely restricting access by outreach workers. Not only has this targeting affected immunisation services and the polio vaccine programme but also the recruitment of female volunteers and medical and nursing staff in high-risk districts and rural outposts. The insurgency and separatist movement in Baluchistan have also made large areas of an already underdeveloped province virtually inaccessible, worsening the poor health and nutrition in the province. The governance challenges as a result of devolution of health services to the provinces were compounded by the dissolution of the federal Ministry of Health and the division of managerial oversight and coordination over several federal ministries and departments. The experience of RMNCH programmes in the 18 months after devolution in June, 2011, is also mixed. Where provincial capacity and will exist, including in Punjab and Khyber Pakhtunkhwa, progress in terms of planning and development of integrated RMNCH planning has been rapid and substantial. In other instances, progress has been less evident and overall family planning still remains a separate Ministry of Population Welfare.

To think that gains in RMNCH and nutrition can be achieved by intervention in the health sector alone would be naive. Although the creation of the federal Ministry of Food Security in 2011 was an important step in the recognition of the importance of safety nets and alleviation of hunger, whether the ministry takes up a nutrition agenda beyond food supply and pricing structures is not clear. The social determinants affecting RMNCH that relate to the fundamental issues of the status of women, and their education and empowerment in Pakistan need to be addressed. In view of the crucial role of education in improving child survival[69] and that of female financial support strategies and empowerment,[70,71] Pakistan needs to accelerate investments in human development and female education as a key platform for its RMNCH strategy.

The crisis of governance and poor political ownership of maternal and child health have played the main part in the lack of progress in RMNCH in Pakistan because no political parties have thought that RMNCH is a priority. Notably, the largest and most successful primary care programme for addressing RMNCH—namely, the LHW Programme—was the idea of the late Prime Minister Benazir Bhutto, who wanted to do something tangible and innovative for rural women and children. For the situation to change, RMNCH in Pakistan must move up the national political agenda and receive concerted support from all sections of a male-dominated society. In view of the long-term development and economic gains associated with improved nutrition, and population control and the obvious link to the emerging
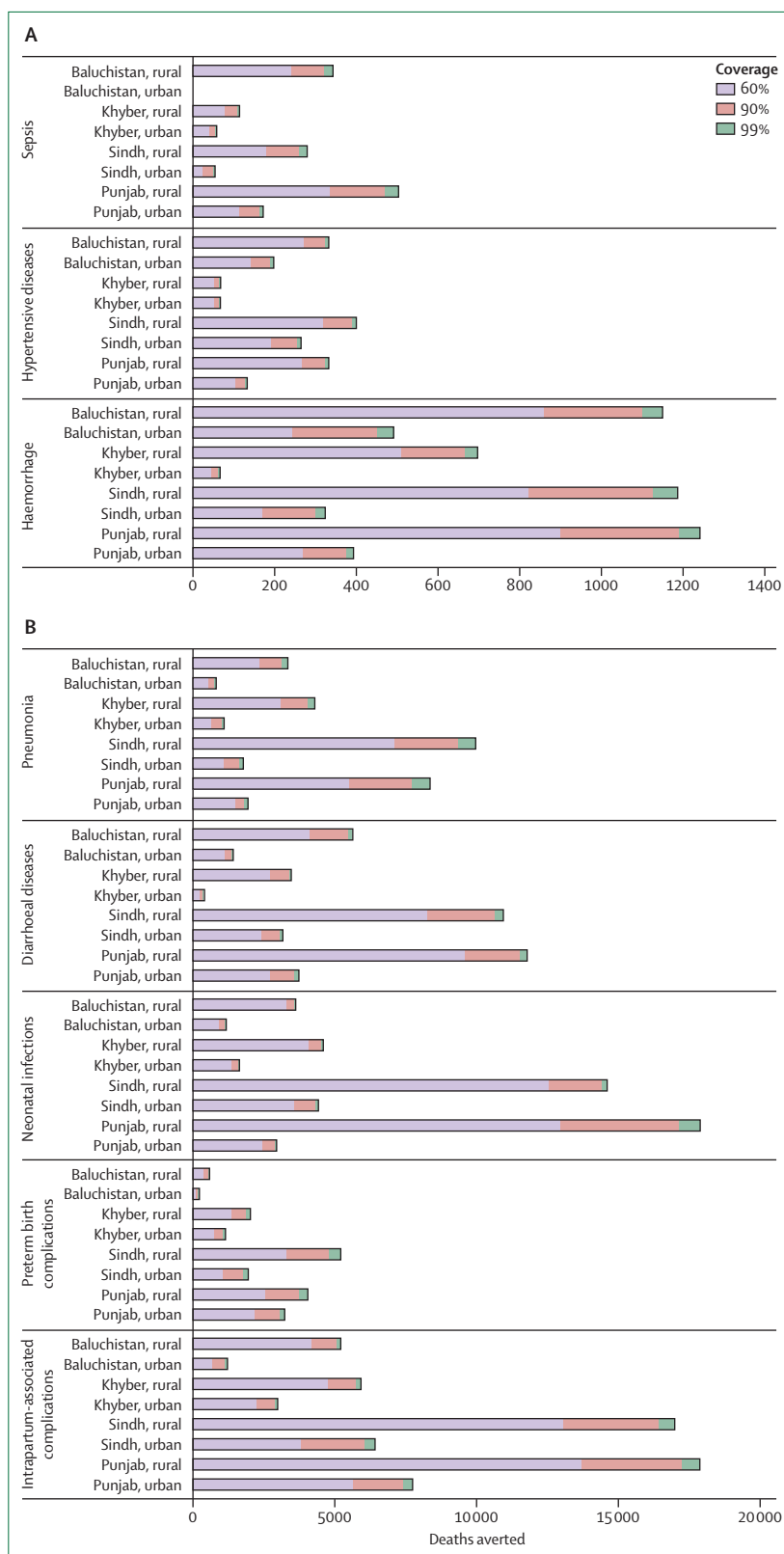

Figure 5: Maternal deaths (A) and deaths in children younger than 5 years (B) averted by main cause and place of residence at 60%, 90%, and 99% coverage of key intervention packages
Data are from the 2007 Pakistan Demographic and Health Survey.[21] Khyber=Khyber Pakhtunkhwa.

	Maternal deaths averted	Newborn deaths averted	Deaths averted in children younger than 5 years
Periconceptual and postabortion care	200 (1·0%)	1100 (1·0%)	..
Antenatal care	900 (5·0%)	2000 (1·2%)	..
Childbirth and immediate newborn care	7800 (49·0%)	94 000 (56·0%)	..
Postnatal care (including community newborn care)	..	20 000 (12·0%)	..
Integrated Management of Childhood Illness and community-based child care	..	..	28 000 (15·0%)
Expanded nutrition	200 (1·0%)	12 000 (7·0%)	4200 (2·0%)
Expanded Programme on Immunization	..	..	8000 (4·0%)

Table 3: Maternal, newborn, and child deaths averted at 90% coverage with care packages

agenda for non-communicable diseases in Pakistan,[72] the ministries of finance and the planning and development departments need to view spending on women's education, RMNCH, and women's nutrition as an investment rather than an expense. Urgent action is needed to improve the state of affairs through concerted, direct efforts, rather than wait for economic growth or poverty alleviation as the main means for change.

Pakistan's current health spending has shrunk to less than 0·5% of the gross domestic product from 1·5% in the late 1980s.[5] Substantial increases in investments in health and education and poverty alleviation over the next few years are crucial. Although health is being devolved to the provinces as a principal responsibility, corresponding resources have not been allocated. Much of the existing expenditure within the health sector is also restricted to tertiary hospitals, mostly in large urban centres and cities. Although the basic health units of the district health services have been contracted to the rural support programmes, links to other public sector services at grass roots such as the LHW Programme and referral to secondary hospitals remain poor. This situation must change to a coherent continuum of care in the district health system. The federal planning commission has concluded that Pakistan needs a plan for national economic development, and, in recognising the importance of devolution, has suggested retention of some national regulatory, coordination, and oversight mechanisms.[73] This plan merits careful consideration and implementation by the provinces.

The primary care services for RMNCH also need a renewed focus with promotion of quality services and stable supplies of commodities. Notably, almost a third of the rural population, especially the poorest and most remote areas, are still without LHW cover. Innovative solutions are needed for such areas, including combining an education and training programme for young girls. Our assessment of various options for introducing interventions suggests that much can be done with the implementation of evidence-based packages of care through available care providers.[58] Consistent with previous assessments,[54] almost two-thirds of maternal and newborn lives can be saved through implementation of several primary care and secondary care interventions. Such interventions need to be introduced in community settings, especially the hard to reach rural populations that will require several innovative approaches, such as community-based platforms for facilitating problem recognition and referrals for care. The LHW Programme is one of the largest outreach programmes in the world and, if access, quality of care, and appropriate referrals for care to functional facilities can be assured, has great potential for altering RMNCH outcomes.

The relation between poverty and RMNCH outcomes in Pakistan is pervasive and the main focus of action must aim at reducing inequities in care. Not only are most deaths clustered in the poor rural populations, but marginalised urban poor are also often under the radar. According to our estimates, targeting these lowest quintiles through strategies that reach the poor can have a huge effect. These strategies include scaling up of outreach services, task shifting with a range of care providers for maternal and newborn care for the rural and urban poor, improving the quality of care in referral facilities, and helping families overcome financial barriers.

Despite widespread perceptions of a failed state and crisis of governance, we believe that the situation in Pakistan is ready for change. Although successive governments might have failed the common man, civic society in Pakistan is vibrant and democracy is slowly but steadily taking root. The devolution of health to provinces offers a unique opportunity for focusing attention on the health and nutrition of the poorest women and children. The key to lasting change would be the combination of effective implementation of primary care strategies for women and children with long-term investments to address social determinants, an action agenda to launch Pakistan into the 21st century.[74]

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