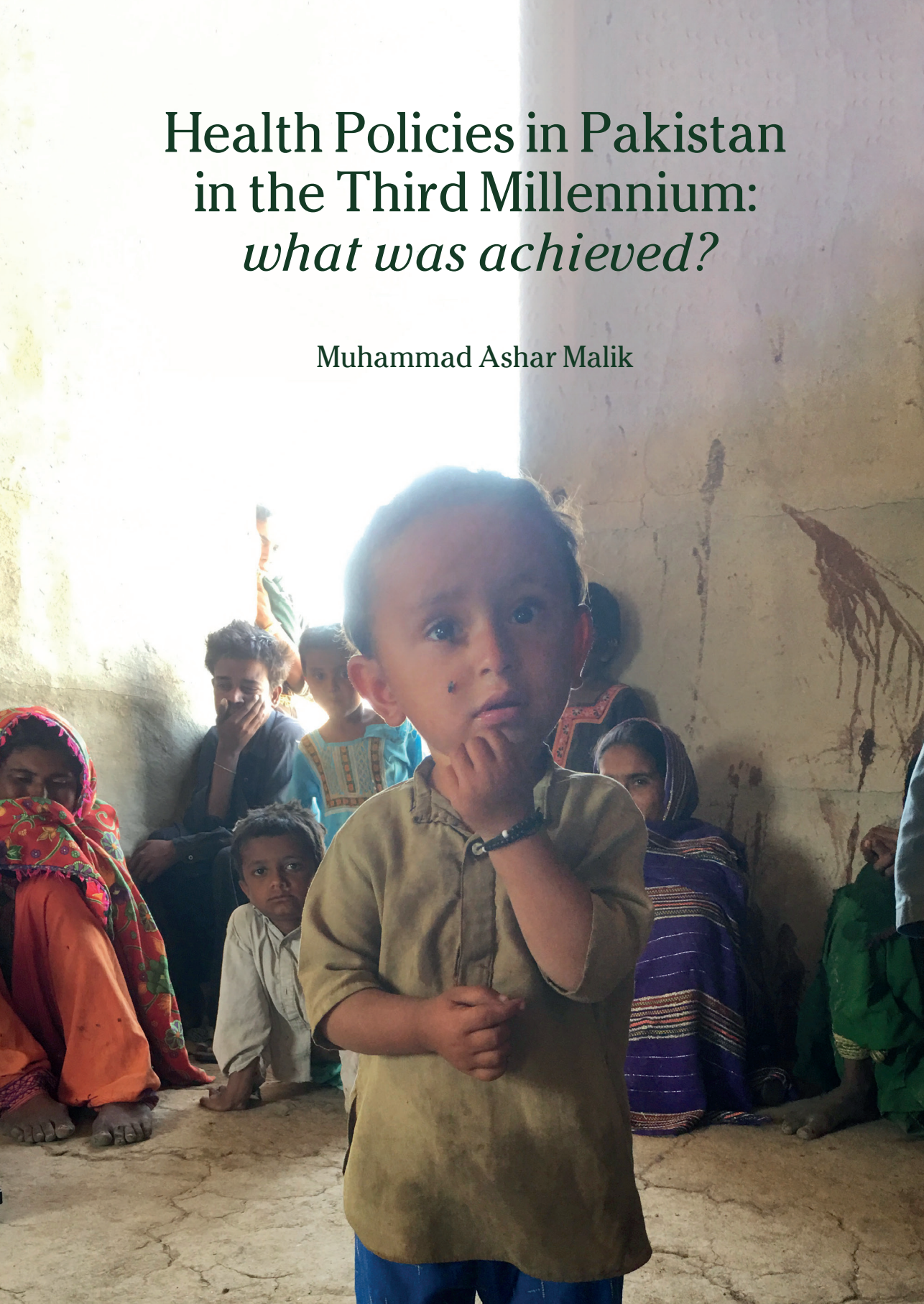
Health Policies in Pakistan in the Third Millennium: *what was achieved?*

Muhammad Ashar Malik



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Health Policies in Pakistan in the Third Millennium: what was achieved?

Gezondheidsbeleid in Pakistan in het derde millennium: wat is er bereikt?

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Chapter 3

Malik MA, Nahyoun AS, Rizvi A, Bhatti ZA, Bhutta ZA. Expenditure tracking and review of reproductive maternal, newborn and child health policy in Pakistan. Health policy and planning. 2017 Jul 1;32(6):781-90.

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Malik AM, Syed SI. Socio-economic determinants of household out-of-pocket payments on healthcare in Pakistan. International journal for equity in health. 2012 Dec;11(1):1-7.

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Akseer N, Kamali M, Arifeen SE, Malik A, Bhatti Z, Thacker N, Maksey M, D'Silva H, Da Silva IC, Bhutta ZA. Progress in maternal and child health: how has South Asia fared? BMJ. 2017 Apr 11;357.

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Malik MA, Rohm LR, van Baal P, van Doorslaer EV. Improving maternal and child health in Pakistan: a programme evaluation using a difference in difference analysis. BMJ Global Health. 2021 Dec 1;6(12): e006453.

Chapter 1 Introduction

At the onset of the Third Millennium, achieving the health-related *Millennium Development Goals* was still a long way off in Pakistan. For example, in 2001, the under-5 mortality rate was 105 per 1000 live births, and the maternal mortality rate was 350 per 100000 live births (Planning Commission, 2004). Out-of-pocket health expenditure constituted 63% of total financing (Pakistan Bureau of Statistics, 2009). The unmet need for treatment of childhood diarrhoea was 18% in 200 (Pakistan Bureau of Statistics, 2003). The use of primary healthcare (PHC) facilities for common illnesses and childhood diarrhoea was only 2% of those seeking care (Pakistan Bureau of Statistics, 2003). Pregnancy-related needs were mostly managed at home by traditional birth attendants (National Institute of Population Studies, 2001; Pakistan Bureau of Statistics, 2003).

Political economy in historical perspective

Pakistan has a population of 220 million. It came into existence in 1947 after gaining independence from the British Empire. Since independence, it has encountered numerous episodes of political and social turmoil. During 74 years of independence, for 35 years Pakistan was ruled by military dictatorships (1958-1971, 1977-1988, and 1999-2008). During the military dictatorships, Pakistan joined military alliances of Western Europe and North America, such as the Baghdad Pact, the war in Afghanistan with the United States, and the alliance on Global War-on-Terror. These alliances attracted immense aid for military and civilian purposes but it came at the cost of widespread social unrest, terrorism, armed conflicts and suicide bombing (Jabeen & Mazhar, 2011). The intervals between these dictatorships were characterized by political turmoil and rifts among the state institutions. For example, during the period 1989 to 1998, the civilian governments were overthrown ten times (Easterly, 2001).

Despite this recent background, until the 1980s, Pakistan enjoyed remarkable economic growth, surpassing many of its neighbours. However, during the 1980s and 1990s, the pace of economic growth slowed down and remained uneven. The economy regained its momentum at the beginning of the third millennium, reaching an unprecedented *Gross Domestic Product (GDP)* growth rate of 8.4% in 2005 (Ministry of Finance, 2008).

The period 2000-2015 marked an unprecedented deterioration with respect to law and order and was also a period when several large environmental, and natural disasters occurred. At the onset of the Third Millennium, southern parts of the country were facing the worst drought in history, and in 2005, a gigantic earthquake hit the northern areas, killing 76000 people and displacing three million (Brennan & Waldman, 2006; Ministry of Finance, 2008). The period 2004-2012, witnessed a massive conflict between the Taliban and the law enforcement agencies. Consequently, more than 20000 civilians were killed in suicide bombings and terrorist attacks, and 14.6 million people were internally displaced during the military operations to over

though the *Taliban regime* in certain parts of the country (Abbasi, 2013). During 2010-14, torrential rains, heavy floods, and heatwaves collectively affected 14 million people (Polastro, Nagrah, Steen, & Zafar, 2011). This era is labelled as the most turbulent time in the history of Pakistan.

Evolution of the public sector healthcare delivery system: challenges and policies

Pakistan has a multi-payer health system, in which the private sector dominates the finance and the delivery of health services (Pakistan Bureau of Statistics, 2009, 2020). Successive policies of the government have sought to improve the utilization of public sector health service delivery. Since 1988, Pakistan has been seeking financial assistance from the International Monetary Fund (IMF)'s Structural Adjustment Program. The *IMF* loans are sanctioned with stringent conditions attached. For example, *SAP*'s budgetary control measures often compromise commitments on enhancing allocations to the social sectors including the health sector (Zulfiqar Ahmed Bhutta, 2001). This is one of the explanations for the low priority that has been given to financing healthcare: spending on healthcare always remained below 1% of *GDP* even though there was an increasing reliance on foreign development assistance in the healthcare sector (J. Ahmed & Shaikh, 2008; Zulfiqar Ahmed Bhutta, 2001).

The public sector healthcare delivery system has evolved to its current shape since the *Alma Ata Declaration on Primary Healthcare* in 1977. The public sector healthcare delivery system was founded on a district-based model that comprises Basic Health Units (BHU) as the first level of care, followed by Rural Health Centres (RHC) sub-district and district hospitals. Most of this setup was established during 1978-1993 (Ministry of Health, 1997; Planning Commission, 1993). As of 2012, there were more than 11000 health facilities, including the tiers of primary, secondary and tertiary levels of care (Government of Pakistan, 2012).

In the 1990s, a consortium of development partners, including the World Bank, Asian Development Bank, Governments of the Netherlands and the United Kingdom, pledged US$ 4 billion financial aid towards the Social Action Program (SAP) (World Bank, 1998). The SAP adopted a Sector-Wide Approach (SWAp) which targeted the entire social sector, including *PHC*, primary education, population welfare, and rural water supply and sanitation (World Bank, 1998). Under the auspices of SAP, the Family Health Project (1991-1999) was the recipient of a significant investment programme with a cost of US$ 177 million in the health sector (World Bank, 1998).

In the period 2000-2015, Pakistan's policy responses in the health sector were based on two assumptions. First, given the limited available resources priority setting in managing the healthcare needs is indispensable. Second, although the public sector healthcare delivery system is sufficient in terms of population coverage and geographical access, it faces challenges mainly related to weaknesses in governance compounding the shortages of resources (M. Ali, Bhatti, & Kuroiwa, 2008; Midhet, Becker, & Berendes, 1998). Reports issued

by the government of Pakistan (GoP) claimed that there was at least some kind of PHC facility in each union council (smallest administrative unit) or in the radius of 5 kilometres that was functioning sub-optimally due to shortage of supplies, especially medicines and availability of doctors (Government of Pakistan, 2012). As a remedial measure, *GoP* prioritized maternal and child health (MCH) among healthcare needs, while reforms were carried out to improve governance, especially in the public sector *PHC*. The findings of the *SAP* reviews were one of the factors to set the *MCH* agenda; that is, gender bias in access to health services and a bias in resource allocation against rural areas (Easterly, 2001).

The government of Pakistan (GoP) began a series of large-scale projects focusing on *MCH*. These projects prioritized two aspects of *MCH*: (1) overcoming deficiencies in district health facilities to manage maternal and child healthcare needs of their target population, and (2) reaching un-served rural poor through an effective community outreach programme on health education and awareness. Notable examples include (1) the Women's Health Project (WHP): 2000-06, (2) the Pakistan Initiatives for Mothers and New-born (PAIMAN) 2004-2010, (3) Norway Pakistan Partnership initiatives (NPPI) 2009-2014. Through these *MCH* projects, the *GoP* targeted the provision of essential routine and emergency obstetric care at all levels of care and a community outreach programme that focused on vaccination and maternal health awareness (M. Ali et al., 2008; S. M. Ali, 2005; Ministry of Health, 2001, 2006).

A parallel agenda of the *GoP* over the same period was aimed at revitalizing PHC facilities. First, *GoP* extended the coverage of the community outreach programme: The National Program on Primary Healthcare and Family Planning, to all rural areas of the country. Second, to overcome common management challenges such as staff deficiencies and absenteeism, and the effective management of stocks of medicines and other essential supplies, it contracted-out PHC facilities to the rural support programmes. From 2004 to 2012, *GoP* extended this reform to 73 districts (out of 113 in total). Figure 1 provides an overview of major health policies and programmes of *GoP* since 1977.

Evidence on effectiveness of health policies

In the area of healthcare financing, the practices that are considered essential for effective health policy analysis, for example, Resource Tracking and Public Expenditure Reviews, were rarely carried out in Pakistan. Furthermore, the existing contents and format of the health accounts limited their usefulness for health policy formation and analysis (Pakistan Bureau of Statistics, 2012). For instance, disease-specific (the functional classifications) health expenditures are not available in current reports of health accounts.

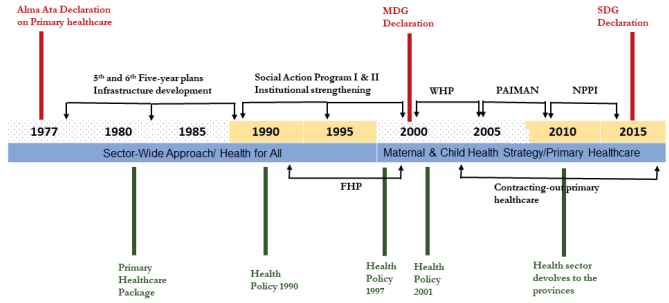

Figure 1 Health system development in Pakistan since Alma-Atta
Figure provides a schematic of the discourse of GoP in health sector over 1977-2015. Top and bottom row provides international health polices and national health policies, respectively. The top bar indicates the type of governments, dotted area is the periods of military dictatorships and rest is democracy. The lower bars explains the specific health sector strategies. Text and bars in red, green and black indicates the names and year of enactment of international health policies, national health policies and specific health projects respectively. MDG: Millennium Development Goals; WHP: Women Health Project; PAIMAN: Pakistan Initiatives for Mothers and Newborns; NPPI: Norway Pakistan Partnership Initiatives; FDP: Family Health Project; SDG: Sustainable Development Goals

Also, the levels of contributions from agencies outside of the *GoP* are under-reported in the health accounts. A further problem for policy analysts is that little evidence exists on the magnitude and drivers of the *OPHE*: the primary source of healthcare financing in the country. The evidence, before 2015, on the effectiveness of the significant programmes and reforms such as *MCH* projects and contracting-out was limited to the project completion reports of the *GoP* (Asian Development Bank, 2007; Atwood, Fullerton, Khan, & Sharif, 2010; Norwegian Ministry of Foreign Affairs, 2015) or case-control studies, commissioned by the multilateral and bilateral development partners (Loevinsohn, Ul Haq, Couffinhal, & Pande, 2009; Martinez et al., 2010; Population Council, 2014).

Given the limitations described the literature before 2012 had little relevance to setting priorities for the years ahead. Given the *GoP* experience of *SWAp* and the fact that Pakistan had missed the health-related *MDGs*, it is crucial to establish an evidence-base about previous initiatives to inform future health policies. Therefore, it is crucial to conduct a critical review of the existing scientific and grey literature, recognize its strengths and weaknesses and identify the areas that should be addressed by generating appropriate additional scientific evidence.

Objectives

The research aim of this thesis is to support evidence-based policymaking in Pakistan. It will do this by evaluating some of the significant investments designed to improve the responsiveness of the healthcare delivery system. Specifically, we will answer two research questions:

1. What were the patterns of healthcare financing in Pakistan and their relationship with health outcomes, particularly in the *MCH* sub-sector?

2. Are the claims of increased utilization of health services causally related to areas exposed to the health reforms/programmes?

We answer the first question by first tracking the resources devoted to the health sector in general and the *MCH* sub-sector specifically, as this was the prime focus of investments of the *GoP* and its development partners. Second by estimating the magnitude and the determinants of the out-of-pocket health expenditure, as this was the major source of healthcare financing. To answer second research question, we evaluate some of the significant reforms carried out in the Third Millennium. In particular, we evaluate (1) the contracting-out of *BHUs*, a large-scale reform sustained over a decade (Martinez et al., 2010) and (2) *NPPI*, the most recently implemented and most innovative project on *MCH* sub-sector (Norway-Pakistan Partnership Initiative, 2008). In addition, using mixed-methods research, we apply a contextual framework to validate our findings related to healthcare financing and health services delivery with health outcomes. To do this, we compare Pakistan's performance in the health sector to 1) the countries that were selected for an in-depth review of progress on health-related *MDGs* by the research collaboration of the Countdown-to-15 (https://www.countdown2015.org) namely, Ethiopia, Malawi, Tanzania, Afghanistan, and Peru and 2) the countries of the South Asian region, namely India, Bangladesh, Nepal, Sri Lanka, Bhutan. Lastly, we explore the influence of socio-economic factors on health-seeking behaviour.

We use a range of sources of quantitative and qualitative data. Data on healthcare financing is drawn from successive rounds of National Health Accounts, Appropriation Accounts of the *GoP* and Household Integrated Economic Survey (HIES). Data on health services utilization is drawn from Pakistan Social and Living Standard Measurement (PSLM) Surveys. Country-level statistics on healthcare financing and health outcomes are obtained from the Health Expenditure Database of the World Health Organization and development statistics database of the World Bank, and Demographic and Health Surveys. In addition, programme-level qualitative and quantitative data for the programmes and reforms that we review is obtained from the official records of the *GoP* and its development partners. This includes information on the design of intervention packages, selection of intervention areas, project management and reviews, terms of references of contracts and agreement, financial and physical targets, and the achievement of the projects. To triangulate our findings, we examine the peer-reviewed scientific literature, archives of the *GoP*, bilateral and multilateral partners, and published and unpublished grey literature.

We apply appropriate methods of resource tracking. These methods are recommended by the system of health accounts of the *OECD* and the *WHO*. We apply techniques developed in health econometrics to

explore casual and non-causal relationships for either describing health-seeking behaviour or evaluation of the health policies or the health programmes. The period of the analysis is 2000-2015: known as the era of the *MDGs*.

This thesis contains two sections. In section 1, question number 1 is answered. Here we review trends in healthcare financing and health outcomes in Pakistan compared with the Countdown-to-15 countries. Next, we estimate and review the expenditure on Reproductive, Maternal, Neonatal and Child Health (RMNCH) sub-sector and the magnitude and the determinants of the out-of-pocket health expenditure. In section 2, question number 2 is answered. Here we review trends of maternal and child health outcomes and health services delivery in the South Asian region. Next, we provide a programme evaluation of 1) contracting of primary healthcare units and 2) the Norway Pakistan Partnership Initiatives (NPPI).

Part a Tracking healthcare financing in Pakistan

Chapter 2 Countdown to 2015 country case studies: what can analysis of national health financing contribute to understanding MDG 4 and 5 progress?

Abstract

Countdown to 2015 (Countdown) supported countries to produce case studies that examine how and why progress was made toward the Millennium Development Goals (MDGs) 4 and 5. Analysing how health financing data explains improvements in *RMNCH* outcomes was one of the components to the case studies. This paper presents a descriptive analysis on health financing from six Countdown case studies (Afghanistan, Ethiopia, Malawi, Pakistan, Peru, and Tanzania), supplemented by additional data from global databases and country reports on macroeconomic, health financing, demographic, and *RMNCH* outcome data as needed. It also examines the effect of other contextual factors presented in the case studies to help interpret health-financing data. Dramatic increases in health funding occurred since 2000, where the *MDG* agenda encouraged countries and donors to invest more resources on health. Most low-income countries relied on external support to increase health spending, with an average 20–64 % of total health spending from 2000 onwards. Middle-income countries relied more on government and household spending. *RMNCH* funding also increased since 2000, with an average increase of 119 % (2005–2010) for RMNH expenditures (2005–2010) and 165 % for CH expenditures (2005–2011). Progress was made, especially achieving MDG 4, even with low per capita spending; ranging from US$16 to US$44 per child under 5 years among low-income countries. Improvements in distal factors were noted during the time frame of the analysis, including rapid economic growth in Ethiopia, Peru, and Tanzania and improvements in female literacy as documented in Malawi, which are also likely to have contributed to *MDG* progress and achievements. Increases in health and *RMNCH* funding accompanied improvements in outcomes, though low-income countries are still very reliant on external financing, and out-of-pocket comprising a growing share of funds in middle income settings. Enhancements in tracking *RMNCH* expenditures across countries are still needed to better understand whether domestic and global health financing initiatives lead to improved outcomes as *RMNCH* continues to be a priority under the Sustainable Development Goals.

Keywords

Health finance, Reproductive health, New-born health, maternal health, Child health, Afghanistan, Ethiopia, Malawi, Pakistan, Peru, Tanzania

Background

Leading up to the deadline of the Millennium Development Goals (MDGs), Countdown to 2015 (Countdown), http:// www.countdown2015mnch.org/, engaged with several country-based teams to produce case studies by using evidence to evaluate countries' experiences in improving reproductive, maternal, new-born, and child health (RMNCH) outcomes, highlighting achievements made towards key health *MDG*s, shortcomings, and recommendations on ways forward. The case studies provide an in-depth understanding of the causes and processes that led to, or detracted from the achievements of *MDG 4* (reduce under- 5 mortality rate by two-thirds from 1990 to 2015) and *MDG 5* (reduce maternal mortality ratio by three-quarters from 1990 to 2015(Moucheraud et al., 2016). Analysing how health financing is related to *RMNCH* outcomes was a key component of these case studies.

Countdown case studies were conducted in three phases. This paper focuses on the second phase of case studies (Afghanistan, Ethiopia, Malawi, Pakistan, Peru, and Tanzania) because they have comprehensive health financing analyses; not conducted in the first phase (Niger and Bangladesh). The third phase of case studies (China and Kenya) were not complete at the time of this study. The first paper of the Countdown case study supplement (Moucheraud et al., 2016) provides details on the country selection criteria for the three phases of case studies. Among the 6 Countdown case studies in this analysis, Malawi, Ethiopia, Afghanistan, and Tanzania are low-income countries (LICs), Pakistan is a lower-middle income country (LMIC), and Peru is an upper-middle income country (UMIC) (World DataBank, 2015). Focus of the case studies vary across country, where some focused on only MDG 4 while others focused on *MDG 4, MDG 5*, and beyond (Table 1).

Country	Case Study Focus
Malawi	Achievement of MDG 4
Ethiopia	Achievement of MDG 4
Afghanistan	Achievements MDG 5, and progress towards MDG 4
Peru	Achievement of MDG 4, MDG 5, and nutrition indicator for MDG 1. More focus on MDG 4 and MDG 1
Tanzania	On track for MDG 4 and insufficient progress for MDG 5
Pakistan	Progress to achieve MDG 4 and MDG 5

Table 1 Country Case Study Focus, by MDG

The first comprehensive review of the *MDGs* was produced in 2005 by the United Nations and consisted of assessing progress for the world as a whole and for various regional country groupings. Findings from this evaluation demonstrated that progress towards *MDG 4* and *MDG 5* was slow – especially among Sub-

Saharan Africa and Southern Asian countries (Department of Economic, 2015). An upsurge in global attention following the 2005 review led to considerable increase in financial contributions to fight poverty and for countries to provide "immediate support" towards impact-focused initiatives for health (International Institute for Sustainable Development 2010). Previous empirical work assessing linkages between public health spending and improvements in *RMNCH* outcomes are mixed. Several studies have demonstrated that an increase in public health spending significantly reduced infant and child mortality (Anand & Ravallion, 1993; Rajkumar & Swaroop, 2008; Ravallion & Bidani, 1999; Verhoeven, Gupta, & Tiongson, 1999)]. For example, a one-percentage point increase in the share of public health spending in gross domestic product (GDP) led to a 0.18 % reduction in child mortality (Rajkumar & Swaroop, 2008). On the other hand, other studies show the impact of public health spending on under-5 and infant mortality rates to be quite small and statistically insignificant, with socioeconomic and cultural factors being more influential on *RMNCH* outcomes (A. M. Basu & Stephenson, 2005; Caldwell, 1990; Filmer & Pritchett, 2000). This paper draws on data and findings from the case studies to understand how health financing contributes to progress made towards *MDG 4* and *5* among selected countries, as part of the Countdown case study supplement. This will be done by answering a series of questions around trends in general health and specific *RMNCH* spending, influences of the different sources of funding, and the relationship between health spending and *MDG* progress.

Methods

The health financing component of the Countdown case studies uses data obtained from health resource tracking tools (such as public expenditure tracking surveys, public expenditure reviews, etc. that can include frameworks, methods, and data systems for collecting and analysing data on the flow of health funds (Powell-Jackson & Mills, 2007), as well as other national surveys, desk reviews of key financing documents, and in some case studies, semi-structured interviews or focus group discussions were conducted in order to enhance the quantitative findings. A uniform methodology for the health-financing component of the case studies was not applied to cater to specific health financing questions relevant for each case study. This depended on country context, specific *MDG* focus, and available data. A health-financing guide was developed to assist country teams to develop the health-financing component. This is provided in the Additional file 1. The methods used for each case study are highlighted in Table 2.

This paper descriptively analyses data from six Countdown case studies (Afnan-Holmes et al., 2015; Akseer et al., 2016; Huicho et al., 2016; Kanyuka et al., 2016; M. A. Malik, Nahyoun, Rizvi, Bhatti, & Bhutta, 2017; Tadesse et al., 2015). Questions that the analysis explores, to understand how health financing contributes to progress made towards *MDG 4* and *5*, are:

1. Did total health spending substantially increase over the MDG time?

2. Did RMNCH spending increase significantly over the MDG time?

3. What are the key sources of health funding and how do they vary by country?

4. What are the differences in allocation shares to RMNCH across countries and how are they related to the different rates of progress toward RMNCH outcomes?

Country	Health Finance Methods Data Sources	Analyses
Malawi	Primary Data • 41 semi-structured interviews Secondary Data • National Health Accounts • IFMIS (Govt health expenditure) • Geocoded Malawian Aid Management Platform available from AidData (external health expenditure data) • Integrated HH Survey (for population)	Analysis Time Period 2006-2011 Qualitative and quantitative analysis at national and district levels by govt and DPs for 2010/11
Ethiopia	Secondary Data • National Health Accounts • Health care financing and related documents	Analysis Time Period 1995-2011 Qualitative and quantitative analysis at national to examine trends and levels in total and child health expenditures
Afghanistan	Secondary Data • Afghanistan Health Surveys • National Risk and Vulnerability Assessment Surveys	Analysis Time Period 2005-2012 Trends in MCH use and spending, and analysis at national and district levels
Peru	Secondary Data • Data from Ministry of Economy and Finance	Analysis Time Period 2000-2013 Qualitative and quantitative analysis at national and departmental levels for trends of RMNCH expenditures, and individual and group discussions to identify possible underlying factors influencing RMNCH expenditure variation
Tanzania	Secondary Data • National Health Accounts • Official development assistance data from Organisation for Economic Co-Operation and Development's Creditor Reporting System (OECD-CRS)	Analysis Time Period 2002-2010
Pakistan	Secondary Data • Household Integrated Economics Surveys • Pakistan Social and Living Standard Measurement Surveys (PSLM: 2004-2010) • Public Sector Development Plans (PSDP: 2003-2010) • Appropriation Accounts • National Health Accounts • Official Development Assistance data from OECD-CRS • Published scientific and grey literature	Analysis Time Period 2000-2010 Qualitative and quantitative analysis at national for trends of MMNCH expenditures, and expert panel to provide local cost estimated for MNCH services, review national guidelines, and classify vertical primary care programs

Table 2 Health Finance Analysis Methods for each Country Case Study

We assessed trends in total health and *RMNCH* financing, health spending adjusted for population levels, spending levels by source of funding compared with total health spending, and the relationship between per capita spending levels and *RMNCH* outcomes to answer these questions. Total health and *RMNCH* financing include government, external, household out-of-pocket (OOP), and other private financial resources. *Microsoft Excel* was used to generate scatter plots and graphs, and simple calculations were used

to determine percent change of health financing trends. (Additional file 2 presents a table for each country with key total health and *RMNCH* financing data used in this paper.) This analysis also examines other factors, such as political and economic context, presented in the case studies that may also determine observed health financing trends. More details about these non-financing determinants are further explored in the first paper in this supplement (Moucheraud et al., 2016).

Additional data was extracted from global databases and country reports including the World Bank's World Development Indicator for macroeconomic and health financing data (for Countdown countries, not including the six in this study) (World DataBank, 2015), *UNICEF's* and *WHO's* country statistics on maternal and child mortality rates(UNICEF, 2013a, 2013b; WHO, 2010), countries' National Health Accounts (Department of Policy and Planning, 2012; Ehtiopia Federal Ministry of Health, 1996; Ethiopia Federal Ministry of Health, 2003, 2006, 2010, 2014; Malawi Ministry of Health, 2007, 2014; Ministerio de Salud, 2015; Ministry of Public Health, 2011, 2013b; National Statistics Office, 2010; Pakistan Bureau of Statistics, 2009, 2012, 2013, 2014), and National Statistics Office (National Statistics Office, 2010). This was to fill any missing health outcome and financing data not reported in the Countdown case studies for Malawi, Pakistan, Afghanistan, and Tanzania. All finance data was converted to constant US$, for ease of comparability to heath financing indicators and other countries, using consumer price index factor with a base year of 2012. Health finance data sources were expressed in financial years (e.g., 2010/11), which is usually the case with NHA data, and were reported as the latter year for simplicity. For example, Tanzania's most recent NHA expenditure data is from 2009/10, and is reported as year 2010.

RMNCH expenditures measurement is based on the reproductive and child health subaccounts definitions and consistent across five of the six Countdown case studies. This is the case for Tanzania, Malawi, Ethiopia, Peru, and Afghanistan (only for reproductive health, child health subaccount was not done). Reproductive health includes family planning and maternal health services, including postnatal care for the mother and new-born (or care up to 6 weeks after birth). Child health includes services or activities provided to children aged 0–5 years. Concluding that these two health-financing categories are not mutually exclusive. This issue will likely lead to overestimate *RMNCH* expenditures as a percent of total health expenditures for each country but could not be addressed. For Peru, *RMNCH* per capita spending was estimated slightly different by the case study team with reproductive spending separate from maternal and neonatal estimates. This affects the comparison of per capita estimates across countries with maternal and neonatal health (MNH) per pregnant woman provided for Peru instead of reproductive, maternal, and neonatal health (RMNH) spending per woman of reproductive age – as in the case for Afghanistan, Tanzania, Malawi, and Ethiopia. The *RMNH* spending per woman of reproductive age (15–49) for Malawi was estimated using the *NHA* total *RMNH* spending and population estimates sourced from the National Statistics Office(National Statistics Office, 2010) of woman aged 15–49 from 2003–2012. The Pakistan

case study team estimated maternal, newborn, and (MNCH) spending using several data sources where *MNCH* were not disaggregated [18]. This was done because RMNCH subaccounts were not conducted for Pakistan's *NHAs*.

Results

Did total health spending substantially increase over the MDG time?

All six countries experienced an increase in total health expenditure (THE), although the percent change over time was more variable (Fig. 1). Malawi experienced a rapid increase in *THE* of US$134 million to *US*$638 million from 2003 to 2012, a 346 % increase. Both Ethiopia and Peru saw an increase in *THE* of more than 200 % after 2000. Tanzania had a lower increase in *THE* from US$930 million in 2003 to US$1,736 million in 2010, an overall 87 % increase. Both Afghanistan and Pakistan saw a smaller increase of 35 % (2008–2011) and 11 % (2006–2012), respectively.

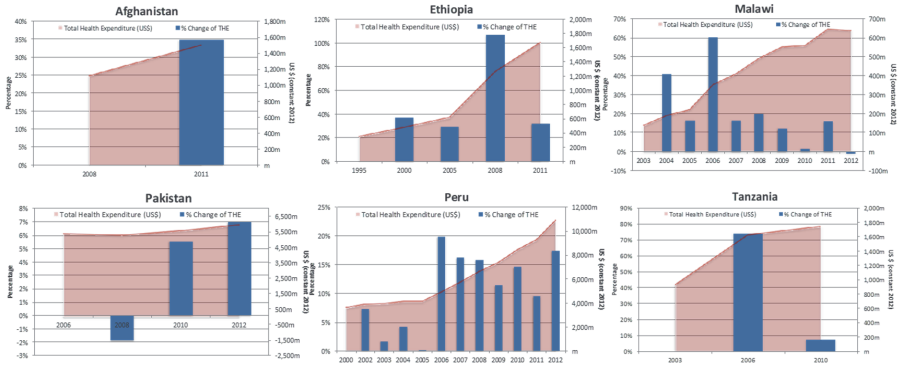

Figure 1 Trend and percent change in total health expenditure (THE) by country

Most countries also experienced an increase in per capita health spending (see Additional file 2). Malawi's per capita health spending increased by 110 % from 2003–2012, but fluctuated from US$19 in 2003, peaking at US$41 in 2009, and then decreasing slightly to US$39 by 2012. Ethiopia's per capita health spending increased by 244 % from 1995–2011, although it was still quite low at *US*$20 by 2011. Tanzania's per capita health spending increased by 65 % from *US*$26 in 2003 to *US*$43 in 2010. Afghanistan increased slightly between 2008–2012 by 24 % and is higher compared to the other lower-income case study countries with a per capita spending of *US*$56 in 2012. Peru's per capita health spending increased at a similar rate as Ethiopia (249 % from 2000–2012), however being an *UMIC* the per capita health spending is substantially higher at *US*$331 by 2012. Pakistan was the only country within this study that experienced a slight decrease in per capita health spending between 2008 and 2012 (*US*$37 to *US*$35, a 7 % decrease).

Most of the 6 countries' health spending in 2010 was below the average of other Countdown countries health spending not showcased in this study, by income level (LIC, LMIC, and UMIC) (Additional file 3). Tanzania and Afghanistan are slightly above the average for *LIC* Countdown countries of US$38. However, Afghanistan, Malawi, and Tanzania are above the average health spending relative to *GDP* for *LIC* Countdown countries (6.7 %), while Ethiopia was slightly below at 5 % of *GDP* for total health spending in 2010. Pakistan and Peru per capita spending was slightly below the average for *LMIC* (US$87) and *UMIC* (US$391) Countdown countries, respectively. Although Peru's total health spending as a proportion of *GDP* was consistent with the average spending for *UMIC* Countdown countries at 5 %.

Did RMNCH spending increase significantly over the MDG time?

RMNCH spending increased substantially across the case study countries after the agreement of the *MDGs* and since its first comprehensive review in 2005. Total child health (CH) expenditures substantially increased after 2005 by 58, 173 and 490 % for Ethiopia, Malawi, and Peru, respectively (Fig. 2). The trend in total *CH* expenditures for Tanzania and Afghanistan was not available, although there is evidence that external spending on *CH* substantially increased (Afnan-Holmes et al., 2015; Akseer et al., 2016). Total MNH (Peru) and RMNH (Malawi, Ethiopia, and Tanzania) health spending also substantially increased after 2005 by 65, 202, 77 and 200 % for Malawi, Ethiopia, Tanzania, and Peru, respectively. In Pakistan, total *MNCH* expenditures increased by 96 % between 2001 and 2010 (M. A. Malik, Nahyoun, et al., 2017). All the countries experienced an increase in health spending per child under 5-years and woman of reproductive age (15–49) or pregnant woman (Fig. 2). For Peru, *CH* expenditures per child under 5 years increased from *US*$6 to US$176 from 2000 to 2013; a more than 20 fold increase (Huicho et al., 2016). For other countries, the increase in *CH* per capita expenditures was not as dramatic but still substantial. In Malawi, health spending per child was 3 times higher in 2012 compared to spending levels in 2003 while Ethiopia almost doubled its spending per child between 2005 and 2011. Peru's *MNH* spending per pregnant woman increased on average almost 50 % annually (or about an annual average increase of *US*$42) going from *US*$31 in 2000 to *US*$574 in 2013. Consistent growth in *RMNCH* funding in Peru was attributed to empowering sub-national governments to participate in design, implementation, and monitoring of *RMNCH* interventions through decentralization; an uptick of successful anti-poverty programs with explicit focus on *RMNCH* such as *JUNTOS* (Conditional Cash Programme with utilisation of maternal and *CH* services as a condition); and the empowerment of civil societies that were instrumental to set the *RMNCH* agenda and ensure substantial funding to *RMNCH* activities despite changes in political leadership (Huicho et al., 2016).Ethiopia's *RMNH* spending per woman of reproductive age increased from almost US$5 in 2005 to just under *US*$13 in 2011 – an increase of 182 %, albeit still low in absolute terms. Malawi experienced an overall 24 % increase from 2003 (US$14) to 2012 (*US*$18); a slight decline occurred between 2011– 2012 of 18 % with per woman of reproductive age spending at *US*$22 in 2011. In Pakistan

per capita *MNCH* expenditure increased by 67 % between 2001 and 2010 (US$4 to *US*$7, respectively). *RMNH* spending per woman of reproductive age was not available for Tanzania.

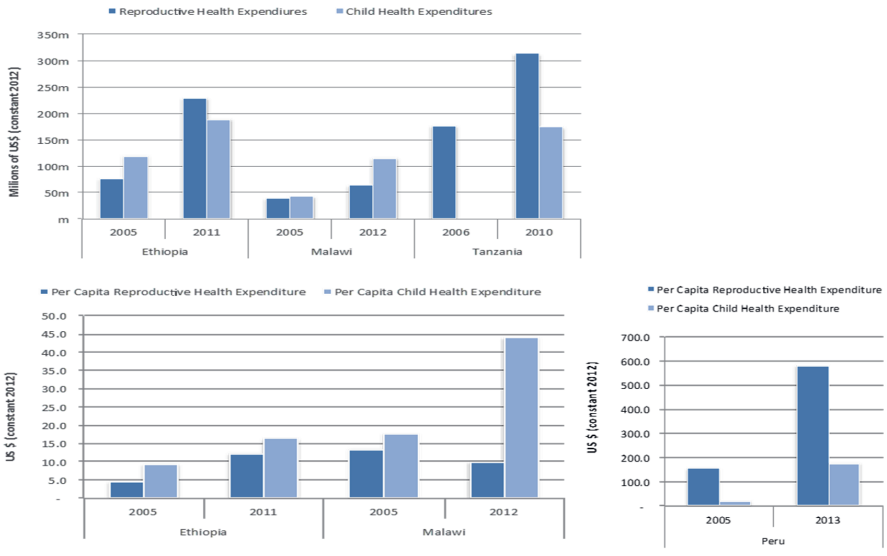

Figure 2 Trend of reproductive, maternal, new-born and child health (RMNCH) expenditures for Ethiopia, Malawi, and Tanzania (constant 2012 US$)

a Reproductive, maternal and child health expenditures by country (Ethiopia, Malawi, and Tanzania). b Reproductive and maternal health spending per woman of reproductive age and child health expenditure per child under-5 years for Ethiopia and Malawi. c. Reproductive and maternal health spending per woman of reproductive age and child health expenditure per child under-5 years for Peru. Note: Peru's per capita reproductive, maternal, new-born and child health (RMNCH) expenditures are substantially higher and with all three (Ethiopia, Malawi, and Peru) graphed together, the changes in per capita reproductive, maternal, new-born and child health (RMNCH) expenditure in 2005 and after would not be as visually noticeable

RMNCH spending as a proportion of *THE,* did not always increase over time for Ethiopia, Malawi, and Peru (Fig. 3). For Ethiopia, *CH* spending as a percent of the *THE* declined from 2005 (19 %) to 2011 (11 %), while *RMNH* spending as a percent of *THE* increased slightly during the same time from 12 to 14 %. *RMNH* spending as a proportion of *THE* also increased for Tanzania between 2003–2010 from 14 to 18 %. In Malawi, *RMNH* spending as a proportion of *THE* decreased from 19 % in 2003 to only 8 % in 2010, and then increased to 14 % by 2012. Child health expenditures as a percent of *THE* in Malawi declined from 17 % in 2003 to 14 % in 2011 and then rapidly increased to 18 % by 2012. In Afghanistan, *RMNH* spending was 16 % of *THE* in 2011. Only external *RMNCH* spending data was available for Pakistan. External expenditures on CH decreased substantially from *US*$7.5 million in 2006 to *US*$4.6 million in

2012. Maternal health expenditures from external resources were more variable during the *MDG* timeframe, with *US*$2.5 million in 2006 jumping drastically to US$49.9 million in 2010 and then declining to *US*$7.2 million by 2012. This data was pulled from the Pakistan *NHA*, while official development assistance (ODA) data from the Creditor Reporting System (CRS) by the Organisation for Economic Co-operation and Development (OECD) shows external spending on *MNCH* to be substantially higher (M. A. Malik, Nahyoun, et al., 2017).

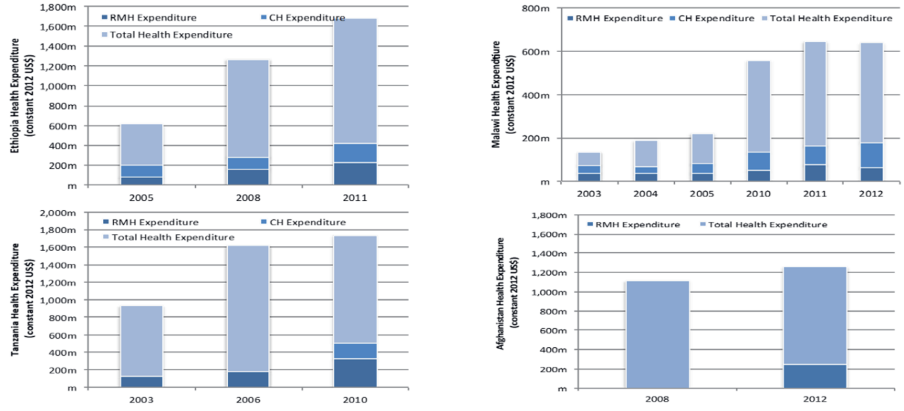

Figure 3 Total reproductive, maternal, new-born and child health (RMNCH) expenditure relative to total health expenditure (constant 2012 US$) for Ethiopia, Malawi, Tanzania, and Afghanistan

What are the key sources of health funding and how do they vary by country?

Key sources of health funding vary across the six countries, and according to their income levels. Ethiopia and Malawi heavily rely on external contributions to the health sector compared to the other 2 LICs in this study, accounting for 50 % or more of total health expenditures, with increases in total health spending levels associated with increases in external aid (Fig. 4). This high level of external support may not continue as these countries develop along with competing priorities for resources especially with the new Sustainable Development Goals (SGDs) consisting of 17 goals and numerous targets compared to the 8 *MDGs*. Afghanistan's health spending relied more on *OOP* spending, with an average of 74 % of total health spending from 2008–2012 compared to external support at 20 % of *THE*. For Tanzania, total spending levels increased from both government and external contributions, although a small increase occurred for health expenditures in 2010 when *OOP* contributions increased.

External aid is less influential on health spending levels among the middle-income countries studied. Household *OOP* spending on health is the main financing source for the health sector in Pakistan, consisting of 55 % of total health spending by 2012.

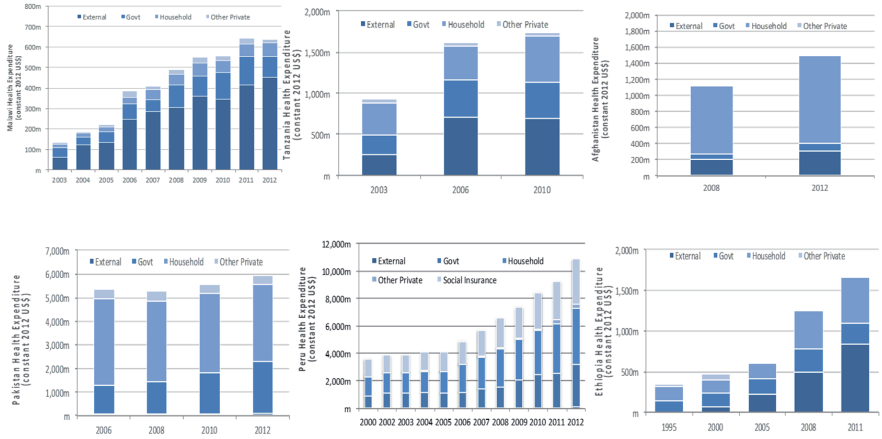

Figure 4 Total health expenditure by funding sources by country (constant 2012 US$)

First row (left to right) Malawi, Tanzania, and Afghanistan. Second row Pakistan, Peru, and Ethiopia

Government spending levels is also quite high for Pakistan compared to other countries at 37 % in 2012; with an increase in the level of government health spending that corresponds with higher total health spending levels mainly between 2008 and 2012. In the case of Peru, *OOP* spending for health was 39 %, government health spending was 26 %, and social insurance (consisting of both *OOP* and government health expenditures) was 33 % of total health spending on average between 2000–2012. External and other private contributions were only 2 % of total health spending during the same time. Little funding from external resources among these middle-income countries is consistent with one criterion of external support toward countries that are typically *LICs* and thus more resource constraint.

Referring to Fig. 5, the source of funding for specific *RMNCH* expenditures is more mixed and specific patterns of funding sources by country income level are not as evident. Malawi continues to be heavily dependent on external resources (e.g., 73 % of total CH spending came from external donors by 2012), and a rise (or fall) in *RMNCH* spending depends on the increase (or decrease) in external funding for *RMNCH*. This seems to be the case in Ethiopia for *RMNH*, although *CH* spending levels fluctuate more according to *OOP* health spending levels. Donor support for C*H* spending in Ethiopia was 27 % and government contributed 25 % of total *CH* spending, while *OOP* was 48 % in 2011. Tanzania relies more on *OOP* spending for *RMNCH* activities, with 56 % of *CH* spending coming from *OOP* and almost 30 % from government sources and only 13 % from external sources. It is important to note that while maternal

and child health services are to be free for everyone in both Ethiopia and Tanzania, *OOP* remains a major funding source for *CH* expenditures in these two countries. Donor support for CH spending in Ethiopia was 27 % and government contributed 25 % of total *CH* spending in 2011, while in Tanzania donor support was slightly lower at 13 % and government contributing almost 30 % of total *CH* spending in 2010.

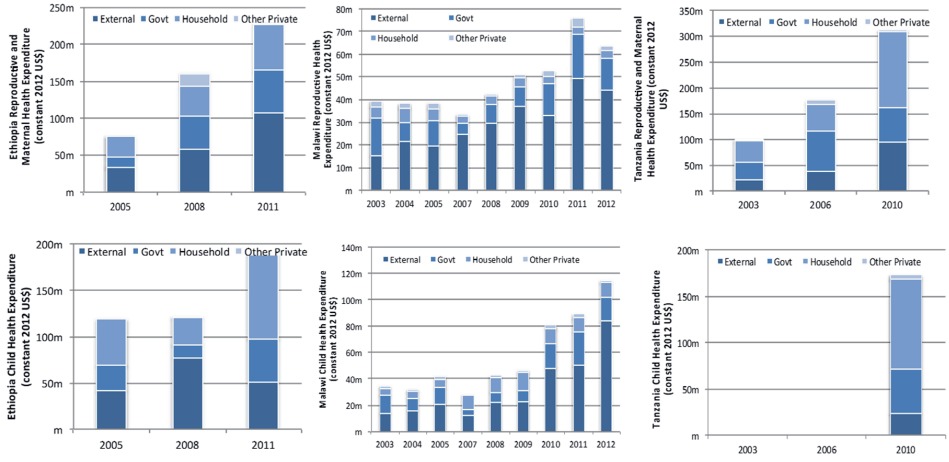

Figure 5 Reproductive, maternal, newborn and child health (RMNCH) expenditure trend by funding sources for Ethiopia, Malawi, and Tanzania (constant 2012 US$)

First row (left to right) Ethiopia reproductive and maternal health expenditure, Malawi reproductive and maternal health expenditure and Tanzania reproductive and maternal health expenditure. Second row Ethiopia child health expenditure, Malawi child health expenditure and Tanzania child health expenditure

What are the differences in allocation shares to RMNCH across countries and how are they related to the different rates of progress toward RMNCH outcomes?

Increase in health and *RMNCH* financing was accompanied by a reduction in maternal mortality rates (MMR) and under-5 child mortality rates (U5MR), and for some of the case study countries, an achievement of *MDG* 4. In most cases, an increase in *RMNCH* spending was accompanied by a reduction in *MMR* (Malawi and Tanzania) (Afnan-Holmes et al., 2015; Kanyuka et al., 2016) and *U5MR* (Ethiopia and Malawi) [15, 16] during the same timeframe. However other contextual factors, in addition to increased health financing, may have also contributed to a reduction in *MMR* and *U5MR* to the necessary levels for *MDG* progress and achievement.

None of the six case study countries achieved the *MDG* 5 target, although Afghanistan, Peru, and Ethiopia are very close to achieving this goal as of 2015 with more than 80 % progress towards *MDG5a* (Moucheraud et al., 2016). Afghanistan has the highest spending per woman of reproductive age (*US*$45), among the LIC case study countries (where data was available), while Ethiopia is very low at only *US*$12 (Fig. 6). Peru

has the highest spending per pregnant woman across all countries, *US*$574, although this estimate does not include reproductive health spending and therefore also has a different denominator compared to the other countries in this study. Most notable changes of coverage rates for key maternal health interventions in Afghanistan were skilled attendants for antenatal care (16 % in 2003 to 53 % in 2012), skilled birth attendants (14 % in 2003 to 46 % in 2012), and facility births (13 % in 2003 to 39 % in 2012) (Akseer et al., 2016) – likely key drivers of maternal health spending and maternal health improvements. Likewise, Peru has increased substantially the coverage of maternal health interventions, including the percentage of women with at least 4 antenatal care visits (from 69 % in 2000 to 95 % in 2013) and skilled birth attendance (from 59 % in 2000 to 89 % in 2013), with greater progress achieved in rural areas and in the poorest quintile (Huicho et al., 2016).

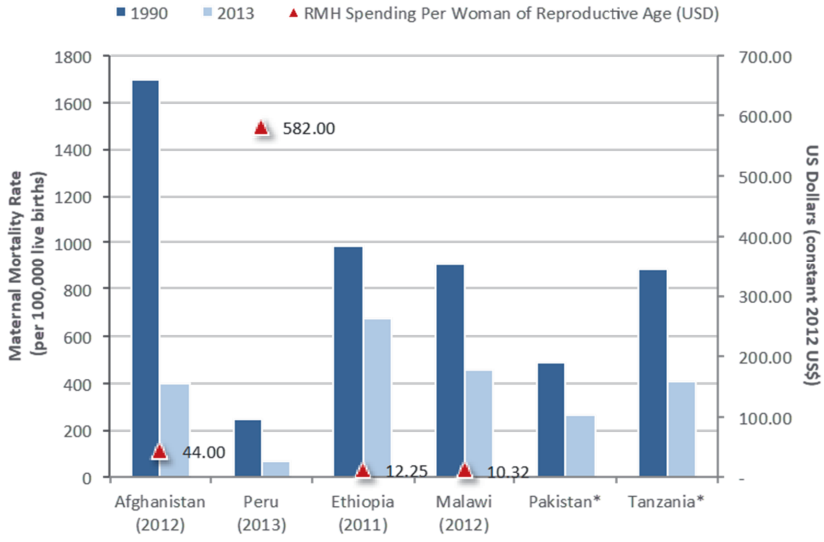

Figure 6 Maternal mortality rates and percent decline from 1990–2013 with most recent maternal health per capita spending by country.

* No per capita reproductive health expenditure data is available. Parentheses under countries is the most recent year with maternal health expenditure data.

Sound and stable policy commitments on health investments and economic growth were listed as possible explanations for achieving substantial progress towards *MDG* 5 in Afghanistan, Ethiopia, and Peru (Akseer et al., 2016; Huicho et al., 2016; Moucheraud et al., 2016; Tadesse et al., 2015). All three countries' focused efforts on the basic health package consisting largely of maternal and child health services and substantial deployment of the health work force such as community midwives in Afghanistan and health extension

workers in Ethiopia (Akseer et al., 2016; Tadesse et al., 2015). In the case for Afghanistan, another explanation is that *MMR* was very high (1,700 per 100,000 live births in 1990) after years of conflict and no health care system, large improvements were possible with an increased focus on *RMNH* and health system structure. On the other hand, in settings where mortality is not as high, it is more challenging (and more expensive) to reduce *MMR*.

Implementation and health system constraints were noted for countries in this study for not achieving *MDG* 5 (Moucheraud et al., 2016). In the case of Tanzania, irregular implementation of key maternal health interventions or services (e.g., antenatal care and clean birth practices) over the decades slowed progress towards *MDG* 5 (Afnan-Holmes et al., 2015). In Ethiopia several possible reasons for not achieving *MDG* 5 include lack of strong referral linkages between health facilities and deep-rooted cultural practices or beliefs that lead to underutilisation of services such as institutional delivery (Tadesse et al., 2015). In Pakistan an equity analysis revealed pro rich utilisation of government health facilities for antenatal care, institution based obstetric deliveries and postnatal care during 2001–2010 (S. M. Malik & Ashraf, 2016).

Four out of the six countries in this study met *MDG* 4– Peru, Malawi, Ethiopia, and Tanzania. The amount of spending per child under 5 years varied greatly (Fig. 7). Ethiopia spent the least amount with only *US*$16 per child in 2011, while Peru spent the most at *US*$176 in 2013. It was found that a decline in child mortality in Ethiopia corresponds with the rapid increase in total health spending due to the implementation of health and health financing programs, policies, and strategies including the Health Extension Program (2004), health Care and Financing Strategy (2005), and Child Survival Strategy (2005). High political commitment to the health sector also led to streamlining a majority of domestic and external resources for health through a harmonization initiative, which focuses health resources jointly to attain common targets and goals (Moucheraud et al., 2016; Tadesse et al., 2015). Malawi spent US$44 per child in 2012, while Tanzania spent *US*$23 per child in 2010. In Pakistan, government health facilities were found to be pro-poor for *CH* services during 2001–2010, yet targets on immunization coverage remained a big challenge throughout the decade of 2000(S. M. Malik & Ashraf, 2016). Pakistan did not achieve *MDG* 4 despite public facilities being pro-poor and an increase in *MNCH* financial resources.

Other factors, in addition to health spending on *CH* services, may explain reductions in *U5MR* and IMR. Increases in *GDP* per capita have been associated with significantly reducing *U5MR* and *IMR* [40]. A few Countdown case study countries experienced rapid economic growth during the *MDG* era (see Additional file 4). Since 2003 Ethiopia experienced more than 10 % real annual *GDP* growth (equating to an annual *GDP* per capita annual increase of 8 %), one of the fastest growing economies among Sub-Saharan African countries (Tadesse et al., 2015). Tanzania experienced a 7 % annual increase in real *GDP* (or 4 % annual increase in real *GDP* per capita) since 2000. The Tanzania case study also found that an increase in gross national income (GNI) per capita was significant, although a weak association, in reducing *U5MR* (Afnan-

Holmes et al., 2015). Additionally, improvements in female literacy has led to a reduction in child mortality (Cornia, Rosignoli, & Tiberti, 2008; Gakidou, Cowling, Lozano, & Murray, 2010), and Malawi case study identified that this may have contributed to increased child survival (Kanyuka et al., 2016).

Discussion

Dramatic increases in health funding occurred among all countries in this study since 2000, with increased focus on the *MDGs*. Low-income countries relied substantially on external support to rapidly increase health spending, something that will need to continue in future to achieve the *SDGs* but brings concerns of fiscal sustainability. Conclusions on whether this increase in external support has led to a displacement of government health spending as found in previous literature (Dieleman & Hanlon, 2014; Farag, Nandakumar, Wallack, Gaumer, & Hodgkin, 2009; Lu et al., 2010) could not be concluded on such few observations. The dependency on external resources is much less among the studied middle-income countries, with much of the health funding coming from government as well as *OOP* health spending. Some studies highlight that high *OOP* health spending is regressive by exposing them to potential catastrophic spending (Ruger & Kim, 2007; Van Minh, Phuong, Saksena, James, & Xu, 2013; Xu et al., 2010). An 89 cross-country study found that catastrophic health spending and impoverishment remained high where *OOP* spending on health that was more than 15–20 % of total health spending (Xu et al., 2010). Pakistan, Afghanistan, and Peru all have substantially higher *OOP* spending than this threshold in 2012 of 55, 73 and 37 %, respectively. Exploration into the causes and economic impact of the high *OOP* spending among the case study countries, especially for Afghanistan, a *LIC*, is needed.

The High-Level Taskforce on Innovative International Financing for Health Systems (HLTF) was set up in 2008 to identify innovative and additional financing to strengthen health systems among 49 of the lowest income countries. In 2009, the *HLTF* modelled the per capita resource requirements for providing a basic health service package among *LICs*. By using the *WHO* normative costing approach, it was estimated that countries should spend US$54 per capita (2005 constant) to deliver all necessary health services. This translates to *US*$86 per capita in 2012 terms for government and donor funding to ensure basic primary health care services within *LICs* (Meheus & McIntyre, 2017). None of the low-income countries in this study have reached this estimated level of per capita spending (Fig. 8). Afghanistan, Ethiopia, Malawi, and Tanzania had a total health per capita spending from government and donors of *US*$15 (2012), *US*$14 (2011), *US*$37 (2012), and *US*$27 (2010), respectively; implying a financial gap between *US*$49-US$74 of per capita spending. It is unlikely that these four countries will close this gap in future given historical trends of health spending.

RMNCH funding also substantially increased across all studied countries, especially after the first review of the *MDG* progress in 2005. Contributing factors that led to an increase in *RMNCH* funding and improvements in *RMNCH* outcomes are political stability; consistent political commitment to health; rapid

economic growth; engagement with community; decentralization; antipoverty programs with explicit focus on *RMNCH*; and, for some *LICs*, increased external support (Afnan-Holmes et al., 2015; Akseer et al., 2016; Huicho et al., 2016; Kanyuka et al., 2016; Moucheraud et al., 2016; Tadesse et al., 2015). Malawi *RMNCH* financing is heavily reliant on external support, consisting of 70 % or more of total *RMNCH* funding in 2012, along with Ethiopia's *RMNH* funding comprising of 47 % from external support in 2011. High *OOP* spending for *RMNCH* activities in Tanzania and *CH* activities in Ethiopia are of particular concern given that maternal and child health services are to be free for everyone. Possible explanations might be heavy reliance on private pharmacies for drugs and supplies when public health facilities are out of stock, imposing costs on the individual or individuals using private providers for *CH* services that may be closer to home or perceived better quality of services (Baltussen, Yé, Haddad, & Sauerborn, 2002; Macha et al., 2012; Polsa, Spens, Soneye, & Antai, 2011).

Substantial progress was made toward *MDG* 4 and 5 among some countries, even with per capita *RMNCH* spending below $50. One possible explanation for this finding is that health spending was targeted toward effective *RMNCH* interventions. The Lives Saved Tool (LiST) analysis conducted under the Countdown case studies demonstrates that certain interventions were particularly effective in reducing child mortality rates. For example, almost half a million of children's' lives were saved in Ethiopia due to key interventions implemented from 2000–2011; 44 % of which was due to activities that focused on reducing stunting (Tadesse et al., 2015). On other hand, resource inefficiencies may be contributing factors that detracted Pakistan's ability to achieve *MDG* 4 and 5. Such inefficiencies were found with duplication of program implementation and routine *PHC* services, along with an overlap of human resource roles between health workers such as the lady health workers, lady health visitors, and community midwives (M. A. Malik, Nahyoun, et al., 2017). The possibility that countries with low *RMNCH* per capita spending were able to achieve *MDG* 4 or make substantial progress towards *MDG* 5 by targeting health spending towards more effective *RMNCH* interventions needs to be tested. Understanding the determinants behind such successful cases could provide a way forward for achievements during the post-*MDG* era.

While the Countdown case studies were not designed to test causal relations between financing and *RMNCH* outcomes, the studies show that reductions in *MMR*, *IMR* and *U5MR* were accompanied by an increase in *RMNCH* financing. Improvements in other distal factors were noted to have potentially contributed to reducing maternal and child mortality rates in the case studies such as rapid economic growth in Ethiopia, Peru, and Tanzania and improvements in female literacy as documented in Malawi for improved child survival. Other studies have shown that public spending leads to a reduction in infant and child mortality, albeit a small one (Anand & Ravallion, 1993; Filmer & Pritchett, 2000; Rajkumar & Swaroop, 2008; Ravallion & Bidani, 1999; Verhoeven et al., 1999).

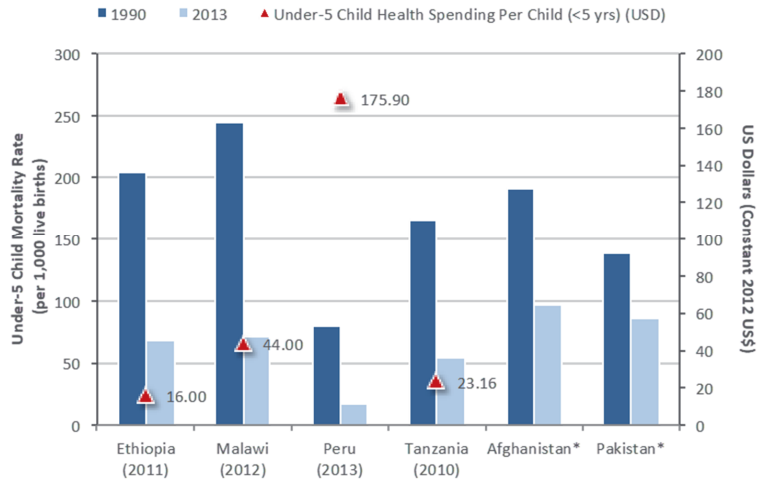

Figure 7 Percent decline for U5MR and health spending per under-5 child by country.

*Per capita child health expenditure data is not available. Parentheses under countries is the most recent year with child health expenditure data. Countries within the blue area achieved MDG 4.

Two main limitations of this study are the availability of regularly reported *RMNCH* expenditure data across the countries and findings presented are not generalizable. Inconsistency in regularly reported *RMNCH* expenditure data across countries, along with the defined scope of the case study (Table 2), did not allow for a more uniform methodology to conduct the health finance component of the case studies. Not every case study focused on the achievements, progress (or lack thereof) on both *MDGs* 4 and 5. Moreover, the time periods of focus for the health financing section of the case studies was dependent on health expenditure data availability. For example, Malawi's period of focus was 2006–2011; Ethiopia's was 1995–2011, while Pakistan's was 2001–2010. Data sources used were also mixed, although when available most used *NHA* data. At times, these data were also supplemented by other country specific data sources, such as the Household Integrated Economics Surveys for *OOP* spending estimates for Pakistan and data from the Ministerio de Economía y Finanzas for *MNH* and *CH* data for Peru, while others (Pakistan, Peru, and Tanzania) used the *OECD-CRS* database for external contributions to *RMNCH*. As a result, the case studies are purely descriptive. Robust econometric analyses to understand the causal relationship between levels and sources of health financing and *RMNCH* outcomes were not feasible because of inconsistent and limited health and *RMNCH* expenditure data with a small sample size of only 6 countries. Thus, these findings are not generalizable toward other *LICs*, *LMICs*, and *UMICs* experiences with health financing and *RMNCH* progress during the MDG era.

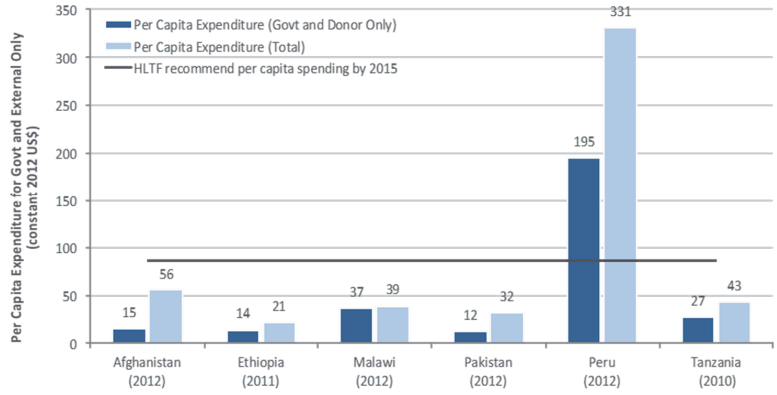

Figure 8 Per capita health spending by country for most recent year (constant 2012 US$)

While *RMNCH* expenditure tracking efforts have improved since 2000, such as the inclusion of sub-accounts under the *NHA*, comprehensive and consistent *RMCNH* expenditures for many countries is still lacking. Resource tracking tools are used to collect and analyse health expenditure data within countries, but many are not institutionalized (conducted on a regular basis), accounting methods for *RMNCH* expenditures may not be mutually exclusive, or face limitations because of inconsistent or subjective methods used over the years. For example, the government spending for the reproductive and child health subaccounts for Ethiopia are based on assumptions developed from background materials (such as health service reports) and expert opinions (Ethiopia Federal Ministry of Health, 2010, 2014). This leaves government estimates of *RMNCH* expenditure prone to estimation errors due to the use of different accounting assumptions from 1 year to the next. Therefore, identifying time trends in *RMNCH* expenditures comes with caveats because methods used over time for the *NHA* subaccounts might be different, as was the case for Ethiopia. Implementation of *SHA* 2011 may minimize some of these issues by tracking expenditures according to the classification of Global Burden Disease. Furthermore, the *OECD-CRS* provides specific data around *RMNCH* expenditures, but this only captures donor disbursements for health. This data set does not break out the *RMNCH*-specific expenditures, which is done by external agencies like Countdown and *IHME* (Institute for Health Metrics and Evaluation, 2015; Requejo, Victora, & Bryce, 2015). The OE*CD* recently added a code specifically for *RMNCH* funding, but this new indicator still does not disaggregate funding within *RMNCH*.

Global efforts to collate *RMNCH* expenditures into one database or report are fragmented. The Commission on Information and Accountability (CoIA) for Women's and Children's Health [54] began an

effort to have all 75 Countdown countries to report their total *RMNCH* expenditure by financing source by 2015. To date, 27 countries have produced this data but only 8 out of the 27 country data were provided for the 2015 Countdown report (Requejo et al., 2015). Another source for health financing data is the *WHO* Global Health Expenditure Database, which attempts to collate all NHA data into one "master" database that is accessible to everyone in an open-sourced platform. A draw back in using this database is that key *NHA* data from the *RMNCH* subaccounts is not consistently available for most countries. Child health expenditure data is compiled only for Liberia in 2007 and Malawi from 2003–2005, while *RMNH* expenditure data is compiled for 17 countries, but this data is still very limited in terms of years available in the database versus data available from the NHA reports. The *WHO* does provide the *NHA* reports for countries but requires one to manually extract the NHA data from the tables. Institutionalising or standardising reporting systems on *RMNCH* interventions and resource use, along with improving the information collected and provided into an accessible database, is important to monitor programs and understand health progress at the country level, and globally.

Conclusions

Through the lens of six country case studies, key lessons are learned on trends in *RMNCH* financing contributing factors to increase resources and progress towards *MDGs*, and gaps in information to assess the magnitude to which health financing has on health outcomes (Table 3). In the countries studied, the *MDG* agenda encouraged the global community and country governments to mobilise more resources for health and specifically for *RMNCH*. Although per capita spending on health and *RMNCH* in some countries are still quite low, significant progress was made toward the *RMNCH MDG* targets, and achievement of *MDG* 4 among some countries. Other distal factors, in addition to health financing, also most likely contributed to the success of achieving some of the *MDGs* across countries. As in the case of Tanzania an increase in *GNI* per capita was significantly associated in reducing *U5MR* (Afnan-Holmes et al., 2015). Unpacking the positive influence of other factors, such as macroeconomic changes and improvements to other sectors, may have on health outcomes is complicated and beyond the scope of this paper.

RMNCH continues to be a priority with the newly created and agreed upon *SDGs*. However, the behaviour and patterns of global and domestic funding for the future is unknown. Continued focus on financing initiatives that lead to improved health outcomes is needed to ensure the continued success that was made during the *MDG* era. This begins with improvements to track *RMNCH* expenditures across countries. We look to organisations that are attempting to improve resource tracking deficits such as the *WHO* with the push to implement the revised System Health Accounts (SHA2011) and the analytical work associated with World Bank's new Global Financing Facility, a key-financing platform of the United Nations Secretary-General's Every Woman Every Child initiative (Kim, 2015; OECD, 2011). These efforts involve better

reporting, collecting, deriving, and using data (e. g., lack of spending does not necessarily mean no intervention, but maybe intervention under another classification or category). Outcomes from these current efforts remain to be seen.

This paper raises important research questions for future analysis around RMNCH financing in terms of spending structure and impact on outcomes. Have countries with low *RMNCH* per capita spending achieved *MDG 4* and *5* by focusing health spending on more effective *RMNCH* interventions? Is potential domestic *RMNCH* funding being displaced by the increase in external support? Does health financing directly lead to improved *RMNCH* outcomes? What are the effects of other sectors' spending (education, agriculture, infrastructure, etc.) on *RMNCH* outcomes?

Web Appendixes

Additional files 1

Health Financing Analysis for Countdown Case Studies

A Guide

12/4/2014

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Additional file 2. Country Data Tables

	2008	2012
Total Health Expenditure (THE)	1,113,109,636	1,500,975,945
External	203,370,244	312,468,367
Govt	68,133,406	84,148,093
Household	839,322,380	1,099,542,464
Other Private	2,283,607	4,817,021
THE as % of GDP	10.0%	8.0%
% Change in THE		34.85%
THE Per Capita	44.79	55.59
% Change of THE Per Capita		24.12%
Reproductive Health Expenditure (RHE)		246,744,339
External		46,387,936
Govt		6,662,097
Household		193,694,306
Other Private		24,674
RHE as % of THE		16.40%
% Change of RHE		
RHE Per Capita (women of reproductive age)		44.00
% Change of RHE Per Capita (women of reproductive age)		
Child Health Expenditure (CHE)		
External		
Govt		
Household		
Other Private		
CHE as % of THE		
% Change of CHE		
CHE Per Capita (children under-5 years)		
% Change of CHE Per Capita		

Afghanistan Health Expenditure Data

	1995	2000	2005	2008	2011
Total Health Expenditure (THE)	346,665,317.20	473,991,349.43	613,345,295.93	1,268,161,518.77	1,675,937,431.65
External	6,309,308.77	75,838,615.91	226,079,076.08	497,626,579.97	836,292,778.39
Govt	134,575,476.14	156,417,145.31	187,315,653.38	282,419,570.23	261,446,239.34
Household	182,553,956.04	170,636,885.79	188,113,002.26	470,361,107.31	564,790,914.46
Other Private	23,261,242.78	71,098,702.41	11,837,564.21	17,881,077.41	16,759,374.32
THE as % of GDP	3.83%	4.40%	5%	4.50%	5.20%
THE Per Capita	6.16	7.47	8.39	17.16	21.20
Reproductive Health Expenditure (RHE)			75,830,181.89	160,954,435.33	228,726,052.21
External			33,365,280.03	57,943,596.72	107,501,244.54
Govt			14,407,734.56	45,067,241.89	56,724,060.95
Household			28,057,167.30	40,238,608.83	63,128,390.41
Other Private				17,704,987.89	1,372,356.31
RHE as % of THE			12%	13%	14%
RHE Per Capita (women of reproductive age)			4.34	8.53	12.25
Child Health Expenditure (CHE)			119,113,685.65	121,673,958.00	188,335,682.40
External			41,689,789.98	76,654,593.54	51,038,969.93
Govt			27,396,147.70	14,600,874.96	46,707,249.23
Household			50,027,747.97	29,201,749.92	90,212,791.87
Other Private				1,216,739.58	376,671.36
CHE as % of THE			19%	10%	11%
CHE Per Capita (children under-5 years)			9.24	9.38	16.33

Ethiopia Health Expenditure Data

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Total Health Expenditure (THE)	134,097,821	188,486,715	219,300,626	351,090,568	408,111,018	489,703,351	548,564,851	556,585,118	643,942,971	637,767,573
External	61,523,580	122,127,775	134,804,857	246,385,779	284,874,077	303,160,117	359,444,977	346,195,943	412,767,444	450,263,907
Govt	47,441,260	39,702,953	53,685,602	75,364,350	55,082,401	109,659,807	98,606,674	125,788,237	141,667,454	102,680,579
Household	16,401,941	18,337,624	20,063,498	32,240,455	48,973,322	52,398,259	63,633,523	62,894,118	60,530,639	66,965,595
Other Private	8,710,208	8,318,363	10,746,669	31,584,317	19,181,218	24,485,168	26,879,678	21,706,820	28,977,434	17,857,492
THE as % of GDP	9.9%	12.6%	12.8%	9.8%	11.2%	12.2%	11.6%	7.4%	8.2%	9.0%
THE Per Capita	18.72	20.66	23.51	28.47	31.45	37.22	41.20	36.43	40.42	39.3
Reproductive Health Expenditure (RHE)	39,354,150	38,315,246	38,381,718		33,389,721	42,494,765	50,761,343	52,770,237	75,822,135	63,573,728
External	15,348,118	21,439,765	19,512,809		24,708,393	29,321,388	37,309,587	33,020,083	49,216,039	44,134,112
Govt	16,335,489	8,700,307	11,130,698		4,774,730	8,881,406	8,223,338	13,817,411	19,606,480	14,139,834
Household	5,102,209	6,108,297	5,326,130		3,172,023	3,357,086	4,111,669	3,218,984	3,218,992	3,229,633
Other Private	2,683,564	2,066,877	2,602,913		734,574	934,885	1,167,511	2,660,909	3,780,624	2,070,149
RHE as % of THE	19%	16%	14%		8.20%	8.70%	9.30%	8%	12%	14%
Estimated RHE Per Capita (women of reproductive age)	14.26	13.46	13.06		10.67	13.17	15.28	15.44	21.59	17.63
Child Health Expenditure (CHE)	34,622,203	32,026,797	42,147,216		28,298,262	42,440,443	46,644,677	80,719,268	89,450,175	115,076,974
External	13,502,659	15,693,130	20,652,136		12,168,253	21,771,947	22,576,024	48,410,397	50,184,372	83,807,294
Govt	14,195,103	8,967,503	12,644,165		4,606,575	8,144,524	8,807,279	18,275,595	25,084,723	17,596,043
Household	5,193,330	5,764,823	6,322,082		10,470,357	11,161,836	13,526,956	11,381,119	10,822,234	11,479,497
Other Private	1,731,110	1,601,340	2,528,833		1,075,334	1,358,094	1,725,853	2,652,156	3,358,845	2,194,140
CHE as % of THE	17%	14%	16%		6.90%	8.70%	8.60%	15%	14%	18%
CHE Per Capita (children under-5 years)	14.97	13.37	17.63		12.83	18.41	19.38	32.64	34.91	44.00

Malawi Health Expenditure Data

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total Health Expenditure (THE)	3,590,855,785		3,853,260,104	3,918,352,460	4,081,043,009	4,087,831,760	4,902,441,002	5,699,182,956	6,599,766,319	7,354,459,877	8,430,100,319	9,238,688,016	10,851,132,614	
External	39,499,414		34,679,341	39,183,525	40,810,430	40,878,318	53,926,851	68,390,195	72,597,430	66,190,139	67,440,803	64,670,816	97,660,194	
Govt	847,441,965		1,032,673,708	1,061,873,517	1,159,016,215	1,083,275,416	1,152,073,635	1,327,909,629	1,478,347,655	2,029,830,926	2,377,288,290	2,503,684,452	3,146,828,458	
Household	1,411,206,324		1,525,891,001	1,512,484,050	1,505,904,870	1,541,112,573	1,990,391,047	2,365,160,927	2,804,900,685	2,912,366,111	3,279,309,024	3,584,610,950	4,014,919,067	
Other Private	25,135,990		26,972,821	27,428,467	28,567,301	28,614,822	29,414,646	39,894,281	46,198,364	44,126,759	50,580,602	267,921,952	271,278,315	
Social Insurance (HH+Govt)	1,271,162,948		1,236,896,493	1,281,301,255	1,350,825,236	1,389,862,798	1,671,732,382	1,897,827,924	2,191,122,418	2,309,300,402	2,655,481,600	2,808,561,157	3,320,446,580	
THE as % of GDP	4.85%		4.98%	4.69%	4.63%	4.77%	4.44%	4.58%	4.74%	5.36%	5.03%	4.93%	4.56%	
% Change in THE														
THE Per Capita	94.72		100.58	100.18	110.82	127.18	137.99	164.33	199.72	223.10	253.71	282.10	331.00	
% Change of THE Per Capita				-0.39%	10.62%	14.76%	8.50%	19.08%	21.53%	11.71%	13.72%	11.19%	17.34%	
Reproductive Health Expenditure (RHE) (maternal and neonatal)				98,773,865	93,892,610	126,522,897	120,818,105	120,839,780	129,599,764	168,680,092	187,246,481	239,853,100	379,941,297	
External				8,870,000	3,850,000	9,430,000	7,680,000	7,870,000	6,890,000	12,580,000	12,290,000	6,920,000	5,930,000	
Govt	26,380,000		22,450,000	133,190,000	123,380,000	157,710,000	138,840,000	134,530,000	143,150,000	179,390,000	188,760,000	237,940,000	374,010,000	
Household														
Other Private														
RHE as % of THE	0.73%		0.58%	3.64%	3.14%	3.67%	3.08%	2.57%	2.26%	2.61%	2.53%	2.95%	3.92%	
% Change of RHE				6.31%	0.86%	0.17%	0.84%	0.84%	1.16%	0.97%	1.17%	1.33%	1.02%	
RHE Per Capita (women of reproductive age)	30.93	34.48	25.91	152.11	142.57	182.69	191.33	187.25	192.80	243.36	244.70	323.35	512.10	574.00
% Change of RHE Per Capita (women of reproductive age)		11%	-25%	487%	-6%	28%	5%	-2%	3%	26%	1%	32%	58%	12%
Child Health Expenditure (CHE)				26,093,828	69,052,208	75,044,790	85,016,932	128,306,938	398,813,265	217,920,737	297,039,466	302,187,149	442,483,671	
External				5,890,000	11,800,000	21,280,000	18,870,000	22,740,000	22,300,000	58,830,000	22,660,000	9,960,000	7,920,000	
Govt	24,980,000		29,880,000	31,640,000	81,770,000	77,860,000	84,220,000	128,460,000	439,420,000	189,190,000	296,280,000	298,540,000	434,560,000	
Household														
Other Private														
CHE as % of THE	1.10%		0.90%	0.80%	1%	2.30%	2.20%	2.70%	7%	3.40%	4%	3.70%	4.60%	
% Change of CHE				1.25%	2.40%	0.94%	0.10%	1.26%	2.54%	0.49%	1.19%	9.27%	1.23%	
CHE Per Capita (children under-5 years)	7.47	9.59	8.81	9.23	24.55	23.28	26.54	40.53	136.18	59.93	98.34	101.46	148.60	175.90
% Change of CHE Per Capita		28%	-8%	5%	166%	-5%	14%	53%	236%	-56%	64%	3%	46%	18%

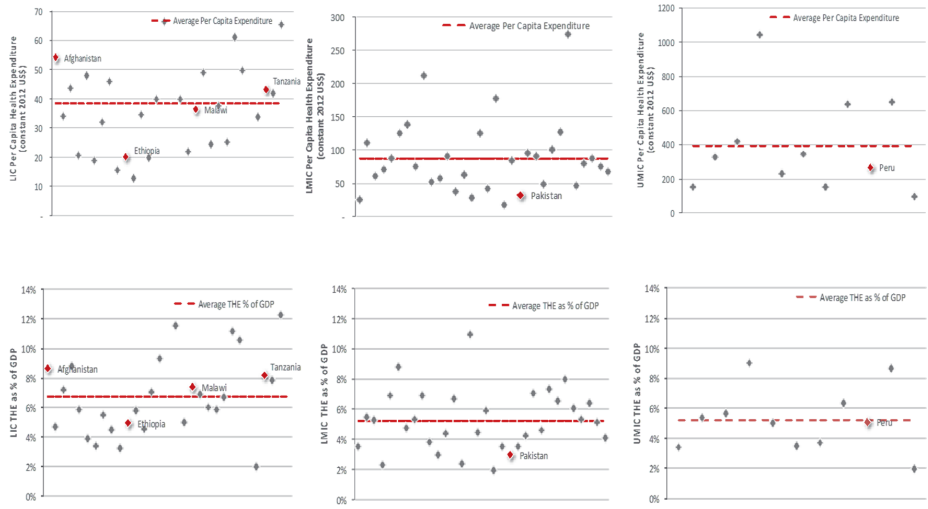
Peru Health Expenditure Data

	2003	2006	2010
Total Health Expenditure (THE)	930,175,331	1,619,285,383	1,735,529,197
External	255,239,521	712,485,714	686,883,227
Govt	236,543,441	453,399,835	451,208,438
Household	390,952,224	404,821,573	560,570,386
Other Private	47,438,944	48,578,261	36,867,146
THE as % of GDP	5.0%	7.6%	8.2%
THE Per Capita	26.20	43.28	43.17
Reproductive Health Expenditure (RHE)	124,779,000	176,523,300	329,560,830
External	26,952,264	38,129,033	100,252,404
Govt	43,048,755	78,023,299	69,932,808
Household	50,161,158	52,427,420	155,980,130
Other Private	4,616,823	7,943,549	3,394,477
RHE as % of THE	13.70%	10.70%	17.90%
RHE Per Capita (women of reproductive age)			
Child Health Expenditure (CHE)			173,519,568
External			23,251,622
Govt			47,891,401
Household			97,865,036
Other Private			4,511,509
CHE as % of THE			9.40%
CHE Per Capita (children under-5 years)			23.16

Tanzania Health Expenditure Data

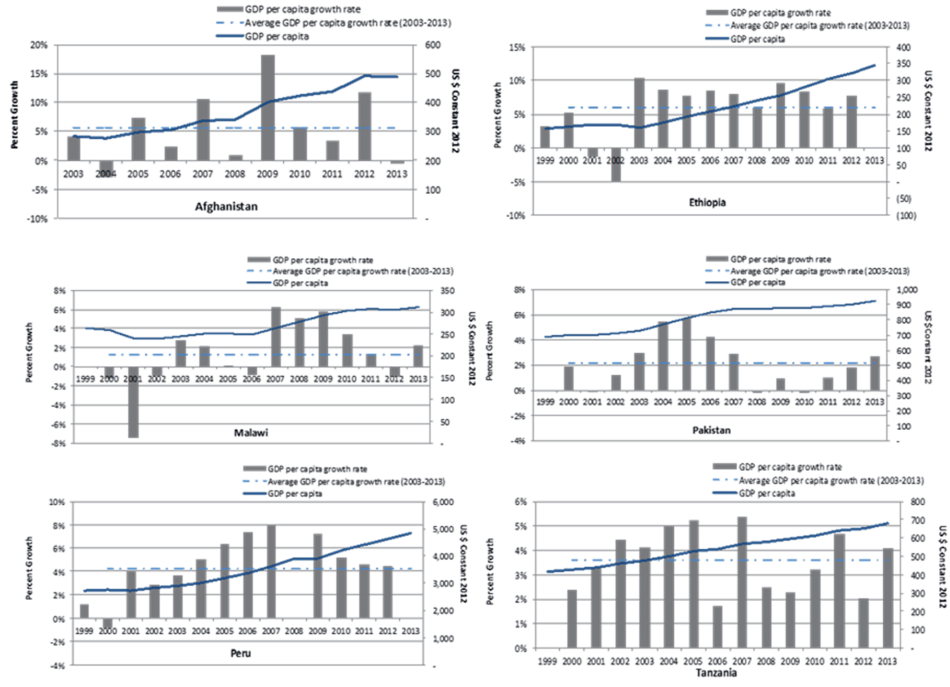
	2006	2008	2010	2012
Total Health Expenditure (THE)	5,350,841,736	5,250,928,484	5,541,810,698	5,927,756,635
External	67,362,634	66,459,397	63,006,160	102,414,260
Govt	1,226,963,618	1,352,148,844	1,753,321,268	2,190,883,537
Household	3,642,249,454	3,442,863,330	3,358,643,564	3,250,927,339
Other Private	414,266,029	389,456,913	366,839,707	383,531,499
THE as % of GDP	2.59%	3.36%	3.00%	2.80%
% Change in THE		-1.87%	5.54%	6.96%
THE Per Capita		37.32	32.85	34.70
% Change of THE Per Capita			-11.98%	5.63%
Reproductive Health Expenditure (RHE)				
External				
Govt				
Household				
Other Private				
RHE as % of THE				
% Change of RHE				
RHE Per Capita (women of reproductive age)				
% Change of RHE Per Capita (women of reproductive age)				
Child Health Expenditure (CHE)				
External				
Govt				
Household				
Other Private				
CHE as % of THE				
% Change of CHE				
CHE Per Capita (children under-5 years)				
% Change of CHE Per Capita				

Pakistan Health Expenditure Data



Additional file 3 Health spending data for all Countdown countries by income status in 2010

[a] In the graphs above, the "other" Countdown countries (those not included in this study) are illustrated in blue nodes, while the Countdown countries included in this study have red nodes and labelled. Both Ethiopia and Afghanistan 2010 THE estimates as a percent of GDP were estimated using linear interpolation.



Additional file 4 GDP per capita trend data by country

Chapter 3 Expenditure tracking and review of reproductive maternal, new-born and child health policy in Pakistan

Abstract

Since 2001 substantial resources have been allocated to the reproductive, maternal, new-born and child health sector (RMNCH) in Pakistan. Many new programmes have been started and coverage of some existing programmes has been extended to un-served and rural areas. Despite these efforts the Millennium Development Goals (MDGs) 4 and 5 were not achieved (2000–15). Maternal Mortality Ratio was reduced to 170 per 100 000 live births (target 100) by 2013 at an annual reduction rate of 3.6% (1990–2013). Against the target of 46 per 1000 live births, the Under Five Mortality Rate was reduced to 81 per 1000 live births by 2015 at an annual reduction rate of 2.1% (1990–2015). We evaluated the comparative expenditures for the RMNCH sector and analysed impact of public expenditures on the use of the public facilities for the RMNCH services. Expenditure on RMNCH increased by 181% (2000–10), reaching PKR 628.79 billion (US$9.67 billion). The Share of the RMNCH expenditure in the total health expenditure increased from 16 to 21% (2005–10). The share of official development assistance for the RMNCH increased from 36 to 51% (2003–10). Equity was modestly achieved with a greater proportion of the poor using public facilities for the childhood diarrhoea (Concentration Index _0.06 in 2001–02 to_0.11 in 2010–11) and reduction in the proportion of the rich using the public health facilities for institutional births (Concentration Index 0.30 in 2001–02 to 0.25 in 2010–11). Overall, the RMNCH disease control programmes focused on vertical primary health approach and targeted the district health system in the un-served areas. Our findings confirm that diseconomies of scale, donor dependence and supply side perspective could only result in a modest progress towards achieving the MDGs. We call for urgent attention of the policy makers for the integration of the vertical and the routine primary health care and reliance on indigenous sustainable healthcare financing. We also recommend acknowledging economic perspective on health policy and health programmes.

Keywords

Disease accounts, disease control programme, equity, expenditure review, maternal neonatal and child health, reproductive, resource tracking, utilization incidence analysis

Introduction

With the end of the Millennium Development Goals (MDGs) many countries have evaluated financial progress related to *MDGs 4* and 5. These assessments conform to the recommendations of the Commission on Information and Accountability for Women's and Children's Health (World Health Organization, 2012b) which emphasized the need for stakeholders to improve the tracking of the resources for women and child health.

Pakistan was a signatory to the *MDGs* at the Global Summit in the year 2000. Since the inception of the *MDGs* the Government of Pakistan (GOP) has focused on improving the health of the poorest and the most vulnerable groups in the country, especially women and children (Siddiqi, Haq, Ghaffar, Akhtar, & Mahaini, 2004). In an effort to align health policy with *MDGs 4* and *5*, the *GOP* enacted a new health policy in 2001 (Ministry of Health, 2001). A 10-point agenda set in this policy included strategies to address inadequacies in the district level health facilities and in the human resources, promote equity in access to health services and allocation of resources to improve the control of infectious diseases (World Health Organization, 2012b). Maternal and child health objectives were strongly embedded in the above features and further reinforced through strategies on strengthening of community outreach programmes for health education, nutrition, promotion of family planning and vaccination. This policy continued till 2010 when a new health policy was drafted emphasizing universal health coverage (Zulfiqar A Bhutta et al., 2013; A. Khan et al., 2012; Nishtar et al., 2013). The health policy of 2001 facilitated enhanced resources from the government and the bilateral and the multilateral development partners to the disease control programmes (DCPs). With enhanced resources, the coverage of the existing *DCPs* was expanded to other parts of the country such as the 'National Programme for Family Planning and Primary Healthcare' (NPFP&PHC)(Ministry of Health, 2003). Some additional DCPs were initiated with an explicit focus on the maternal and child health, including the 'Maternal, Neonatal and Child Health (MNCH) Project (Ministry of Health, 2006).

Despite strategic importance to the reproductive, maternal, new-born and child health (RMNCH) sector, the progress on key indicators of the *MDGs* is far less than expected (Requejo et al., 2015). Pakistan did not meet the targets of the *MDGs* 4 and 5 in the given time frame (2000–15). Against the target of 100 per 100 000 live births, the Maternal Mortality Ratio was reduced to 170 per 100 000 live births in 2013 at an annual reduction rate of 3.6% (1990–2013).Under-five Mortality Rate was reduced to 81 per 1000 live births in 2015 against the target of 46 per 1000 live births at an annual reduction rate of 2.1% (1990–2015) (World Health Organization, 2012b).

In addition to the contribution of the economic growth and the social determinants of health, progress on health outcomes can be causally interrelated to enhanced public spending for *RMNCH*, improved quality

and access to the public health facilities and improved health seeking by the target populations. Slow progress on the *MDGs* thus requires review of the claims of enhanced resources to the *RMNCH* and their benefits to the target population.

Steps such as tracking the flow of the financial resources provide valuable insight for planning and implementation of the health programmes in developing countries (Powell-Jackson & Mills, 2007). It determines how resource were raised, distributed and spent within the health sector (Powell-Jackson, Borghi, Mueller, Patouillard, & Mills, 2006)

There are relatively few health expenditure tracking and financing reviews from Pakistan and those that existed were limited in scope and were not specific for RMNCH. For example, maternal and child health classification in National Health Accounts (NHAs) of Pakistan[1] (Pakistan Bureau of Statistics, 2009, 2012, 2013) has not been based on the definition recommended by the *WHO* (World Health Organization, 2003). We find an expenditure review of the health and the education sectors in the Khyber Pakhtunkhwa province in 2013. This review mainly reproduced provincial data of *NHAs* and provincial figures on health seeking from social and health surveys: thus suffers similar limitations to the health accounts of Pakistan discussed earlier (World Bank, 2013).

A few scattered individual efforts on the health expenditure tracking were found limited in scope, e.g. Mohammad et al. (2007) tracked development expenditure by the federal government on vertical public health programmes(Mohammad, Hafeez, & Nishter, 2007). A report on public expenditures on health could not capture health expenditure by the provincial governments. Unlike Bangladesh and Sri Lanka, we could not find scientific or grey literature on disease-specific expenditure tracking from Pakistan. This probably reflects limited expertise and lack of interest in applying health economics methods and approaches to health policy analysis.

We undertook a comprehensive analysis of resource allocation of the RMNCH programmes in Pakistan. We further analysed equity of *RMNCH* programmes implemented from inception of the health policy in 2001 till 2010.We attempt to answer following research questions.

How much of the total health expenditure (THE) has been devoted to the RMNCH sector?

Has the use of public facilities for RMNCH services been increased by the poor?

This study is part of the Countdown-to-2015 (Countdown 2015) series of country case studies aimed at describing and explaining trends in *RMNCH* expenditure at the country level(Requejo et al., 2015).

Methods

We used multiple sources of the data for our analysis. In Table 5 we provide list of the data sources and their use in the components of our analysis. In the following section, we explain the methods we applied to answer the research questions.

How much of the *THE* has been devoted to the *RMNCH* sector?

Definition of *RMNCH* expenditure

We adopted the definition of the *RMNCH* expenditure provided by the Countdown 2015 group (Powell-Jackson et al., 2006). The scope of the *RMNCH* expenditure in our analysis included expenditure on health promotion and preventive services to mothers and their families; immunization services to the mothers and the under five children; provision of services for antenatal care, institutional births, postnatal care, and all types of family planning services; treatment of the childhood diarrhoea, malaria and tuberculosis and management of the sexually transmitted diseases such as *HIV/AIDs*, hepatitis B and C.

Expenditure by the public sector, out-of-pocket health (OOP) payments by the households and the official development assistance (ODA) to health sector constitute over 90% of the *THE* in Pakistan (Akram & Khan, 2007; Pakistan Bureau of Statistics, 2009, 2012, 2013). We tracked the *RMNCH* expenditure by these three sources for the period 2000–10. All expenditures are reported in *PKR* 2010 constant prices.

Public expenditure

Public expenditure on the health sector has two broad categories, development expenditure and recurrent expenditure. Development expenditure is the expenditure of the public sector development programme: which comprised new initiatives of the government. Expenditure on the management of the existing health facilities and expenditure on the salaries of the permanent employees is included in the recurrent expenditure: that is provision of routine curative services at public facilities. We estimated share of the *RMNCH* expenditure in the public expenditure of these two categories.

The most reliable source of information of the public expenditure is the data of the appropriation accounts of the Controller General of Accounts of Pakistan. Due to limitation on the classification and the levels of detail in the appropriation accounts, we could only use this data to extract share of the *RMNCH* expenditure in the development expenditure. To estimate the *RMNCH* share in recurrent expenditure we used different data sources (Table 1) and methods. We explain the methods to estimate the share of the *RMNCH* in the recurrent expenditure and the Public Sector Development Plan (PSDP) expenditure below.

Share of *RMNCH* in development expenditure: from the review of the appropriation accounts data, we find that all *DCPs* were financed through the *PSDP*. From the data of the appropriation accounts we could only find the yearly expenditure as an aggregate number for each *DCP*. No further breakup of the expenditure was available in the appropriation accounts. We reviewed the functions and the activities envisaged in the programme plans of the *DCPs* to determine whether the programme focus is explicitly on *RMNCH*? We included all expenditure of a programme if the programme focus was explicitly *RMNCH*. We determine the proportion of the *RMNCH* in the total expenditure of DCPs if the programme focus was implicitly on the *RMNCH* (Table 1).

DCP	Programme period	Sources of financing	RMNCH component	RMNCH Focus	Share of RMNCH in programme expenditures
EPI	1997 to date	GoP, GAVI, UNICEF and WHO	Vaccination to women and children	Explicit	100%
NPFP&PHC	1994 to date	GOP, UNICEF, USAID, and DFID	Community outreach for health, education, and preventive services for maternal, child health and family planning	Explicit	100%
Women Health Project	2000–5	GoP and ADB	Emergency obstetric care, health, education, and community outreach	Explicit	100%
RHP	2004–8	GoP and ADB	Reproductive, maternal,	Explicit	100%
MNCH project	2006–12	GoP and DFID	neonatal and child health through community midwifes and provision of basic and comprehensive emergency obstetric care	Explicit	100%
FPP	1997 to date	GoP and multiple donors	Family planning services from fixed centres and outreach activities for married women of reproductive age (15–45 years)	Explicit	100%
National HIV/AIDS Control Programme	2003–9	GoP and World Bank	Diseases of reproductive track and sexually transmitted diseases and preventing mother to child transmission of HIV/ AIDS	Implicit	30%
Prime Minister's Programme on Prevention and Control of Hepatitis	2005–10	GoP	Vaccination of women in reproductive age (15–45 years) and children against hepatitis B in hyper-endemic areas	Implicit	40%

Table 1 Features of DCPs and proportion of RMNCH in the programme expenditures

Share of the *RMNCH* expenditure in the public expenditure on the provision of the routine curative care services: public expenditure on the routine *RMNCH* curative services was estimated with the methods of benefit incidence analysis. In Benefit incidence analysis the population level data on the use of public services is multiplied by the unit cost of the respective services (O. A. O'Donnell & Wagstaff, 2008). We obtained use of public services data, estimated unit cost, and multiplied both to estimate the share of *RMNCH* in the public expenditure on the provision of the routine *RMNCH* curative services.

We obtained population weighted use of public facilities from Pakistan Social and Living Standard Measurement Survey (PSLM) datasets (Table 5) for antenatal care, institutional births, postnatal care and treatment of childhood diarrhoea, malaria and tuberculosis (Pakistan Bureau of Statistics, 2004-2011). In the remaining part of this article, we will refer to these services as *RMNCH* services. Data for the missing

years were interpolated using the methods recommended by the World Health Organization (World Health Organization, 2003).

Due to limitations on data and resources we excluded complication in the provision of *RMNCH* services. We assumed standard treatment for the *RMNCH* curative services except the institutional births. Institutional births were assumed to be normal vaginal deliveries in 80% of cases. We assumed that in public facilities the remaining 20% of the institutional births were assisted vaginal deliveries (14%) and caesarean sections (6%). These assumptions were consistent with findings on the patterns of institutional births in South Asian, African and Latin American countries (O. Pasha et al., 2015).

The unit cost of the *RMNCH* curative services at the public facilities was not readily available in the published scientific and grey literature. We used micro-costing techniques (Drummond, 2005) to estimate the unit cost of the *RMNCH* services. Micro costing is an appropriate method to generate the aggregate cost of the health care system for a specific service (Chapko et al., 2009). First, we determined use of the resources for the provision of the *RMNCH* services and second, we applied monetary valuation to the resource use. An expert panel was formed to determine the actual resource use for the *RMNCH* services.2 Expert panel reviewed clinical practice guidelines (Ministry of Health, 2005, 2007a, 2007b, 2010) and used two round Delphi methods to determine use of building space, equipment, medicines, operational resources and time spent by the medical personnel. The estimated use of resources was converted to the costs by applying staff salaries, capital cost of buildings, costs of equipment, operational expenses and trade prices of the medicine used for the *RMNCH* services at the public facilities. All costs were estimated in 2010 constant prices. The methods and the findings of the costing exercise would be published separately. *OOP* health payments Household *OOP* health payments were reported in the annual expenditure module of the Household Integrated Economic Survey (HIESs) (Table 5). Information on the types of the health service that were availed in exchange of the *OOP* health payments was not available in *HIESs*. The *PSLM* surveys contained data on the use of the health facilities for the *RMNCH* services. Historically HIESs have been conducted on a subsample of the *PSLM* surveys (Pakistan Bureau of Statistics, 1998-2010). Although the *OOP* health payments and the use of the health facilities were reported separately: but referred to the behaviour of the same household during the same period. We assumed causality between the *OOP* health payments and the use of the public facilities for *RMNCH* service in case a household has reported both. We merged the *HIESs* and the *PSLMs* data at the household level for those households that had reported both (Table 5).

We predicted the share of the household *OOP* health payments that was explained using the public facilities for the *RMNCH* services by the methods of ordinary least square multiple linear regressions. We assumed that household uses of *RMNCH* services were independent predictors of household *OOP* health payments. Due to the skewed distribution, we used natural log transformation of the *OOP* health payments.

We obtained the share of the predicted *OOP RMNCH* payments in total *OOP* health payments for the years 2000–10. Missing year's data were interpolated using the methods recommended by the *WHO* (World Health Organization, 2003). We obtained national level aggregate estimates of *RMNCH OOP* payment by applying the predicted proportion of the *RMNCH* in total *OOP* health payments to the national estimates of the *OOP* health payments in Pakistan by the World Health Organization, Global health expenditure database(World Health Organization).

Official development assistance

We extracted data of the *RMNCH ODA* (2003–10) to Pakistan from the Countdown-to-15 database (Arregoces et al. 2012; Hsu et al. 2012). *ODA* data were reported by two types, the child health expenditure, and the reproductive health expenditure. We estimated the share of the child health and the reproductive health in the total *RMNCH ODA*. We estimated the share of the *RMNCH ODA* in the total *ODA* to Pakistan. To understand the priorities of development partners we compared the RMNCH expenditure trends of Pakistan with trends from other countries.

Has the use of public facilities for *RMNCH* services been increased by the poor?

We estimated the effects of public investment on equity of the use of the public facilities. We assumed that substantial input to the public facilities should have improved the access to the *RMNCH* services by the poor. We estimated concentration indices of the use of the public facilities for *RMNCH* services in the years 2001–02, 2004– 05 and 2010–11 (O. A. O'Donnell & Wagstaff, 2008). Household's socio-economic status was determined by their assets holding and dwelling conditions as reported in the *PSLM* surveys (GOP 2000–10). This included household holding of the assets e.g., Television, Table/chairs, and Radio; dwelling conditions e.g., the material used in the roof of the house; and availability of the public utilities to the household for example electricity and water supply. We constructed an assets index by Principle Component Analysis and derived asset quintiles(World Health Organization, 2012b). The concentration index value ranges from 1 to 1. Zero value indicates perfect equality. Positive or negative values of the concentration index indicate pro rich or -poor concentration of the health indicator respectively. For example, positive value of concentration index of institution births at public facilities would indicate that the rich benefited proportionately more than the poor.

Results

Health care financing trends

The overall trends of healthcare financing confirmed that Pakistan has been falling short of the targets on equitable healthcare financing (Etienne et al. 2010). High share of the *OOP* health payments in *THE* has remained a constant challenge (Table 2). In the following section we provide answers to our research questions.

Indicator	Target[a]	2001–2	2003–4	2005–6	2007–8	2009–10	2011–12
THE[b] as % of GDP		2.8	2.9	2.59	3.36	3	2.8
GHE[c] as % GDP	4	0.6	0.69	0.49	0.56	0.53	0.27
GHE as % of TGE[d]	8–15	2.4	2.8	7.54	6.57	9.20	9.70
OOP payments as % of THE	15–20	61.6	60.9	68.10	65.57	60.61	54.76
Per capita THE US $	44–60	13	16	29	35	31	35
Per Capita THE in PKRs		623	798	1758	2076	2611	3099
Provincial government share in government health expenditure		19	24	52	58	66	97
Rest of the world as % of Government HE		5.29	4.79	5.50	4.86	3.59	4.67

Table 2 Overview of healthcare financing in Pakistan

Data source 2005–12 National Health Accounts of Pakistan, 2001–04 World Health Organization. A Targets set by WHO; b Total Heath Expenditure; c Government Health Expenditure; d Total Government Expenditure.

How much of the THE in Pakistan has been devoted to the RMNCH sector?

Over 10 years (2000–10) *PKR* 628.79 billion (*US*$9.67 billion) were spent on *RMNCH* services in Pakistan. Expenditure on the *RMNCH* increased by 181% (96% in terms of *US*$) between 2000 and 2001 (*PKR* 33.52 billion or US$0.57 billion) and 2009–10 (*PKR* 94.22 billion or *US*$1.12 billion). The share of the total RMNCH expenditure in the *THE* has been increased from 16 to21% (2006–10).

Public expenditure on the *RMNCH* sector during 2000–10 was *PKR* 116.64 billion (*US*$1.78 billion). Public expenditure on the *RMNCH* sector has been increased by 341% from *PKR* 4.56 billion (US$78.07 million) in 2000–01 to *PKR* 19.91 billion (*US*$237.56 million) in 2010 (Table 3).

Expenditure on the *RMNCH* related *DCPs* was PKR 123.83 billion (US$1.92 billion) in 2000–10. It has been increased by 206%, from *PKR* 5.51 billion (*US*$94.32 million) in 2000 to *PKR* 16.82 billion (*US*$200.73 million) in 2010.

The share of public expenditure on the *RMNCH* sector was on the average 25% of the public expenditure on health (2000–10). The share of the public *RMNCH* expenditure in the total public expenditure on health has been declined from 26 to 14% in the same period (Figure 1). *ODA* to the *RMNCH* sector was *PKR* 101.69 billion (US$1.46 billion) between 2003 and 2010. Unlike the total ODA to the health sector in Pakistan we observed a steady growth in the *RMNCH* ODA to Pakistan over 2003–10. The share of the *RMNCH ODA* in the total health *ODA* has been increased from 36.2 in 2003 to 53.9% in 2010. Between 2006 and 2010 the share of the *RH ODA* in the *RMNCH ODA* was doubled (3–6%, Figure 2).

	2000–1	2001–2	2002–3	2003–4	2004–5	2005–6	2006–7	2007–8	2008–9	2009–10	Total
a. Public											
	4562	5056	6835	10 772	10 085	12 178	15 958	12 633	18 650	19 908	116 637
	(78)	(82)	(117)	(187)	(170)	(203)	(263)	(202)	(238)	(238)	(1778)
b. Private OOP health payments											
	28 954	29 410	34 963	42 159	49 017	46 401	59 086	75 134	72 717	74 313	512 153
	(495)	(479)	(598)	(732)	(826)	(775)	(974)	(1201)	(926)	(887)	(7894)
c. Grand Total											
(a+b)	33 516	34 466	41 798	52 931	59 102	58 579	75 044	87 767	91 367	94 221	628 790
	(574)	(561)	(714)	(919)	(996)	(979)	(1238)	(1403)	(1164)	(1124)	(9672)

Table 3 Maternal and child health expenditure in million PKR and (million US$ in parenthesis) in Pakistan

All expenditures are reported in 2010 prices. Some ODA (on-budget) for RMNCH is included in public expenditure.

During our review we find that *ODA* has been under-reported in NHAs of Pakistan. We find that estimates of *ODA* reported in *NHAs* are lower than Countdown-to-15 data (Arregoces et al. 2012; Hsu et al. 2012). For example, in NHAs 2009–10, total *ODA* for health was Pak Rupees (*PKRs*) 9565 million (GOP 2008–12) while in Hsu and Pitt et al. (2012) and Arregoces et al. (2015) *ODA* was *PKR* 21 169 million and *PKR* 28 237 million in 2009 and 2010, respectively. Estimates of *ODA* in the *NHAs* of Pakistan covered only the off-budget expenditure. We speculate that the *ODA* other than the Off-budget was reported as the public expenditure on health in the *NHAs* of Pakistan (Pakistan Bureau of Statistics 2008–12).

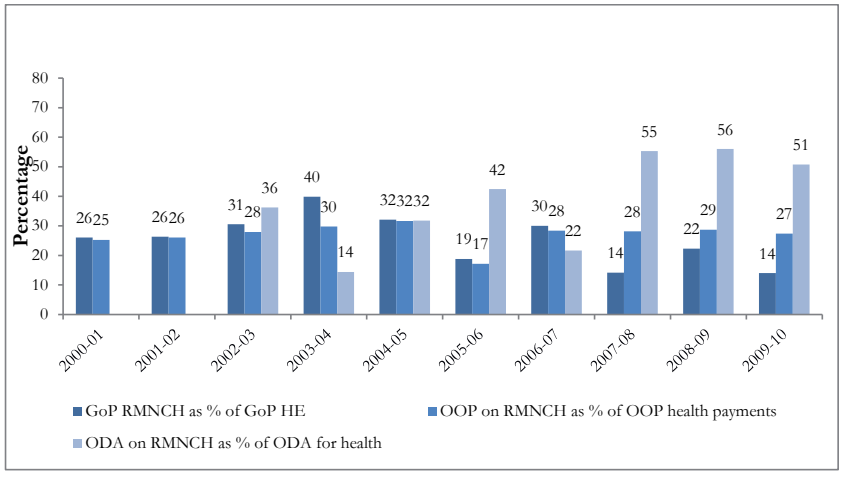


Figure 1 RMNCH expenditure as percent of health expenditure

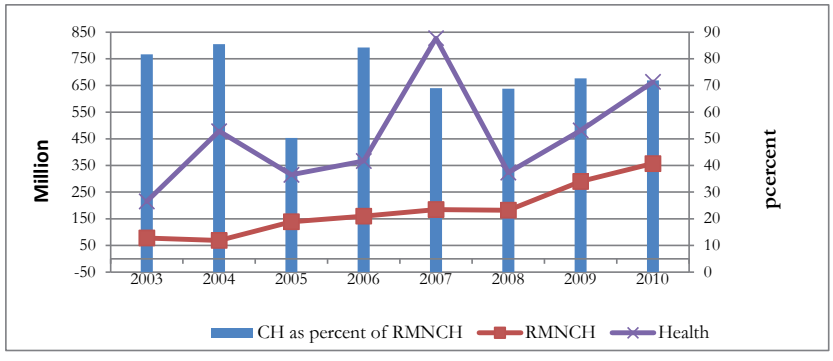


Figure 2 ODA to Pakistan US$ (in 2010 constant prices)

Has the use of public facilities for RMNCH services been increased by the poor?

Despite substantial inputs, use of the public facilities has slightly increased over the years. From 2000 to 2010, use of public facilities has only slightly been increased, that is antenatal care (3% points), institutional births (3% points), postnatal care (4% points) and childhood diarrhoea (15% points). In terms of equity in the use of the public facilities we find some improvement. Concentration index for seeking care at the public facilities for the childhood diarrhoea has significantly been inclined towards the poor. In case of institutional births and postnatal care the situation was pro-rich but with a slight decline in these proportions over the years 2000–10(Table 4).

Equity has modestly been achieved with higher use of public facilities for childhood diarrhoea by the poor by 2010 (Concentration Index _0.06 in 2001–02 to _0.11 in 2011–12) and fewer utilizing public facilities for institutional births by the rich by 2010 (Concentration Index 0.30 in 2001–02 to 0.25 in 2011–12) (Table 4).

		Antenatal care	Institution births	Post-natal care	Childhood diarrhoea
2001–02	Percentage use	17%	10%	3%	23%
	Concentration index	0.195*	0.304*	0.202**	0.061***
	SEs of CI	(0.027)	(0.0382)	(0.0573)	(0.0365)
2004–05	Percentage use	14%	11%	7%	20%
	Concentration index	0.200*	0.241*	0.262*	0.162**
	SEs of CI	(0.0355)	(0.0396)	(0.0453)	(0.0535)
2010–11	Percentage use	20%	13%	7%	24%
	Concentration index	0.099*	0.253*	0.228*	0.11*
	SEs of CI	(0.008)	(0.011)	(0.015)	0.015

Table 4. Equity analysis on the use of health services at public facilities 2001–10

Analyses are based on the household assets index. *, **, *** refers to 1, 5 and 10% levels of statistical significance, respectively.

Discussion

The overall healthcare financing situation in Pakistan has been similar to many low- and middle-income countries (Afnan-Holmes et al., 2015). High reliance on *OOP* health payment has remained a challenge to equitable healthcare financing. Due to *OOP* health payments in Pakistan, 3.5% points (pre-payment poverty headcount 24.6%, post-payment poverty headcount 28.2%) or 5.2 million people were dragged into poverty (at poverty line US$1.25) in 2004–05 (M. A. Malik, 2015).

Over the years the *RMNCH* financing has improved due to continued investments by the *GOP* and the development partners. Total expenditure on the *RMNCH* has increased by 181% from 2000 to 2010. This increase was like the trends in the *MNCH* expenditure in Tanzania (164%) between 2004 and 2102, but lower than Ethiopia (202% between 2005 and 2010) and Peru 273% between 2004 and 2012) (Mann et al.

2016). The ODA to the *RMNCH* sector was substantial over 2003–10 especially for the child health component (71.8% of *RMNCH ODA*). This trend was like Afghanistan (66–78%), Ethiopia (57–74%), Rwanda (66–78%) and Peru (40–83%) (Arregoces et al., 2012; Hsu, Pitt, Greco, Berman, & Mills, 2012). In Ethiopia, the RMCH expenditure in 2011 was 25% of *THE*. In the same year Tanzania spent 27% of THE on the reproductive and maternal health (RMH) (18% of THE) and the CH (9% of THE). In the South Asian context, the RMNCH expenditure was 12%, 11% and 16% of the *THE* in Bangladesh (2007), Sri-Lanka (2000) and Afghanistan (2011), respectively (Mann et al., 2016; R. Rannan-Eliya, Kasthuri, & Alwis, 2012; R. P. Rannan-Eliya et al., 2000). However, progress on the MDG goals 4 and 5 was better in Afghanistan, Bangladesh, Sri Lanka, and Ethiopia than in Pakistan. Although there were many reasons for better progress on the MDGs, resources tracking and healthcare financing analysis could have been a factor for better planning and efficient management, and better health outcomes in some regional countries such as Bangladesh and Sri Lanka. In Sri Lanka, the RMNCH expenditure tracking has been carried out since late 1990s(R. P. Rannan-Eliya et al., 2000). Similarly the healthcare economics unit in the Ministry of Health of Bangladesh has been compiling the NHAs and the health expenditure reviews since 1994(M. A. Malik, 2009).

Decade long substantial investments in the *RMNCH* sector and the fact that Pakistan did not meet the *MDGs* 4 and 5 (Requejo et al., 2015) call for review of *RMNCH* policy and programmes. The major component of *RMNCH* investment was devoted to the *DCPs*. These programmes targeted their activities to strengthen district-based healthcare system, reach the poor, rural and un-served population. We could not confirm substantial improvement in health seeking from public facilities nor did the overall trend of use public primary care services supports effectiveness of the investments in *RMNCH* sector (Table 4). Successive rounds of the *PSLM* surveys confirmed that over 90% of the aggregate demand for healthcare services has been managed by the private sector and the public tertiary care(Pakistan Bureau of Statistics, 2003, 2004-2011) that are mostly located in urban areas. To improve equity in the use of public services, the government should revisit its strategies on management of district-based primary and secondary care: where access to health facilities by the poor is compromised due to physical unavailability of medical staff especially medical doctors and distance constraint in the far-flung rural areas.

Although evaluating the impact of the *DCPs* on improving use of the public facilities is beyond the scope of this review yet scientific and grey literature have highlighted many examples of inefficiencies and dis-economies of scale in management of *DCPs*. Although reviewing the financial performance of the *DCPs* over the years 2007– 10, we find that yearly financial targets of the *DCPs* fell short by an average of 28%. Underutilized funds indicate incomplete physical activities that were rolled-on to next years at an escalated cost. Pasha et al. (2011) estimated that the cost of Expanded Programme on Immunization (EPI) and Family Planning Programme (FPP) was escalated by a factor of four over 2003–11, respectively (H. Pasha

et al., 2011). Delayed releases effected timely disbursement of the salaries to the staff of the *DCPs*. This factor has been highlighted as sources of staff demotivation and attrition, which in-turn have hampered services delivery components of some of the *DCPs* (Ayub & Siddiqui, 2013; Mangrio, Alam, & Shaikh, 2008)(Mangrio et al. 2008; Ayub and Siddiqui 2013).

The review of PFP&PHC highlighted improved health seeking in the intervention districts but pin-pointed several challenges in the governance and the management of the programme (Oxford Policy Management, 2009; Wazir, Shaikh, & Ahmed, 2013). In mid-term review, the *MNCH* project was ranked partly successful and characterized with poor planning and weak management capacity of the health departments (Technical Resource Facility, 2012). The Asian Development Bank review ranked Reproductive Health Project (RHP) as unsuccessful and has mentioned Pakistan as one of the countries with high failure rate (Asian Development Bank, 2010). Besides the socioeconomic and cultural aspects, gaps in the planning and the execution of the *DCPs* provide some clue to the slow progress on the *MDGs*. In retrospect the routine primary healthcare has faced critical challenges of stock-outs and staff turnovers (Sabih et al., 2010). These factors were mostly overlooked in the resource allocation priority settings, where most of the resources were devoted to the *DCPs*.

Our analysis argues that the approach of vertical *PHC* in the shape of *DCPs* was reinforced by the bilateral and multilateral development partners. With limited resources the approach of focusing on cost effective interventions was a plausible option to accelerate progress to achieve *MDGs*. Though not-conclusive but our review indicates that not resource scarcity but quality of the health bureaucracy and good governance were the missing elements (Rajkumar & Swaroop, 2008) in implementing the *DCPs*. Cost efficiency or equity were neither included in the objectives nor were tracked in reviews and completion reports of the *DCPs*. Other aspects such as the socio-economic and the behavioural determinants of health and challenges to the routine healthcare system have been overlooked in the health policy of 2001 (M. M. Khan, van Dijk, & Van den Heuvel, 2008) and the programmes emerged from this policy.

As of 2010 health sector has been devolved to the provinces under the 18th constitutional amendment. Federal units of the *DCPs* have been dissolved and role of the federal ministry has been curtailed to the health regulations and coordination. The provincial governments are independent to set their own priorities. As an immediate consequence the share of the provinces in public expenditure on health has significantly increased (Table 2). Provincial governments of Punjab and *KPK* have introduced management reforms. For example, administrative integration of the *RMNCH* programmes is underway in both the provinces. Health insurance schemes for the people living below poverty line have been piloted in Punjab and KPK. More important task such as integration of the parallel service delivery models, structural reforms of the health system and equitable access to the health services are now responsibilities of the provincial governments.

The partial success of the vertical *PHC* model and the development assistance to Pakistan and elsewhere calls for low and middle income countries to rely on sustainable indigenous financing, integrate primary healthcare, strives for cost efficiency in management of resources and improve equity (De Maeseneer et al., 2008; Ekman, Pathmanathan, & Liljestrand, 2008; Magnussen, Ehiri, & Jolly, 2004; Walley et al., 2008). Although strategizing health policy requires rigorous and holistic analysis, yet few recommendations have emerged from our findings. In the situation emerging from devolution of health sector to the provinces, rapid economic growth and adopting sustainable development goals we recommend institutionalizing resource tracking, ensuring economy of scale in strategizing healthcare financing, and promoting equity in access and health outcomes through stringent reforms. We have summarized our recommendations in Table 6. We expect that these recommendations would aid efforts of the provinces to achieve the sustainable development goals and other health outcomes.

In the wake of paucity of the detailed health expenditure data we provide estimates of the *RMNCH* sector expenditure and equity analysis in the use of the public facilities for health services. We recommend that our findings should be interpreted with our limitations on the data and the methods. We could not add expenditure on important maternal and childhood illnesses e.g., childhood pneumonia, acute respiratory infections, and pregnancy related complications. The public expenditure on the *RMNCH* related curative services excludes management cost of the ministry/departments of health.

Share of *RMNCH* in *OOP* payments is estimated indirectly. We could not provide details of the *RMNCH OOP* payments into the public and the private or *RMNCH OOP* payments on travelling and the unofficial payments: which are important component of health expenditure in mixed health systems of low- and middle-income countries (Ensor & Ronoh, 2005; Ensor & Witter, 2001). Lastly, we did avoid double counting but due to lack of detailed expenditure data this factor is not completely overruled.

- Improve resource tracking in health sector by applying standard methodology of the health accounts and relevance to the health policy analysis
- Increase the share of the public in the *THE* with sustainable indigenous healthcare financing
- Attain economy-of-scale of the *RMNCH* programme by integrating the routine primary healthcare with vertical programmes
- Increase access and availability of the public health services for the poor and rural areas

Table 6 Recommendations

Conclusion

Pakistan's progress towards the *MDGs* 4 and 5 has remained slow and the goals were not achieved. The vertical *PHC* approach could partly deliver the anticipated targets. While the overall healthcare financing picture in Pakistan showed little improvement, nevertheless *RMNCH* sector funding was substantial. However, it has faced multiple challenges: some innate problems of the vertical *PHC* and limited insight

of the local health system and some acquired problems related to the poor planning and the weak management of the resources.

In the post-devolution situation and with the emergence of the sustainable development goals, we call for urgent attention of the policy makers for acknowledging economic perspective on health policy formulation and analysis. This would ensure timely remedial measures as has been witnessed in some regional countries.

Notes

1. National health accounts of Pakistan reports function of health services according to Government of Pakistan PIFRA (Project to Improve Financial Reporting and Auditing) classifications that are different from health accounts classification.
2. The expert panel comprised practicing paediatrician, gynaecologist, family medicine practitioner, an epidemiologist and public health expert.

Data/reports	Source	Years/ rounds	Sample size	Use of data
Pakistan Integrated Household Survey (PIHS)/PSLM	Pakistan Bureau of Statistics	1998–99	16 156	To estimate population weighted use of health services i.e., *ANC, OD, PNC*, Childhood diarrhoea.
		2001–02	16 182	
		2004–05	76 820	To estimate assets index using data on household assets holdings and dwelling conditions reported in the survey.
		2005–06	15 457	
		2007–08	15 512	
		2009–10	6950	To estimate concentration indices of use of government health facilities for *ANC, IB, PNC* and childhood diarrhoea
HIES	Pakistan Bureau of Statistics	1998–99	16 156	To predict household reporting *OOP* expenditure (as dependent variable) attributable to *RMNCH* related needs identified in *PSLM* i.e., *ANC* visits, *IB*, *PNC* and childhood diarrhoea as independent variables in multiple linear repression methods.
		2001–02	16 182	
		2004–05	14 776	
		2005–06	15 453	
		2007–08	15 512	
		2009–10	6950	
Appropriation Accounts	Accountant General of Pakistan Revenue	2007–10		To extract expenditure data on vertical *PHC* programme (2005–10)
NHAs	Pakistan Bureau of Statistics	2005–12		To extract expenditure on family welfare programme (2005–06, 2007–08 and 2009–10)
Poverty Reduction Strategy Paper	Ministry of Finance	2001–10		To extract expenditure data on family welfare programme (2000–01 to 2004–05, 2006–07, 2009–09) and public health schools (2000–1 to 2009–10)
PSDP	Planning Commission of Pakistan	2000–05		To extract expenditure data on vertical PIHC programme (2000–01 to 2004–05)
ODA to Pakistan	Credit Reporting System of OECD	2003–10		To extract OIDA to RMNICH in Pakistan (2003–10)
OOP Health payments and external resources on health	World Health Global Health Expenditure database	2000–10		To extract yearly aggregate *OOP* expenditure (2000–10) Health expenditure by rest of the world (2000–03)

Table 5 Data sources of resources tracking analysis.

Chapter 4 Socio-economic determinants of household out-of-pocket payments on healthcare in Pakistan

Abstract

Out-of-pocket (OOP) payment on healthcare is dominant mode of financing in developing countries. In Pakistan it is 67% of total expenditure on healthcare. Analysis of determinants of OOP health expenditure is a key aspect of equity in healthcare financing. It helps to formulate an effective health policy. Evidence on OOP in Pakistan is sparse. This paper attempts to fill this research gap. We estimated determinants of OOP payments on healthcare in Pakistan. We used data sets of Pakistan Household Integrated Economic Survey (HIES) and Pakistan Standard of Living Measurement (PSLM) Survey for the year 2004-05. We developed a multiple regression model for the determinants of OOP payments using methods of Ordinary Least Square (OLS). We mainly used social, economic, demographic and health variables in our analysis. Median household OOP healthcare in the year 2004-05 was Pakistani Rupees (PKR) 2500 (US$ 41.99) in 2004-05. Household non-food expenditure was the single highest significant predictor of household OOP health expenditure. Household features like literate head and spouse, at least one obstetric delivery in last three years, unsafe water, unhygienic toilet and household belonging to Khyber Pakhtunkhwa (KPK) province were significant positive predictors of OOP payments. Households with male head, bricks used in housing construction, household with at least one child and no elderly, and head of household in a white-collar profession were negative predictors of OOP payments. Our analysis confirms earlier findings that economic status and number of old aged members are significant positive predictors of OOP payments. This association can direct government to enhance allocations to healthcare and to include program focusing on non-communicable diseases. Our findings suggest further research to explore beneficiaries of government healthcare programs and determinants of high OOP payments by household residing in KPK province than other provinces. The interaction between white collar profession and their economic status in predicting OOP payments is also an area for further research.

Key Words

Out-Of-Pocket payment, social and economic determinants, equity, healthcare financing, demand for health, health policy, developing countries, Pakistan.

Background

Out-of-pocket (OOP) payment is the dominant mode of financing healthcare in developing countries (O'Donnell et al., 2008). In the case of OOP payments, accessing healthcare services is dependent on the economic status of the individual or household. Meeting demand for healthcare is a great challenge if the cost is unaffordable (World Health Organization, 2012a). Households may borrow money, sell assets, or divert resources from other needs to seek healthcare. They may opt for less costly traditional or sub-optimal care, or altogether forgo healthcare services they need (Goudge et al., 2009). Thus an out-of-pocket payment is considered the most inequitable financing mechanism (Wagstaff & Van Doorslaer, 2000).

One of the main objectives of national and international health policy is to replace OOP payments with more equitable modes of financing (World Health Organization, 2000). In this context analysis of determinants of OOP payments is important for devising an effective health policy. The role of socio-economic, geographic and environmental, lifestyle and other factors is well documented in determining health and health seeking behaviour (Marmot et al., 2008). This argument draws from the seminal work of Michael Grossman on health production and the demand for health, i.e. multiple factors contribute to health (Grossman, 1972). The behavioural model of health service-use also emphasizes role of multiple factors in determining health services-use such as demography, social structure and health beliefs, availability of health services, financial resources and community support, perceived and actual need for healthcare and consumer satisfaction (J. G. Anderson & Bartkus, 1973; R. Anderson, 1995).

Like many developing countries OOP payment is dominant mode of financing healthcare in Pakistan. The per capita total expenditure on health is US$26. The share of OOP payment was 67% of total expenditure on health and 85 % of private expenditure on health in the year 2010 (World Health Organization, 2015). People pay out-of-pocket for treatment in private hospitals and clinics as-well-as unofficial payments for healthcare at the government facilities.

Pakistan is a federation of four provinces. It currently has a population of 177 million. This population is mainly rural with a recent trend towards urbanization. Currently the per capita income is US$1,254 (Ministry of Finance, 2011). Government has recognized financial protection for healthcare as major objective of its social protection policy(Planning Commission, 2011). Evidence on household demand for healthcare, social determinants of health and the nature and extent of out of-pocket payments is direly needed to supplement government efforts to devise and effective health policy in Pakistan. We found few scientific research papers on healthcare financing in Pakistan. These papers mainly cover government health expenditure (Akram & Khan, 2007; Siddiqui, Afridi, Haq, & Tirmazi, 1995). The purpose of this paper is to help fill this gap in health services research and contribute to improved health policy in Pakistan by estimating the determinants of household health expenditure in Pakistan.

Methods

Data

We used the data set of the Pakistan Living Standard Measurement (PSLM) Survey for 2004-05. It is a nationally representative survey covering all four provinces of the country. The survey collected data on various aspects of social and living standards. It included demography, health, education, water supply & sanitation, housing, household income and expenditures, and public services use and satisfaction. The core welfare indicator approach is used in this survey (World Bank, 2004).

Sample size of PSLM was 76,520 households. The Household Integrated Economic Survey (HIES) was carried out on a sub-sample of 14,708 households. The respondents in the PSLM survey were all individuals in the households, but in the HIES it was solely head of the households(Pakistan Bureau of Statistics, 2005). The sampling technique of both the surveys was multi-stage cluster sampling with stratification. Sampling weights were also provided in the survey. The HIES, being a sub-sample of PSLM, provides a unique opportunity to associate income and expenditure patterns of households with their social and demographic and other characteristics from the PSLM (Pakistan Bureau of Statistics, 2005).

Out-of-pocket payment on healthcare was reported in the "consumption of consumable goods and services" module of the survey(Pakistan Bureau of Statistics, 2005). It was reported in four different categories i.e.

1) Purchase of medicines, equipment supplies etc.

2) Medical fees paid to doctors, Hakeem (traditional healer) etc. outside hospital including medicines,

3) Hospitalization including doctors' fees, laboratory tests, X-ray charges etc. and

4) Dental/optical care and all other expenses on healthcare not classified elsewhere.

The recall period of health expenditure was one year.

Variables

We mainly used household level characteristics. Certain individual characteristics that can influence OOP payments, e.g., some characteristics of head and spouse in a household are also included in our analysis. All independent variables included in our analysis mainly covered economic, demographic, social and living standard, and health characteristics of the households.

Economic

We used household non-food expenditure as a proxy of economic status of a household. Due to the positively skewed distribution of non-food expenditure, we used its natural logarithm transformation.

We transformed the profession of the head of household to the lifestyle dummy variables. We assumed that a household is living a modern lifestyle if its head is in the professional categories of senior officials/ managers and professionals.

Demographic

We included the educational level of the head and spouse of the household as a predicator for OOP payments. Five years of formal schooling is considered as literate. For provincial differences in OOP payments four dummy variables for provinces of Punjab, Sindh, Khyber Pakhtunkhwa (KPK) and Baluchistan were included in the analysis.

The household members aged more than 60 years and less than five years were assumed to be major predictors of OOP payment compared to other members. The four dummies were created for households with 1) no children or elderly, 2) at least one child and no elderly 3) at least one elderly and no children and 4) at least one child and one elderly in the household. The gender of the head of household was also included in our analysis.

Social and living standard

A dummy variable of bricks as the housing construction material is included to explore influence of housing on OOP payments compared to other less durable housing materials.

Drinking water source and types of toilets were also transformed into a dummy predictor of OOP payments. We assumed all types of water source of the household as unsafe except "piped water inside the house". All types of toilet facilities were assumed unsafe except "flush to public sewerage".

Health and healthcare

Households reported the time and distance, and mode of travelling, to reach a nearby health facility. We assumed that distance to reach hospital and clinics could potentially predict the OOP payment in the form of traveling cost. The number of obstetrical deliveries in the last three years in a household was transformed to categorical variable of any delivery in last three years in the household.

Statistical Analysis

We used Ordinary Least Square (OLS) methods to estimate a multiple linear regression model of OOP payments. Household OOP payments are usually characterized as positive, with sizable zero responses and a positively skewed distribution of the data (Mullahy, 2009). In case of the HIES data, 14,488 households (98.5%) reported OOP payments. It exhibited a positively skewed distribution. We applied a natural logarithm transformation of health expenditure in the regression model.

We explored the multi-collinearity of the independent variables. We estimated the variance inflation factor (VIF). Its value remained less than 3.41 predicting limited multi-collinearity.

We reported our estimates in median, inter-quartile range, and percentage. All analysis was carried out in STATA version 11.2, Stata Corporation, Texas, USA, 2011.

Results

Descriptive analysis

Median household OOP payment on healthcare in the year 2004-05 was Pakistan Rupees (PKR) 2500 (US$ 41.99). It was highest in Khyber Pakhtunkhwa (KPK) (PKR 3000, US$ 50.39). Median OOP payment on medicine was highest in KPK (PKR 2400, US$ 40.32). Median OOP payment on hospitalization was highest in Punjab (PKR 1000, US$ 16.80).

We found marked differences in household OOP payment related to their socio-economic characteristics. Households with both head and spouse literate, urban households, and households where at least one child was delivered in last three years reported higher OOP payments than the other households.

In half of the households the heads and spouses were illiterate (50.9%). The literacy of household head and spouse was higher in Punjab and Sindh provinces than in other two provinces. Most of the households were headed by a male in all four provinces with KPK being the lowest in this ranking. The detail of the descriptive analysis is given in Table 1.

Econometric analysis

We considered all variables in the multiple linear regression models that were significant predictors of OOP payments in the uni-variate analysis.

Non-food expenditure (LOG_NFE) emerged as the largest significant predictor of the log of OOP payment. An increase of 0.769 in the log of OOP payment in Pak Rupees was associated with a unit increase in the log of non-food expenditure in Pak Rupees. This was followed by households in KPK province, literate households, and houses with unhygienic toilets. Details of the regression model are given in Table 2.

Literate head and spouse of the household, urban households, unsafe water source, houses with unhygienic toilets and households with at least one child and one elderly person were significant predictors of OOP payments. Households where the head is in a white-collar profession and male heads of the household negatively predicted OOP payments. Households being at a greater distance from health facilities was a positive predictor of higher OOP payments than OOP payments by households taking less than 30 minutes to reach a hospital or clinic.

Discussion

The influence of socio-economic and other factors on health is well recognized. Our analyses of the situation in Pakistan are the first of its kind to be published in Pakistan. We used OLS methods for analysis of OOP payments which is appropriate if there are fewer zero values of OOP payments by the household. We considered the Matsaganis and Mitrakos et al (2009) argument as appropriate (Matsaganis, Mitrakos, & Tsakloglou, 2009).

Their sampling unit and recall period of health expenditure was like our data set, i.e., household and one-year recall period. A one-year recall and aggregate health expenditure for the entire household would likely reveal fewer zero responses.

Household characteristics	Provinces				National
	Punjab	Sindh	KPK	Baluchistan	
Household OOP payment (PKR)	1800	2500	3000	2500	2500
	(3000)	(2500)	(4150)	(2300)	(2990)
Household non-food expenditure (PKR)	22050	19045	20945	22100	21120
	(39080)	(21130)	(25350)	(19140)	(24674)
Modern lifestyle	7%	12%	7%	8%	8%
Literacy of head and spouse					
-Both head and spouse are illiterate	2895	1560	1732	1291	7478
	(39 %)	(21 %)	(23 %)	(17 %)	(51 %)
-Only spouse is literate	178	47	23	5	253
	(70 %)	(19 %)	(9 %)	(2 %)	(2 %)
-Only head is literate	140	1042	760	673	3876
	(36 %)	(27 %)	(20 %)	(17 %)	(26 %)
-Both head and spouse are literate	1632	828	446	178	3084
	(53 %)	(27 %)	(14%)	(6 %)	(21 %)
Population (millions)	63.92	36.43	31.03	22.48	153.92
	(41.56%)	(23.67%)	(20.16 %)	(14.61 %)	(100 %)
Rural Population (millions)	37.71	20.76	19.55	15.06	92.35
	(59%)	(57%)	(63%)	(67%)	(60%)
Male head of the household	5584	3396	2570	2117	13667
	(91 %)	(98 %)	(87 %)	(98 %)	(93 %)
Household Size	4 (3)	4(2)	6(4)	7(3)	5(3)
Children (< 5years) & elderly (> 60 years)					
-No children or elderly	2077	1154	835	718	4784
	(43 %)	(24 %)	(17 %)	(15 %)	(28 %)
-At least one elderly and no children	1042	430	333	236	2041
	(51 %)	(21 %)	(16 %)	(12 %)	(14 %)
-At least one child and no elderly	2026	1506	1244	998	5774
	(35 %)	(26 %)	(21 %)	(17 %)	(39 %)
-At least one elderly and one chid	961	387	549	195	2092
	(46 %)	(18 %)	(26 %)	(9 %)	(14%)
Unhygienic toilet facility	4694	2581	2769	2038	12082
	(39 %)	(21 %)	(23%)	(43%)	(82 %)
Unsafe drinking water	4192	2029	1597	1144	8962
	(47 %)	(23%)	(18%)	(56 %)	(61 %)
Housing material (bricks)	3594	2178	1656	1377	8805
	(41 %)	(25 %)	(19 %)	(16%)	(60 %)
Any delivery in last 3 years in the household	2481	1615	1520	935	6551
	(38%)	(25%)	(23%)	(14%)	(45%)
Health facilities distance constraint	1774	1574	969	1060	5377
	(33%)	(29%)	(18%)	(20 %)	(37 %)

Table 1: Descriptive statistics of determinants of out-of-pocket payments in Pakistan
*Percentage sign (%) is mentioned where numbers and percentages are given, otherwise median and Inter Quartile Range

Independent Variables	Coefficient	95 % confidence intervals	
Log of Non-food-expenditure	0.769	0.737	0.800
Modern lifestyle	-0.092	-0.164	-0.020
Literacy of head and spouse			
-Both head and spouse are illiterate	-	-	-
-Only spouse is literate	0.166	0.104	0.228
-Only head is literate	0.136	0.005	0.266
-Both head and spouse are literate	0.233	0.172	0.293
Male head of household	-0.107	-0.184	-0.030
Household with children aged less than five years and elderly aged 60 years or above			
-No children or elderly	-	-	-
-At least one elderly and no children	0.066	-0.005	0.137
-At least one child and no elderly	-0.016	-0.084	-0.051
-At least one elderly and one chid	0.107	0.029	0.185
Provinces			
-Punjab	-	-	-
-Sindh	0.102	0.059	0.0145
-KPK	0.402	0.351	0.453
-Baluchistan	0.037	-0.011	0.084
Unhygienic toilet facility	0.182	0.124	0.240
Unsafe drinking water	0.096	0.052	0.139
Housing material (bricks)	-0.026	-0.064	0.013
Any delivery during last 3 years in the household	0.179	0.116	0.242
Health facilities distance constraint	0.064	0.023	0.104
Constant	-0.419	-0.774	-0.065
Dependent variable log of out-of-pocket payments			
Total observation 14708, censored observation =12725, F (17,12707) = 186.37, R^2 = 0.3768, Root MSE = 0.78336			
Ramsey Reset Test F (3, 12704) =4.10, p = 0.0064			

Table 2: Estimated Coefficients in the OLS linear regression model for OOP payment in Pakistan

The authors compared log OLS linear regression, two parts regression and generalized linear regression to model health expenditure. They report similar results to alternative estimators (Matsaganis et al., 2009) We provided some useful additional information which increases the understanding of the determinants of OOP payments in Pakistan. We adapted various determinants of OOP payments from the literature review to our model considering data availability and our understanding of socio-economic and cultural factors in Pakistan. For some determinants of OOP payments, our findings confirmed earlier research, such as income, age, and schooling. While for other determinants we opened a new debate on research into the determinants of OOP payments. Positive predictors of OOP payments in our model, e.g. household income or expenditure support earlier research finding by Rous and Hotchkiss (2003), Tin-Su and Pakhrel et al (2006) and Okunade and Suraraetdecha et al (2009) (Okunade, Suraratdecha, & Benson, 2010; Rous & Hotchkiss, 2003; Su, Pokhrel, Gbangou, & Flessa, 2006). The economic status in these research papers was the log of income, log of expenditure and household animal value, and wealth index respectively. In our model the log of non-food expenditure significantly predicted household's OOP payments. It confirms

argument of Xu K and Lavus K et. al. (2003) that non-food expenditure is an appropriate proxy of household effective income that predicts OOP payments better than total income or total expenditure(Xu et al., 2003).

In our model the greater influence of households with elderly members on OOP payments compared to households with children was similar to the findings of Tin-Su and Pakhrel et al (2006) i.e. adult respondent as positive predictors (regression coefficient 0.439) of OOP payments than young(Su et al., 2006). Rous and Hotchkiss (2003) reported positive age related influences on OOP payments of all age groups except age 1-14 years (Rous & Hotchkiss, 2003). This effect was highest for respondents in age group of 65 years and above (regression coefficient 0.651). The lack of health sector resource allocation by the government for management of non-communicable diseases in the elderly could be a possible explanation of the positive influence of a household member of 60 and older on OOP payments in Pakistan.

Our findings on literacy of the head of household as positive predictor of OOP payments was similar to Tin-Su and Pakhrel et al (2006) and Okunade and Suraraetdecha et al (2009)(Okunade et al., 2010; Su et al., 2006). Rous and Hotchkiss (2003) found it to be a negative predictor of OOP payments(Rous & Hotchkiss, 2003). Our findings show that urban households made higher OOP expenditures on healthcare than rural households. This contradicted Rous and Hotchkiss's (2003) findings(Rous & Hotchkiss, 2003).

White collar households are a negative predictor of OOP payments in our analysis. It is contradictory to the income and health expenditure relationship discussed above. We could not find any research article that has included profession of the head of household in the analysis of determinant of OOP payments. Fair access to free healthcare at government facilities and healthy lifestyle could be possible explanations. Earlier research found that government subsidies in health sector in some developing countries for instance Nepal, China, Indonesia, and India, benefited the rich more than the poor. However, this conclusion is based on income/expenditure of the household rather the profession or lifestyle.

One important aspect from the health policy perspective is the provincial differences in OOP payments. Our regression analysis indicated that a household in KPK province was higher predictor of OOP payment than for households in Punjab. Khyber Pakhtunkhwa province is generally considered to be a more conservative society with a predominance of population of Pashtun ethnicity. It a greater rural population, lower literacy, lower level of sewerage systems and larger household size than the other provinces. In KPK province more female heads of household than other provinces. In the regression model male head predicted negative influence on log of OOP than female heads. This finding is contrary to Rous and Hotchkiss (2003) findings regarding influence of male head of households on OOP payments. Besides other determinants we can associate higher OOP payments in KPK to the more households headed by a female than other provinces.

We only extracted that data which was attributed to households rather than individuals. In many cases there was a heterogeneity issue of individual characteristics and behaviour within a household. For example, individual satisfaction with services, vaccinations, etc. could not be grouped into a single indicator for households. Unlike Rous and Hotchkiss (2003) we did not include a providers' choice variable in our model since the unit of analysis in their data was the individual (Rous & Hotchkiss, 2003). In case of the HIES data, the unit of analysis was households. The heterogeneity of such provider choices within the household could not allow provider's choice to be used as a predictor in the regression model. We grouped provider choices into public and private providers in the regression model but it was insignificant in explaining the variation in OOP payments (i.e. regression coefficient was -0.01) Unlike Tin Su and Pokhrel et al (2006) we could not use morbidity and mortality in our analysis due to limited data in PSLM survey(Su et al., 2006).

The double hurdle model of Okunade and Suraraetdecha (2009) was a time series analysis of determinants of health expenditure. They used permanent income instead of current income or expenditure to compare trends over many years 1994, 1996, 1998 and 2000(Okunade et al., 2010). In our case, the analysis was carried out on OOP payments reported for one year. This kind of time series research would be worth undertaking in Pakistan in future, but only when similar data is made available for later years.

The comparison of our results with earlier research is not conclusive. These comparisons are constrained by differences in the selection of econometric model, the choice of independent variables and their interaction. There are also significant differences in the time period and sampling unit among the research studies reviewed, i.e.one time (Dieleman & Hanlon, 2014; Matsaganis et al., 2009; Rous & Hotchkiss, 2003; Su et al., 2006) or time series (Okunade et al., 2010) and sampling unit of data collection i.e. individual (Rous & Hotchkiss, 2003; Su et al., 2006)) or households (Matsaganis et al., 2009; Okunade et al., 2010).

Findings of our research can help devising more effective health policy in Pakistan. Government should consider enhancing resources to healthcare. It is equally important for the government to understand beneficiaries of public provision of healthcare services. Parallel to government spending other prudent and sustainable risk pooling mechanism can help reducing intensity of OOP payments. Enacting mandatory social health insurance legislation can be a suitable option in the backdrop of rapid economic growth in the country since last decade. Thirdly non-communicable diseases require particular attention of the government in resource allocation priority settings into health sector in Pakistan. Our findings also encourage provincial level analysis of OOP-Payments, especially in KPK such analyses are important from health policy perspective.

Conclusion

Our findings strengthen the argument that multiple factors influence OOP payments. It supplemented the approach of Anderson that the "family as a unit" affects the choices regarding the seeking healthcare. We

added some new elements to determinants of OOP payments in Pakistan. We included literacy of household head and spouse in our model and assessed their joint influence on OOP payments. The influence of the profession of the head of household on OOP payments is another important innovation in our analysis that should be further explored theoretically and empirically. We have provided important new information relevant to policy on OOP payments in Pakistan that will support improved health policy and programs in future.

Part b Maternal and Child Health Policies

Chapter 5 Progress in Maternal and Child Health: how has South Asia fared?

Abstract

South Asia constitutes two third of the world population. Rampant poverty, malnutrition and lack of women empowerment had hampered health of women and children in this region. In this paper we explore progress and current state of reproductive, maternal, new-born and child health in the region in the era of *Millennium Development Goals*. We used multiple national level data sources, national health and nutrition, social and expenditure surveys, and global data bases on maternal and child health, still births and causes of death. We calculated coverage rates of intervention, their time trends, carried out an extensive literature review on reforms and programs implemented in the countries of the region. While South Asia has reduced maternal mortality ratio across the region, mortality remains high in many countries including Afghanistan, Pakistan, and Nepal Despite progress in delivering antenatal care and vaccinations, wide disparities exist across wealth groups and between rural and urban populations in many countries Social determinants and health systems or policies are important contributors to observed improvement and differentials in the region Ongoing challenges include conflict or insecurity, malnutrition, encouraging empowerment of girls and women, and supporting better and timely data collection

Key words

Maternal health, child health, health services coverage, equity

Introduction

In our review of the state of maternal and child health in South Asia published in The BMJ 12 years ago,(Zulfiqar A Bhutta et al., 2004) we highlighted rampant poverty, malnutrition, and lack of female empowerment as key barriers to change. Since then, the region has seen much focus on the millennium development goals related to maternal and child health as well as economic development. This article explores the progress and current state of reproductive, maternal, new-born and child health throughout South Asia, and presents a snapshot of the regions' preparedness for the Sustainable Development Goals (United Nations, 2015).

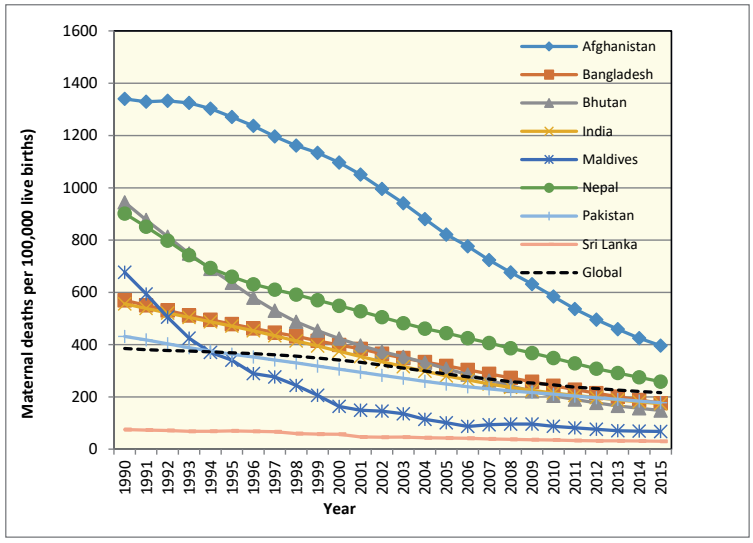
Methods and data sources

Our analysis focuses on countries that are active members of the South Asian Association for Regional Cooperation: Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka. We used national and global data sources to assess maternal mortality,(United Nations, 2016c) child mortality (United Nations, 2016b), and stillbirths(Lawn et al., 2016) as well as causes of death (Kassebaum et al., 2014; L. Liu et al., 2016; UNFPA, 2016). We calculated coverage rates for interventions and health indicators for mothers, infants, and children in South Asia from UN, World Bank, and WHO sources (UNFPA, 2016; UNICEF, 2011, 2016; United Nations, 2016a; WHO and UNICEF, 2016a, 2016b). Full definitions of the variables and details of the methods are provided in the appendix on bmj.com.

Mortality trends and causes of death

Globally, maternal mortality ratio dropped from 385 to 216 deaths per 100 000 live births from, 1990 to 2015, a 44% reduction(United Nations, 2016c). Nevertheless, around 303 000 mothers die every year, about 22% of whom are in South Asia, with India accounting for the bulk of these deaths. Maternal mortality fell substantially in all South Asian countries during this period (ranging from a 59% reduction in Pakistan and Sri Lanka to 90% in the Maldives), with an overall reduction of 68% (fig 1). Afghanistan had the highest maternal mortality ratio in the region in 1990 (1340/100 000 births) and still had the highest ratio in 2015 despite a 70% fall. The main causes of maternal death vary across South Asia (appendix), though maternal haemorrhage, hypertensive disorders, obstructed labour and uterine rupture, and abortion, miscarriage, or ectopic pregnancy are leading causes in many countries.

Mortality among children under 5 years reduced by about half from 1990 to 2015 (91 to 43 deaths per 1000 live births) across the world and by 60% in South Asia (from 129/1000 to 53/1000)(United Nations, 2016b) Of the 5.9 million children under 5 who died in 2015, almost 1.9 million (31%) were in South Asia (Lawn et al., 2016).



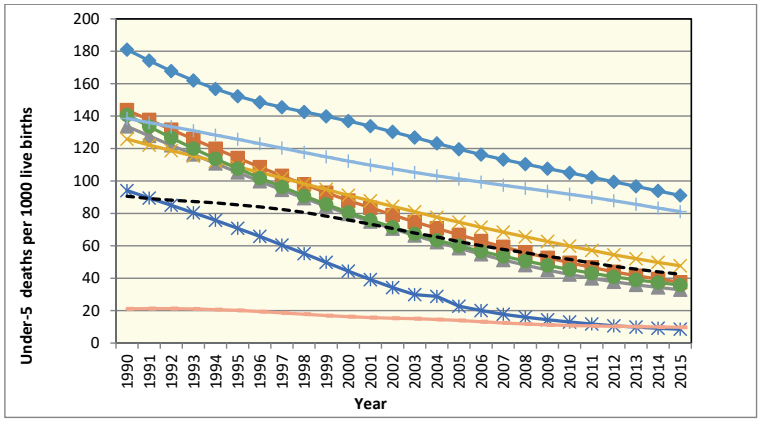


Figure 1 Mortality Trends in South Asian Countries, 1990-2015
*Sri Lanka's 2004 U5MR estimate was smoothed using linear interpolation

Pneumonia and diarrhoea related illness are the two leading preventable causes of child mortality in South Asia (appendix), leading to about half of all child deaths in most countries. Injuries are responsible for at least a further 10%. In Sri Lanka and Maldives congenital anomalies cause a third of child deaths.

Over half (57%) of deaths among children under 5 in South Asia occur in the first 28 days of life; this amounts to more than 1 million new-borns dying every year in the region (United Nations, 2016b). Moreover, of the 2.6 million stillbirths that occur globally every year, about 37% (almost 1 million) are in South Asia.5 New-born mortality rates fell from 1990 to 2015; stillbirth rates also fell, although more slowly

(appendix). New-born mortality rates continue to be highest in Pakistan (45.5 deaths per 1000 live births) and Afghanistan (Lawn et al., 2016; Van Doorslaer et al., 2006)(35.5). The main causes of new-born death are consistent across the region, with preterm birth causing about one third of deaths and intra partum related events; infections, including sepsis and meningitis; and congenital anomalies each contributing about one fifth of deaths (appendix). Some variation exists across countries. Robust data on causes of stillbirths were not available for comparison.

Coverage of essential interventions

We explored a range of evidence based essential interventions for mothers and children that are associated with improved child and maternal survival (see appendix for detailed list). Figure 2 shows the wide differences in coverage across the region. Contraceptive use is about 55% on average and is lowest in Afghanistan (31%) and highest in Sri Lanka and Bhutan (about 70%). About 70% of women have at least one antenatal visit in most countries, reaching almost 100% in Sri Lanka and Bhutan. Coverage drops for four or more antenatal care visits and skilled birth attendance; these interventions have the widest variation across countries, ranging from 23% in Afghanistan to 93% in Sri Lanka. The provision of postnatal care within two days for both the new-born and mother is low in the region (30-40% median) with some variation across countries. Data for Sri Lanka were not available. Breastfeeding interventions (including early initiation and exclusive breastfeeding for 6 months) have about 50% regional coverage, with a gap of 40% between the highest (Sri Lanka, Bhutan for early initiation; Afghanistan for exclusive breastfeeding) and lowest (Pakistan) countries. The region performs well in the provision of child vaccinations, with about 90% coverage on average for tetanus, Hib3, measles, and DPT3. Country coverage ranges from about 70% to 100%, with Afghanistan and Pakistan amongst the lowest and Sri Lanka consistently the highest.

Access to treatment for children with diarrhoea and pneumonia is moderate in the region (50-60%). Oral rehydration solutions (ORS) and ORS with continued feeding are least used in India and Pakistan, and coverage rates are highest in Bangladesh. Conversely, care seeking for pneumonia is highest in India and Maldives (almost 80% coverage) and lowest in Bangladesh (41%).

Coverage inequalities within countries

We analysed socioeconomic and residence inequalities for two key interventions (skilled birth attendance and measles vaccination) as they represent opposite ends of the continuum of care and diverse delivery strategies (fig 3). Coverage gaps for skilled birth attendance between the richest and poorest quintiles and between urban and rural residents are evident in most countries, with gaps of at least 70% in India, Nepal, and Bhutan. Sri Lanka and Maldives have minimal to no gaps. Inequalities in measles vaccination were greatest for Pakistan, India, and Afghanistan, with lowest coverage rates among the poorest populations and those living in rural areas.

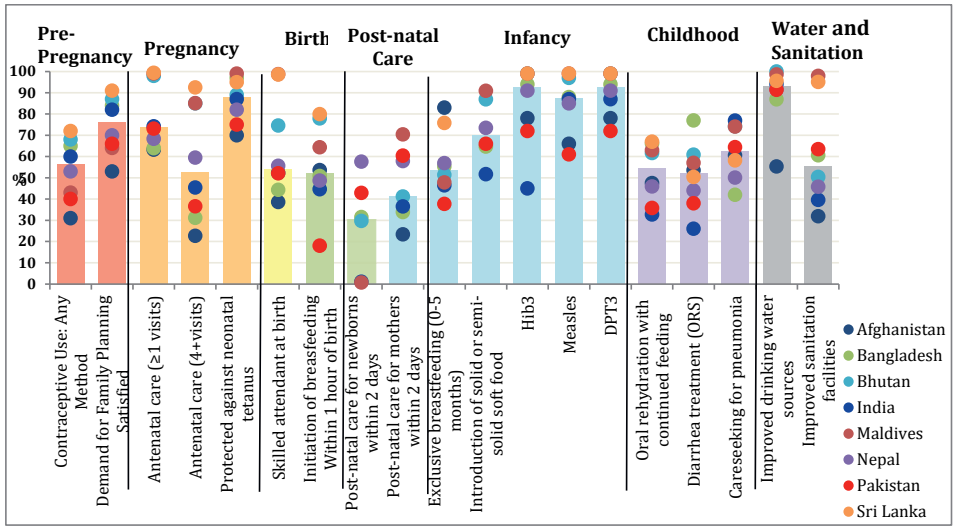
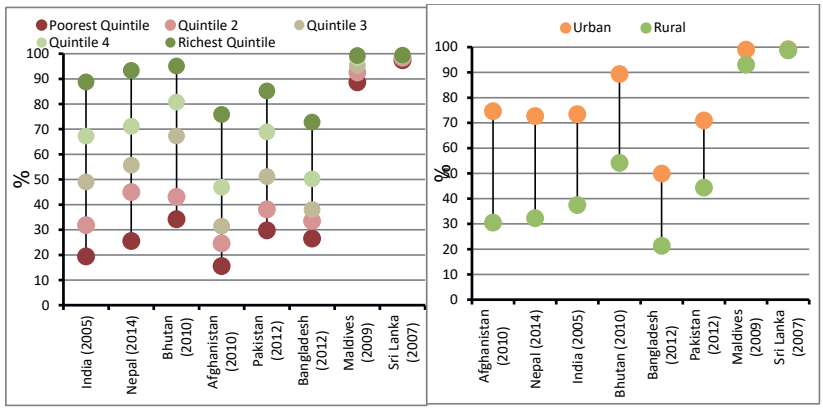


Fig. 2 Coverage of Essential Interventions in South Asian Countries (best recent estimates)
(Countdown to 2015, 2015)

A) Skilled Birth Attendance



B) Measles Vaccination

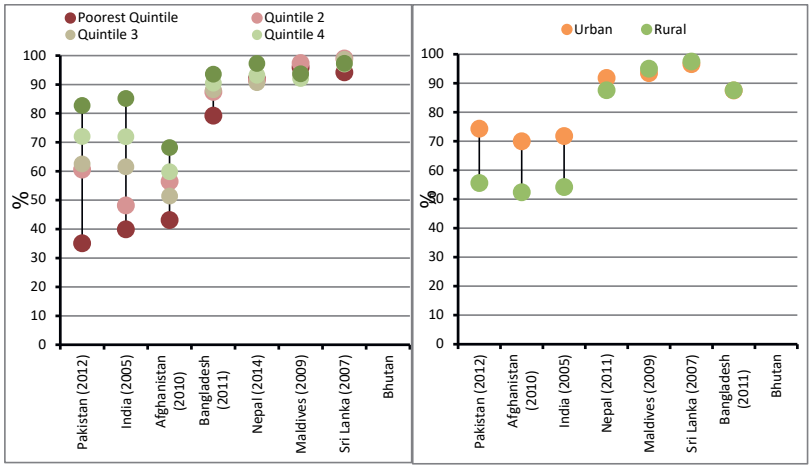


Fig 3 Inequalities in Skilled Birth Attendance and Measles Vaccination by Country
(Countdown to 2015, 2015)

Access to improved water and sanitation

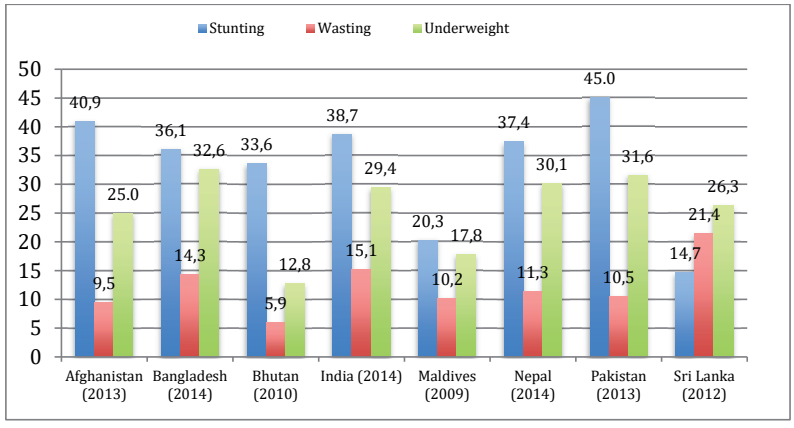
Equitable and sustainable access to safe water and improved sanitation and hygiene can improve outcomes in many ways through its implications for environmental cleanliness, health, reduced poverty, and equity(Waddington & Snilstveit, 2009). About 8% of maternal deaths worldwide are attributable to infections that can be directly linked to unhygienic conditions during labour and to poor hygiene practices in the six weeks after birth (Goodburn & Campbell, 2001; Gravett et al., 2012). The availability of improved water is almost universal throughout the region except in Afghanistan, where only 55% of the population has access (see appendix on bmj.com) (Zulfiqar A Bhutta & Nundy, 2017). Improved sanitation facilities are less available in the region (about 55% regional median), varying from 32% in Afghanistan to over 90% in Sri Lanka and Maldives.

Malnutrition

Malnutrition of children and women remains a problem in South Asia (fig 4). Since the early 2000s, the prevalence of under 5 stunting has dropped by about one third in Afghanistan, Bangladesh, India, Nepal, and Maldives. Pakistan, however, experienced an increase over this period (from 42% to 45%). Despite progress, current levels of stunting are more than 30% in most countries in the region, except Sri Lanka (15%) and Maldives (20%). Currently around a third of children are underweight in most countries except Bhutan (13%) and Maldives (18%) (Appendix). Prevalence of wasting has hardly changed over the decade, and currently ranges from 6% in Bhutan to 21% in Sri Lanka.

Both over nutrition and under nutrition are concerns among women aged 15-49 years in South Asia (fig 4). Maternal underweight (defined as body mass index< 18.5) is prevalent in about 36% of women in India—about double that in the next highest countries (Nepal 18% and Bangladesh 19%). Obesity (BMI≥30) is highest in Pakistan (15%) and Maldives (13%).

A) Child Malnutrition



B) Maternal Malnutrition

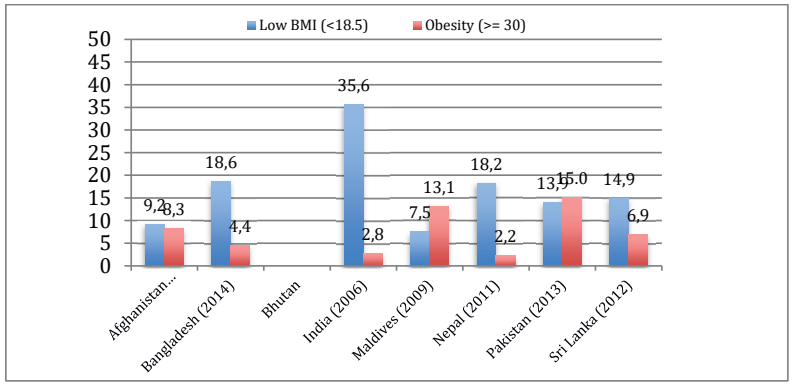


Fig. 4 Malnutrition Trends in South Asian Countries

Using latest available data. Baseline figures for stunting relate to earliest available estimates between1999-2004)(Unicef/ WHO/World Bank & UNICEF, 2015)

Empowerment of girls and women

Empowered girls and women are more inclined to seek healthcare when in need and consequently have improved health outcomes and survival. Empowered females are more educated, delay marriage, postpone childbearing, and have fewer and spaced pregnancies, all of which are known to improve maternal and child health (Karlsen et al., 2011).

All countries in the region have experienced an overall reduction in fertility rates since 2004, ranging between 9% and 36% (table 1). Current fertility rates are highest in Afghanistan and Pakistan. Births among adolescent girls (age 15-19 years) have declined more than 50% in Bhutan, Maldives, and India. Pakistan has made the least progress in reducing fertility among adolescent girls (11% reduction). Average age at first marriage is lowest in Bangladesh (19.2 years), and highest in Sri Lanka (23.6 years). Although most countries have increased the average age of marriage by 2%-7%, Afghanistan had the fastest rate of change over the past decade (from 15.0 years in 2006 to 21.2 years in 2011).

Literacy of women (age ≥15 years) is greater than 90% in Sri Lanka (92%) and the Maldives (99%), and about half in other South Asian nations except Afghanistan where only 24% of women are literate. Literacy of young women (age 15-24 years) is >85% in all countries except Pakistan (67%) and Afghanistan (46%).

Country	Afghanistan	Bangladesh	Bhutan	India	Maldives	Nepal	Pakistan	Sri Lanka
Fertility rate (average births per woman):								
2014	4.8	2.2	2.0	2.4	2.1	2.2	3.6	2.1
2004	7.0	2.8	3.0	3.0	2.4	3.4	4.1	2.3
% Change	-30.7	-21.7	-31.6	-20.1	-12.2	-35.2	-12.4	-8.6
Adolescent fertility rate (average births per 1000 women aged 15-19):								
2014	76.7	83.5	22.7	25.7	7.3	72.5	39.2	15.4
2004	134.7	101.1	61.7	54.0	20.1	104.1	44.2	25.7
% Change	-43.0	-17.5	-63.2	-52.4	-63.7	-30.4	-11.4	-40.1
Mean age at first marriage:								
Current (year of data)	21.2 (2011)	19.2 (2013)	21.4 (2010)	20.7 (2011)	22.4 (2009)	20.7 (2014)	23.1 (2013)	23.6 (2007)
Baseline (year of data)	15.0 (2006)	18.7 (2004)	21.8 (2005)	20.2 (2006)	22.9 (2006)	19.4 (2006)	22.3 (2003)	NA
% Change	41.3	2.7	-1.8	2.5	-2.2	6.7	3.6	—
Female adult literacy rate (% aged ≥15):								
2015	23.9	58.3	55.1	63.0	98.9	54.8	42.7	91.7
Baseline (year of data)	NA	NA	38.7 (2005)	50.8 (2006)	98.4 (2006)	NA	35.4 (2005)	89.1 (2006)
% Change	—	—	42.4	23.9	0.5	--	20.7	2.9
Literacy rate of young women (% aged 15-24):								
2015	46.1	85.9	90.4	87.3	99.5	87.4	66.8	99.2
Baseline (year of data)	NA	NA	68.0 (2005)	74.4 (2006)	99.4 (2006)	NA	53.1 (2005)	97.9 (2006)
% Change	—	—	33.0	17.3	0.1	—	25.8	1.3

Table 1 Indicators of empowerment of women and girls in South Asian countries

NA=not available

Investments in health systems

The density of healthcare staff, including physicians, nurses, and midwives, varies widely across the region. South Asia has seen various health system and outreach innovations targeted at marginalised populations with poor access to health services. These have included deployment of community health workers through non-governmental health workers in Bangladesh (M. Rahman et al., 2016) to public sector workers such as

lady health workers in Pakistan (Zulfiqar A Bhutta et al., 2011) or accredited social health activists (ASHA) in India (Saprii, Richards, Kokho, & Theobald, 2015).

There have also been large scale experiments with community engagement through women's groups (Prost et al., 2013) as well and financial incentive programmes, both conditional on recipients' health behaviour, such as India's Janani Suraksha Yojana programme supporting facility births, (Powell-Jackson, Mazumdar, & Mills, 2015) and unconditional, such as the income support programme in Pakistan targeting women (Cheema et al., 2014).

Table 2 lists the key health initiatives implemented in South Asia during the period of the millennium development goals. Common features of such programmes include adaptation of a basic package of healthcare services and strategies to expand universally, contracting out delivery of healthcare services to non-governmental organisations to enable rapid scale-up, financial incentive programmes or abolishing user fees, and community-based healthcare initiatives and training of midwives. High out-of-pocket health expenditures annually drag about 4% of the population into poverty in the three most populous countries of the region: India, Bangladesh, and Pakistan (table 3). Only four countries had data available for spending on maternal and child health. The proportion of total health expenditure was 9.8% in Sri-Lanka, 12% in Bangladesh, 16% in Afghanistan, and 21% in Pakistan.

Discussion and conclusion

Despite wide variations, South Asia has made impressive progress in maternal and child health over the past decade. In many countries with widespread conflict and grinding poverty, notably Nepal and Afghanistan, these gains are remarkable. Although countries have used different approaches to achieve these reductions, many have involved community-based programmes to manage demand and deliver services.

Nepal invested heavily in community based approaches to increase detection of serious childhood illnesses and management of pneumonia (Dawson et al., 2008). A range of innovative approaches for addressing maternal health and nutrition through women's groups provided some of the first evidence on the role of community empowerment in rural Makwanpur, Nepal (Manandhar et al., 2004). Bangladesh also used interventions including community empowerment, investments in education and young women, and national roll-out of community health workers through non-governmental organisations such as BRAC. It was able to rapidly roll-out interventions through a range of community outreach programmes (Chowdhury et al., 2013; El Arifeen et al., 2013). However, the reductions in maternal mortality in Bangladesh far outstripped the gains in skilled birth attendance coverage and facility births (El Arifeen et al., 2014). The innovative deployment of public sector community health workers in Pakistan (Soofi, Ahmed, et al., 2012), as well as India (Bhandari, Mazumder, Taneja, Sommerfelt, & Strand, 2012), suggest that such strategies could be deployed at scale.

Country	Reform	Year started	Focus
Afghanistan	Midwifery training program	2002	Provided pre services training to midwife for community care and hospital-based care.
	Contracting of primary health services to NGO	2004	Capitation based (US$ 3.8 to US$ 5.1 per capita) contracts with providers through a bidding process.
	Basic package of health services	2004	Basic primary care services including maternal health and family planning.
Bangladesh	BRAC Shasthya Shebikas Community health workers	1970	Scaled up to all 64 districts: from 1080 CHWs to 91000 CHW by 2010
	SWAp	1998	A shift from project-based planning to sector-wide planning, management, and financing.
	Bangladesh national strategy for maternal health	2001	Adopted community based skilled birth attendant to supplement institution-based care.
	Demand side financing	2007	Maternal health voucher scheme. Current converges in 53 Upazilas.
Bhutan	Universal access to health services	2008	In the constitution of 2008 health is recognized as human right and as one of the nine domains of gross national happiness.
	Health policy	2012	Pledges universal health access to modern and traditional care, 90% population living within three hours walking distance to a health facility.
India	Integrated child development services	1975	Anganwadi (community) worker for maternal and child health and nutrition services.
	National rural health mission	2004	Integration of vertical reproductive and maternal health programs and health system strengthening in 18 states
	Janani Suraksha Yojana	2005	Conditional cash transfer to pregnant women
	Accredited Social Health Activist (ASHA)	2006	820000 community health workers (ASHA) as of 2012
	Rashtriya Swasthya Bima Yojna	2008	In patient (including maternity) coverage for the poor. 41.3 million People covered by 2016.
Maldives	Madhana	2008	Publicly funded health insurance scheme initially covering public employees and the elderly.
	Aasandha	2012	Universal health coverage (up to Rf 100,000) including treatment in neighbouring countries.
Nepal	National safe motherhood plan	2002	Increase the access of poor and marginalized people on the reproductive health services.
	Free healthcare policy	2006	Abolishing user's fee at public facilities. By 2009 free essential health services including maternity services.
	National safe motherhood/ neonatal health plan	2006	Birth preparedness package.
	Community based neonatal care package	2007	Piloted in 10 districts and planned to scale up to 35 more districts by 2013
Pakistan	Social Action Program I & II	1992/1998	Sector wide approach for primary and secondary healthcare
	National Program for family planning and primary healthcare	1994	Currently over 100000 lady health workers covering more than 80% of rural population
	18th constitutional amendment	2010	Devolution of health sector to the provinces
	Community midwife program	2005	New cadre of community midwife is introduced.
	National health insurance scheme	2014	Financial protection from health shocks to the population living below poverty line for inpatient care including maternity services.
Sri Lanka	National maternal and child healthcare program	1965	Family Planning and reproductive health were integrated
	Strategic framework for health development 2004-2015	2003	Health master plans and health development plans were implemented
	National Policy on maternal and child health	2012	Broader approach is adopted to maternal and child and demographic transition

Table 2 Health policies and reforms in South Asia

Similarly, reductions in child mortality (and especially from diarrhoeal diseases) have been notable, but while there have been major gains in use of oral rehydration therapy, care seeking for childhood pneumonia is low and rates of childhood under nutrition are still high (A. E. Rahman et al., 2014). Investments in social determinants and non-health sectors such as education, especially girls' education and female empowerment to reduce early marriages and high fertility rates, as well as effective communication strategies are likely to be especially important to improve and sustain gains in maternal and child health.

In war ravaged Afghanistan, because of the shortage of skilled public sector workers, the government adopted contracted non-governmental organisations to provide a basic package of primary care services(Akseer et al., 2016). Although the transaction costs were relatively high, there were limited alternatives and the model allowed for rapid population coverage in difficult to reach rural populations.

High rates of new-born mortality and intrapartum stillbirths are a major challenge across the region, and are associated with poor quality of care in both community and facility settings (Das et al., 2015). Further reductions in under 5 mortalities will require action on the dual challenge of improving care during pregnancy and childbirth in community settings and facilitation of facility births, as well as improving care of new-borns in referral facilities. Pakistan invested in a major national programme of primary care using "lady health workers," who now number over 100 000 and cover almost two thirds of the rural population (Hafeez, Mohamud, Shiekh, Shah, & Jooma, 2011), and India has also introduced a major public sector programme of community based health workers. Evidence shows that there is considerable opportunity for innovations in facilitating the work of frontline workers to improve mother and child health (Baqui et al., 2015; Bhandari et al., 2012; Zulfiqar A Bhutta et al., 2011; Soofi, Cousens, et al., 2012). In other regions of South Asia where there have been relatively rapid gains, we need to invest in strategies to improve the quality of care in referral facilities, especially those responsible for secondary care. Major challenges remain. The rapid growth of urban slums—often home to over a third of the population of megacities— poses huge challenges to effective care and governance. These and other marginalised populations, including indigenous groups and those relegated because of ethnicity, religion, or caste systems, will require innovative targeting to reduce inequities. Furthermore, reaching the poorest and remote populations in countries where care is focused on rich and urban populations such as Afghanistan and Pakistan, is critical. Recent reviews have highlighted innovative strategies for reducing such inequities to improve maternal and child health (Yuan et al., 2014).

Finally, the state and international partners must support and protect women and children who are at risk of gender-based violence, lack of economic security, and physical immobility. High rates of maternal and adolescent malnutrition remain tenacious underlying risk factors for ill health and mortality in the region. Direct policies and initiatives to improve nutrition of all populations are critical for health gains in South

Asia. Low rates of breastfeeding and complementary feeding are a concern and should be prioritised for large scale intervention. Quality and timely data are vital for effective monitoring, evaluation, and rapid feedback. Countries should focus on efforts to enhance administrative databases, health management information systems, birth and death registries, and national surveys on health and wellbeing to track progress towards the sustainable development goals.

South Asia comprises a substantial chunk of the global population and contains some of the highest maternal and child mortality rates worldwide. Gains over the past decade provide evidence that progress is possible, but much more can be done with focus on scaling up evidence-based interventions and addressing barriers as key investments in reaching the sustainable development goals.

	India	Bangladesh	Pakistan	Afghanistan	Sri-Lanka	Nepal	Bhutan	Maldives
Health expenditure as % of GDP	4	3.5	3	8	3.2	5.3	3.7	9.2
Per capita health expenditure ($)	59	27	40	56	97	25	107	561
Government health expenditure as % total health expenditure	28.6	23	32.1	5.6	55	21	71	44
Out-of-pocket health payments as % total health expenditure	64.2	63	60.4	73.3	37.9	54.8	11	49
RMNCH expenditure as % total health expenditure	-	12	21	16	9.8	-	-	-
% From official development assistance	0.3	8.3	7	20.8	1.5	18.9	18	3
% Of population impoverished due to OOP health payments	3.7	3.8	3.8	-	0.3	3	-	-
% Of population with OOP health expenditure greater than 25% of total expenditure	1.8	4.5	5	-	0.5	1.2	-	-

Table 3 Health care financing overview in South Asia

Source: National health accounts for India (2013-14), Bangladesh (2012), Pakistan (2013-14), Sri Lanka (2013), Afghanistan (2011-12), Maldives (2011), Nepal (2008-09), Bhutan (2009-10). World Bank poverty headcount at national poverty line for most recent years Afghanistan (2011), Pakistan (2013), Sri Lanka (2012), India (2011), Nepal (2010), Bangladesh (2010), Maldives (2009) and Bhutan 2012). Dooslear et al (2006) for Impoverishment impact of OOP health payments (except Pakistan Malik, 2016) and Doorslaer (2007) for OOP health payments exceeding 25% of the household total expenditure(M. A. Malik, 2015; Ministry of Health, 2011; Ministry of health and family welfare, 2015, 2016; Ministry of Health and Population, 2012; Ministry of Health Maldives and World Health Organization, 2014; N. I. M. Ministry of Health, 2016; Ministry of Public Health, 2011, 2013a; Pakistan Bureau of Statistics, 2016; Van Doorslaer et al., 2006)

Chapter 6 Did management contracting effect the use of primary health care units in Pakistan?

Abstract

For many years, Pakistan has had a wide network of Basic Health Units spread across the country, but their utilization by the population in rural and peri-urban areas has remained low. As of 2004, to improve the utilization and performance of these public primary healthcare facilities, the government has gradually started contracting-in intergovernmental organizations to manage these BHUs. Using five nationally representative household surveys conducted between 2001 and 2012 and exploiting the gradual roll-out of this reform to apply a difference-in-difference approach, we evaluate its impact on BHU utilization. We find that contracting of the BHU management did not have any effect on health care use generally in the population, but it did significantly increase the use of BHU for childhood diarrhoea for the poor (by 4 percentage points) and rural (3 percentage points) households. These increases were accompanied by lower rates of self-treatment and private facilities usage. We do not find any significant effects on the self-reported satisfaction with BHU utilization. Our findings contrast with earlier small-scale studies that reported larger effects of the contracting of primary care in Pakistan. We speculate that the modest additional budget, the limited management authority of the contracting agency and the lack of clear performance indicators are reasons for the small impact of the contracting reform. Apparently critical aspects of services delivery such as location of BHUs, ineffective referral system and medical practice variation in public and private sectors have contributed to the overall low utilization of BHUs, yet these were beyond the scope of the contracting reform.

Keywords

Contracting-in, Management contracting, Impact evaluation, health econometrics, primary healthcare, Difference-in-difference

Introduction

In Pakistan people are free to seek care from any type of health care facility and any level of care. Private care is the most popular choice: more than 60 per cent of the aggregate demand for healthcare is provided by private healthcare providers (Akbari, Rankaduwa, & Kiani, 2009). Public primary health care caters to less than five % of the aggregate demand of healthcare in Pakistan (Pakistan Bureau of Statistics, 2005-2012). The first level of public primary care is offered by *Basic Health Units* (BHUs), which provide essential preventive and curative care services and serve as a referral point to the next level of healthcare. The target population of a BHU is around 10000 people or a union council and/or within a radius of five kilometres. A BHU is staffed with a medical doctor and supported by a female trained birth attendant, vaccinators, and paramedical staff. A *Rural Health Centre* (RHC) represents the next level of care, providing outpatient and some inpatient services (Javed & Amin, 2007). In 2012, there were 5449 BHUs and 556 RHCs (Government of Pakistan, 2012) serving a population of 184 million. In the past decades, the government has used various strategies to try to increase the utilization of care at BHUs and RHCs and to reduce the pressure on secondary and tertiary care hospitals. These strategies included the construction of residences for doctors and female staff in the BHUs and RHCs (Government of Pakistan, 1988), an enhanced non-salary budget for primary care facilities (Government of Pakistan, 1993), the implementation of a health management information system to monitor progress (Afifi, 1998) and a raise in doctor salaries (Javed & Amin, 2007). In 2000, the government introduced the district government system in the entire country. In the health sector, the district health department was given autonomy in deciding over resource allocation, human resources, and financial management (Anjum & Ahmad, 2001). Despite all these reforms, the use of public sector primary healthcare facilities has remained extremely low (Javed & Amin, 2007; M. A. Malik, Gul, & Abrejo, 2015; Pakistan Bureau of Statistics, 2005-2012).

As of 1999, the Rural Support Programs (RSPs)[1], which are not for profit joint stock companies (Batley & McLoughlin, 2004) mandated for rural development and poverty reduction through micro finance and other initiatives, were contracted by the provincial health departments for the management of BHUs in selected districts. The RSPs were given this contract without competition, reflecting the fact that they were partly funded by the provincial governments and therefore could be trusted to be given public funds. A pilot was started in Lodhran district, Punjab province, followed by a scaling up of the model to Rahim Yar Khan (RYK) District in 2003 (Punjab Rural Support Program, 2008). A Memorandum of Understanding (MOU) was signed between the government of Punjab's health department and the Punjab Rural Support

[1]The National Rural Support Program (NRSP) works at the national level while each province has provincial rural support program e.g., Punjab Rural Support Program (PRSP), Sindh Rural Support Organization (SRSO), Sarhad Rural Support Program (SRSP) and Baluchistan Rural Support Program (BRSP) in Punjab, Sindh, Khyber Pakhtunkhwa, and Baluchistan provinces. These programs receive funding from the government and classified as quasi non-government organization (Batley and Hussein et al. 2004).

program (PRSP) which gave the PRSP administrative and financial control over the management of all BHUs in RYK. The MOU provided the PRSP with the autonomy to implement organizational and management changes regarding the BHU infrastructure, staff, budget, and procurement of medicines. Punjab Rural Support Program introduced a number of changes in RYK such as (i) the recruitment of managers on a market-based salary, (ii) formation of clusters of three BHUs with one doctor in-charge of the management, (iii) enhancing salaries of medical officers, (iv) developing community support groups and (v) enhancing the BHU infrastructure through additional funding from the Punjab government (M. Ali, 2005; Loevinsohn et al., 2009). Quarterly monitoring of the performance of the PRSP by the health department was agreed upon, though no performance targets or sanctions/bonuses were included in the *MoUs*.

An initial assessment found the contracting reform to be associated with an increased use of BHUs of 54% (Loevinsohn et al., 2009), which led to a scaling up of the contracting reform to the national level. As of December 2013, 45% of BHUs across the country were managed by this model.[2,3] While the evidence on the impact of this reform is positive, it only considers the first phase of the reform and claims of causality are severely limited due to lacking baseline data and problems of unrepresentativeness of the data (Loevinsohn et al., 2009; Martinez et al., 2010; Tanzil, Zahidie, Ahsan, Kazi, & Shaikh, 2014). We review this evidence in more detail in the next section. We contribute to the literature by evaluating the contracting reform using nationally representative data covering both the pilot and later phases of the reform. By comparing changes in health care use between districts that did and did not get contracted, we are able to estimate the effect of the reform, both for general ill-health conditions and for episodes of childhood diarrhoea. In contrast to earlier studies, we find the contracting reform to impact on the use of BHUs only marginally among the poor (4 percentage points (pp)) and rural households (3 pp). We hypothesize that the limited additional budget combined with limited management authority of the contracting agency and lack of clear performance indicators are reasons for the small impact.

Our findings have relevance beyond the Pakistan health policy context, as many other low- and middle-income countries are currently experimenting with contracting in the health care sector. While there is considerable enthusiasm for this approach, there is still relatively little robust evidence on its impact (X. Liu, Hotchkiss, & Bose, 2008; Loevinsohn & Harding, 2005; Palmer & Mills, 2006).

Generalizing results across studies is difficult, because of the heterogeneity in contracts and contextual factors, such as the managerial and financial capacity of the principal of the contract. Mills (1998) and

[2] As of June 2012, there were 113 districts in four provinces, 36 in Punjab, 23 in Sindh, 24 in Khyber Pakhtunkhwa and 30 in Baluchistan (source: Pakistan Social and Living Standard Measurement Survey 2011-12, Pakistan Bureau of Statistics)

[3] In some districts RHCs and Maternal and Child health facilities were also handed over to PPHI/CMPHI. As of December 2012, there were 658 other health facilities managed by PPHI/CMPHIC besides BHUs.

Siddique and Khan et al. (2006) have reviewed the success factors of contracting of clinical and non-clinical services in in low- and middle-income countries. Some of the key aspects they identify are: 1) the influence of types and nature of contracts, 2) level of competition, 3) organizational capacity of public sector to manage contracts and 4) funding sources of the contracting. Generally, the limited evidence from low and middle income countries to date suggests that performance-based contracts are more effective than those that are not performance based (X. Liu et al., 2008), and that contracting models that provide a greater degree of autonomy to the contracted agency are more effective than those in which the contracted agency needs to operate within public sector rules. There is limited evidence on the effects of contracting beyond pilot phases.

The three most relevant examples of countries that have employed similar types of NGO contracting strategies to raise the utilization of public primary care on a large scale are Cambodia, Guatemala and Afghanistan (Arur et al., 2010; Cristia, Prado, & Peluffo, 2015; Van de Poel, Flores, Ir, & O'Donnell, 2015). Since 1999, for the management of district health services, a variety of contracting with non-governmental organisations (NGOs) has been implemented in Cambodia that link payment to performance targets. A recent evaluation by Van de Poel et al. (2015), using a similar difference-in-differences design as used in this paper, found that while contracting did raise the rate of institutional deliveries (7.5 %), effects are likely to be confined to the non-poor and can be limited when the contracted agency is constrained to operate within public sector employment and procurement rules (Van de Poel et al., 2015). Guatemala has used two models of capitation-based contracting for basic health services in rural areas in 1995. Ministry of health, Guatemala contracted NGOs to manage existing health setup of the ministry. In the other model NGOs were the direct providers of the basic services. Using a difference-in-differences approach, a recent evaluation, covering the first phase of the reform, confirmed a modest increase in the services uptake in management contracts but no significant difference while comparing both the models. First dose of vaccination of children increased by 9-12 % points and 10-11 % points in management contracts and services delivery contracts, respectively. Results also showed a significant increase in 1) the proportion (12% points) of pregnant women who had received three doses of Tetanus Toxoid and 2) proportion (4 % points) of women who had used a modern contraceptive methods in management contracting model then in the controls (Cristia et al., 2015). Afghanistan has used two different approaches of contracting basic health services: contracting-out the management to NGOs, and contracting-in, with the government contracting with the districts and hiring technical support from NGOs. In 2006, 77% of the Afghanistan population was provided basic health care through contracting services. Also using a difference-in-differences technique, Arur et al. (2010) find contracting to substantially increase the use of outpatient care (29%) in Afghanistan, especially among the poor (41%), with little differences across the types of contracting (Arur et al., 2010). One of the main differences between these schemes and the reform in

Pakistan is that in the latter no explicit goals or targets of the contracting reform were formulated, nor was the budget linked to any kind of performance measure. Both contract characteristics are highlighted by Loevinsohn et al (2009) as important success factors.

The next section provides a more detailed description of the contracting reform in Pakistan, as well as an overview of the existing literature. Thereafter we describe the data and empirical strategy used to identify impact, after which we conclude and discuss the main results and policy implications.

Intergovernmental management contracting of primary care in Pakistan

Contracting of primary healthcare in Pakistan is an indigenous reform that started in the province of Punjab. Afterwards it was gradually rolled out to other provinces. Due to strong political will, the reform was implemented and scaled up to 75 out of 113 districts in the country.[4] Theoretically the contracting reform should be seen as a form of relational contracting with cooperation between intergovernmental agencies rather than any legally enforceable obligations (Palmer, 2000). It involved a transfer of funds as well as management to the inter-government agency RSP. The model is thus a hybrid of intergovernmental and management contracting according to the typology of Loevinsohn and Harding (2005).

The reform was widely criticized by the local medical community (I. Ali, 2012; News, 2012). In some cases, doctors even refused to be posted at the BHUs in reform districts (M. Ali, 2005). One of the likely explanations is that medical doctors are not allowed to have a private medical practice while posted in BHUs managed by PPHI/RSP (M. Ali, 2005). Health departments were also reluctant to hand over their authority to another agency (M. Ali, 2005). None of the contracted districts have however been back sourced to the health departments.

Figure 1 illustrates the gradual rollout of contracting by districts. It was implemented by provincial health departments at the district level. In the first phase a MOU was signed between the health departments and the RSPs to take over management of BHUs in a district. PPHI appointed a district manager who carried out renovation and operationalization of the BHUs under the new management (Figure 1).[5] Once contracted, district health offices transferred the annual budgets and the management of all BHUs to the contracting parties, the provincial RSPs. Provincial and district health departments are the principals, and they sign an MOU with the respective provincial RSPs. Health department staff working at the BHUs were seconded to the RSPs.

[4] As of December 2013, 2441, BHUs, and 658 other primary healthcare facilities were contracted-out in 75 districts in four provinces and federal areas. In the three provinces namely Khyber Pakhtunkhwa (KPK), Sindh and Baluchistan this reform is now known as Peoples Healthcare Initiatives (PPHI). In Punjab it is named Chief minsters' Initiative for Primary Healthcare (CMIPHC). It has established a separate management structure at federal, province, division, and district levels. After the enactment of 18th constitutional amendment, the federal unit of PPHI is dissolved.

[5] The full contracting process took about a year (median 1.09 years and interquartile range 0.26 years)

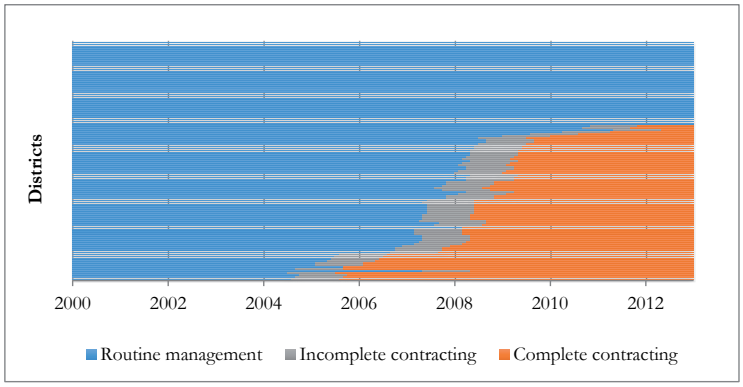


Figure 1 Overview of the rollout of contracting across districts in the period 2001-2013
Note: Vertical axis represents each of 114 districts in four provinces of Pakistan. Horizontal axis indicates month and year of incomplete and complete contracting of the BHUs in districts or districts that remained with the provincial government health departments. Once contracted to PPHI, districts were never back sourced to the provincial health department.

The RSP receive a grant-in-aid from the provincial governments to establish provincial and district support units (I. A. Khan, 2010). At the service delivery level, the contracted BHUs received a one-time grant of PKR 100 000-150 000 (US$ 1040-1560)[6] for renovation and repairs. The authority to take disciplinary action against the staff seconded to RSPs is retained by the health department, but the RSP is allowed to appoint additional staff on a contractual basis (Punjab Rural Support Program, 2008; Sarhad Rural Support Programme, 2013). Public sector financial administration rules are replaced with the RSP's management system. For example, authority is granted to reallocate funds from one line item to another, to transfer savings to the next year and to have an audit done by private audit companies (Sindh Rural Support Organization, 2009). RSPs are required to report performance on key functions of the BHU on a quarterly basis to the health department, but no performance targets were set in the contractual agreement. It was, however, agreed to have a third-party evaluation by the end of the first year on mutually agreed indicators. Contracts between the government and RSPs were signed for fixed terms with a possibility of extension (Martinez et al., 2010; Punjab Rural Support Program, 2008; Sindh Rural Support Organization, 2009). Health departments, on the one hand, served as the principal, signing MOUs with RSP, and handing over BHUs to RSP, and on the other hand emerged as a competitor to RSPs by providing services through BHUs in districts that were not contracted to RSPs.

The evidence on the effects of contracting in Pakistan is limited. It generally reports positive findings, but it is limited in scope and in its ability to make causal inferences. The RYK model was evaluated with a case control research design (Loevinsohn et al., 2009) that revealed the use of BHUs to be 13pp higher in RYK

[6] In 2015 US$ to PKR official exchange rate.

(35%) than in Bahawalpur (22%), a neighbouring control district with a comparable socio-economic situation. In 2010, a commissioned study evaluated the reform in three provinces other than Punjab. A logistic regression analysis comparing health care use in contracted and non-contracted districts revealed the use of BHUs to be significantly higher (odds ratio of 1.75) in contracted districts. Patient's satisfaction and observed quality of care were found to be 11 pp (36% versus 47%) and 15pp (61% versus 76%) higher respectively in contracted districts (Martinez et al., 2010).[7] Finally, a study on the outsourcing of BHUs in Sindh province compared volume and quality of services provided at two BHUs in Thatta (contracted) and Karachi (control) districts. The average daily number of outpatient visits was found to be 166 % higher in the contracted district (80 visits) as compared to the control district (30 visits) (Tanzil et al., 2014).

In sum, the above studies suggest that there may have been positive effects of the contracting reform, but they all relied on ex-post comparisons of districts with and without contracting in the absence of longitudinal data. It therefore remains difficult to causally attribute any of the observed differences to the introduction of contracting.

Methods

We use data from the *Pakistan Social and Living Standard Measurement Survey* (PSLMS) rounds of 2004-05, 2006-07, 2008-09, 2009-10 and 2011-12 (Pakistan Bureau of Statistics, 2005-2012), and from the *Pakistan Integrated Household Survey* (PIHS) 2001-02 (Pakistan Bureau of Statistics, 2003).[8] The total sample size of the combined surveys is around 2.2 million respondents; the sample size for variables reflecting whether people sought care at BHU for unknown illness and childhood diarrhoea is 138675 and 30417 respectively. This gives us more power than previous studies to detect any effects of BHU contracting.

Our approach relies on a comparison of trends in health care use between districts that got contracted, referred to as the treated, compared to those that did not, referred to as the controls. We consider a district as treated if *all* BHUs in the district were fully operational under the new management at the time of the survey.[9]

Basic Health Units typically provide preventive and primary care. A BHU is the focal point for most of the vertical primary health care programs funded by the federal government on health promotion, immunization, and health education. We investigated the effects of contracting primary health care on the probability of seeking care at a BHU for unknown illnesses and more specifically for childhood diarrhoea

[7] This study reports much higher utilization rates of BHU as compared to national statistics, likely related to the fact that data was collected from BHUs in areas where no other health care provider was available.

[8] Sampling methodology of PSLM rounds 2006-12 allows for representativeness of findings to districts, provinces, and national levels. PSLM 2004-05 and PIHS 2001-02 surveys are representative for population of provinces and national levels.

[9] The process of contracting included a formal agreement between the district health department and the rural support programs, the establishment of a district management office, and the taking over of the BHU to become operational. This process typically took about two years in each district. We used the date of becoming fully operationalization of BHUs as the starting point of the contracting period. Including an additional indicator reflecting incomplete contracting does not yield significantly different result.

in the four weeks preceding the survey. Seeking care for childhood diarrhoea is reported in all surveys mentioned above while seeking care at BHUs for unknown illnesses is only reported in the later Pakistan Living Standard measurement Surveys (Pakistan Bureau of Statistics, 2005-2012). We distinguish between care sought at government hospitals and clinics, private hospital, and clinics, BHU/RHCs[10], alternative and traditional healthcare providers, and pharmacies. We also estimate the effect of contracting on self-reported satisfaction with services availed from BHU in the wake of unknown illness, as this information was not available for childhood diarrhoea. Respondents who reported to have used services from a BHU were asked whether they were satisfied with the services provided and the reasons for dissatisfaction. Due to paucity of observations on the various reasons for not being satisfied, we simply grouped the variable into dissatisfied and satisfied with the services at BHU.

Descriptive evidence

Table 1 presents means of all outcome indicators for the 2001, 2004 (prior to the contracting-in) and 2012 surveys. Figure 2 presents trends in the use of BHUs for childhood diarrhoea and common illness across both the treated and control groups. Apparently, BHUs only account for a very small proportion of the general health care use and the use for childhood diarrhoea in both the control and treated group (going from 1.5% in 2004 to 5.25% and from 2.25% in 2001 to 5.25%% in 2012 respectively). The trends suggest there to be a small effect of the contracting reform on the use of BHUs for cases of childhood diarrhoea, though only in the initial phases of contracting.

Private hospitals/clinics are the most important source of health care provision, accounting for over 60 % of the use of general and child health care. The proportion of respondents reporting to forego care for childhood diarrhoea dropped from 18 to 8 per cent between 2004 and 2001, which is probably related to the substantial increase in private hospital/clinic use, which went from 48 to 63 %, but remained stable thereafter (65% by 2012).

By 2012, the use of BHUs for childhood diarrhoea has increased among the treated group (by 5pp) while it has remained stable among the controls. BHU use for unknown illnesses also shows a small increase (of 2 pp) in the treated group while it remained stable in the control group over 2004-2012.

To assess the validity of our control group of districts, we compare baseline differences and pre-treatment trends (2001-2004) in outcomes between both groups. Table 1 reports both means and differences in means between treated and control for the two pre-intervention years and the last survey year. Statistical

[10] In the PSLM survey BHUs and Rural Health Centers (RHC) are grouped together.

significance of the difference in means is assessed by t-tests, and by normalized differences calculated as the difference in means divided by the square root of the sum of the variance.[11]

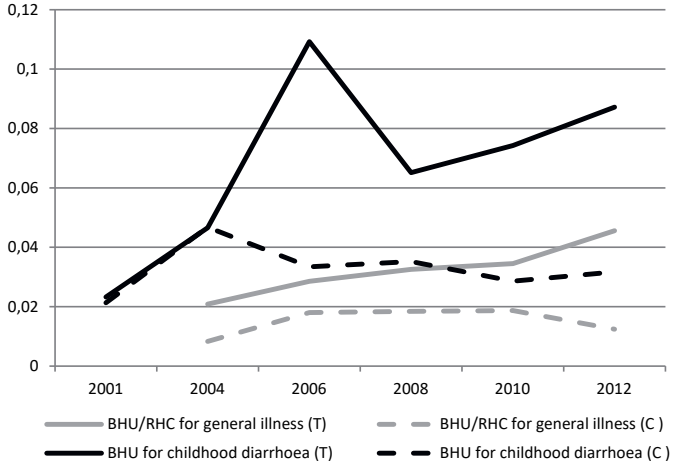


Figure 2 Trends in outcomes across treated and control group (2001-2012)
Notes: Treated/Control refers to districts that got/did not get contracted by 2012. No information on BHU use for general illness was available in the 2001 survey.

Differences in pre-intervention outcomes between control and treated groups are generally small; most notable is a higher reliance on private providers (as compared to public) for general health care in the control group. While some of the baseline differences are statistically significant (though none of the normalized differences are larger than 0.25), we found no evidence of differential trends in health care used for childhood diarrhoea in the 2001-2004 periods. Also Figure 2 illustrates that trend in the use of BHUs were very similar across both groups prior to the contracting-in reform. The final column, which provides evidence of the difference in trends between both groups across the full period (the uncontrolled difference-in-differences estimate), suggests that there was indeed a significantly steeper increase in the use of care at BHUs in response to childhood diarrhoea and common illness in treated districts as compared to controls, though the differences are relatively small, which can also be seen in Figure 1.

Empirical analysis

We identify the impact of contracting-in with a difference-in-differences (DiD) approach (Wooldridge, Jeffrey, Imbens, & Wooldridge, 2009) which relies on a comparison of the trend in the use of BHUs for

[11] Normalized differences are a scale free measure that does not mechanically inflate with sample size. Wooldridge et al. (2009) find that normalized differences below 0.25 imply little sensitivity of linear regression method due to specification changes (Wooldridge et al., 2009).

contracted districts with the trend in non-contracted districts. Identification of a causal effect relies on the assumption that the trend in outcomes among the control districts provides a good counterfactual of what would have happened to the treated in the absence of contracting, i.e., the parallel trends assumption. Similarity in pre-intervention means and trends — as shown in Table 1 and discussed in the previous section — lends some credibility to this assumption. Given the non-random rollout of the contracting-reform it is, however, important to weaken the parallel trends assumption by controlling for observable characteristics that may have generated different trends across treated and control districts. We therefore control for characteristics including demographic and socio-economic aspects such as gender, age of the respondent (child in the case of childhood diarrhoea), educational attainment of the respondent (head of household in case of childhood diarrhoea), whether a family is headed by a female, urban/rural location and wealth quintiles derived from an asset index generated by principal component analysis.[12] Summary statistics of these variables can be found in the Appendix table.

We estimate the following DiD model by ordinary least squares for each of the outcomes of interest (Puhani, 2012): [13]

$$y_{idt} = \beta * CC_{dt} + \boldsymbol{X_{idt}} * \boldsymbol{\Omega} + D_d + \tau_t + \varepsilon_{idt} \quad (1)$$

where y_{idt} is an indicator of whether the respondent (child) i used health care from a specific provider (no care, private, public, BHU, other, pharmacy). CC_{dt} reflects whether the district was (completely) contracted at time t. In our baseline analysis, we define (complete) contracting as the date at which the BHUs were fully operationalized by the contracting management. X_{idt} is a vector of household level characteristics and D_d and τ_t are district and year fixed effects respectively, which respectively pick up the time-invariant differences between contracted and non-contracted districts and the general time trend in the use of BHUs that is common to the contracted and non-contracted districts. Standard errors are adjusted for clustering at the district level. Our main interest lies in the parameter β which reflects the average treatment effect of contracting on the outcome of interest.

We also examine whether there were already any effects during the transition period in which the management of the BHUs moved from the health department to the PPHI by estimating two additional models. In the first, we assume contracting to have started earlier, at the date when the RSP appointed the district managers to take over the management of BHUs from the health department. The model specification is identical as in equation 1 but the (full) contracting variable is replaced by the incomplete

[12] The wealth index is estimated within each survey wave and uses information on the ownership of household durable goods e.g., electronic goods, furniture, transport, and housing conditions

[13] We prefer OLS because the identifying assumptions of DiD with non-linear estimates differ from the parallel trends' assumption in a linear setting (Puhani 2012). Results from non-linear models resulted in very similar impact estimates compared to those reported in the paper and are available from the authors upon request.

contracting variable IC_{dt}) (as determined by the date of the district manager appointment). In a third model, we add both variables (CC_{dt} and IC_{dt}) (in equation (1) to test for any differential effects of complete over incomplete contracting.

As BHUs mostly cater to poor households residing in rural areas, we also investigate the heterogeneity of the effect of (complete) contracting across urban/rural location and poverty status[14] by adding interaction terms with the contracting variable and using the following specification:

$$y_{idt} = \partial \mathrm{C}_{dt} + \gamma_1 CC_{dt} * poor_{idt} + \gamma_2 CC_{dt} * rural_{idt} + \boldsymbol{X_{idt}}\boldsymbol{\Phi} + D_d + \tau_t + \mu_{idt} \qquad (2)$$

The average effect of contracting on a sub-group, e.g., the poor, is estimated by averaging the partial effect of contracting (CC_{dt}) across all observations in the sub-group that are exposed to contracting. To examine whether effects differ significantly between groups, we test the null hypothesis of no interaction between the treatment and group indicator, e.g., $\gamma_1 = 0$.

Results

Estimation results for three variants of model (1) on the effects of contracting on the type of care seeking are presented in Table 2-- separately for childhood diarrhoea and for any unknown illness. While we generally find negative coefficients on foregoing care and on the use of private care and positive coefficients on seeking formal public care, most of the estimated coefficients are very small and not statistically significant. In the baseline model (1) for complete contracting (CC), we find only one significant effect of complete contracting: it lowers the probability of self-medicating from the pharmacy in response to childhood diarrhoea by 2.6 pp. There is no indication that the reform has achieved its main intended effect as the coefficient for BHU use is small and not significant. In models (1a) and (1b) we explore the effect of incomplete contracting (IC) but in neither of these we find a significant positive effect on the probability of seeking care from BHUs/RHC. Model (1a) only indicates a significant increase in seeking care from other providers (traditional medicine and spiritual healers) for unknown general illness, clearly not an intended effect of the contracting reform. We find the same when we estimate the effects of incomplete and complete contracting in model (1b): both have slightly reduced the likelihood of not seeking any care for general illness, but they have only raised the likelihood to seek care from other providers, not from BHUs/RHC.

In Table 3 we show some tests of the heterogeneity of effects of (complete) contracting across urban/rural location and poverty status. Most of the effects are again insignificant in both groups, but now we do see that contracting has led to small but significant increases in the use of BHUs for childhood diarrhoea for the poor (4pp, 160% compared to the baseline of 0.025) and for rural (3 pp) households. For unknown

[14] Poverty is defined as belonging to the poorest 20% of the population based on a survey specific wealth index

	2001 Control (C)	Treated (T)	Normalized differences	2004 Control (C)	Treated (T)	Normalized differences	Φ Change: 2001-2004 Test: ΔT=ΔC (p-value)	2012 Control (C)	Treated (T)	Normalized differences	Φ Change: 2004-2012 Test: ΔT=ΔC (p-value)
Care seeking for childhood diarrhoea											
Did not seek care	0.195	0.154	-0.077	0.087	0.078	-0.022	0.418	0.061	0.067	0.018	0.488
Sought care at private hospital clinics	0.452	0.515	0.090	0.638	0.616	-0.031	0.256	0.676	0.632	-0.065	0.681
Sought care at other public hospital clinics	0.189	0.194	0.009	0.121	0.163	0.085	0.598	0.155	0.171	0.031	0.521
Sought care at BHU/RHC	0.021	0.025	0.022	0.060	0.032	-0.094	0.267	0.027	0.079	0.168	0.019
Sought care from other providers	0.060	0.027	-0.113	0.052	0.037	-0.049	0.332	0.037	0.015	-0.100	0.606
Self-prescription from pharmacy	0.083	0.085	0.004	0.043	0.073	0.091	0.363	0.046	0.036	-0.033	0.125
Care seeking for general illnesses											
Did not seek care	-	-		0.070	0.076	0.018	-	0.040	0.041	0.002	0.620
Sought care at private hospital clinics	-	-		0.665	0.605	-0.089	-	0.703	0.656	-0.071	0.706
Sought care at other public hospital clinics	-	-		0.160	0.212	0.093	-	0.164	0.195	0.058	0.558
Sought care at BHU/RHC	-	-		0.008	0.021	0.074	-	0.012	0.046	0.141	0.080
Sought care from other providers	-	-		0.061	0.034	-0.088	-	0.047	0.031	-0.057	0.531
Self-prescription from pharmacy	-	-		0.036	0.053	0.056	-	0.034	0.031	-0.012	0.204
Satisfied with the services provided at BHU	-	-		0.533	0.624	0.130	-	0.577	0.613	0.052	0.741
Observations	64238	52486	116724	40170	61844	102014	218738	186255	308212	494467	596481

Table 1 Means and difference in means of outcomes in 2001, 2004 (baseline) and 2012 and test of differences in means and trends

Notes: Treated/Control refers to districts that got/did not get contracted by 2012. All variables are binary indicators. Seeking care at BHU is only defined for those individuals that report an illness. Sample sizes for seeking care at BHU for unknown illness are 7875 and 34849 for the 2004 and 2012 surveys respectively. Sample sizes for seeking care at BHU in case of childhood diarrhoea are 2393, 2122 and 6364 for the 2001, 2004 and 2012 surveys, respectively. Normalized differences in mean are computed as the difference in mean divided by the square root of the sum of the variances. Φ Column gives the p-value from a t-test of the null that the change in the mean between 2001 and 2004 (2004 and 2012) is the same across treated and control districts. This involved restricting the data to observations from the 2001 and 2004 (2004 and 2012) surveys and regressing each variable on a treatment indicator, a year indicator and an interaction between the two, and testing whether the coefficient on the latter is zero.

illness, we observe a small increase in the probability of seeking care at BHUs for the rural population only (1.5 pp). Like the results from the pooled sample, we find negative but insignificant effects on self-reported satisfaction with BHU services in both subsamples.

In general, the estimated effects on BHU services use are quite small in magnitude and seem to be driven by a decline in both self-medication and in care seeking from private hospitals. Any health impact of the reform is therefore likely to be small and dependent on the quality of services provided at BHUs. To gauge any effects of the reform on quality of care provided at BHUs, we also used equations (1) and (2) to estimate effects on the probability that the child was given ORS for his/her episode of diarrhoea when s/he was taken to a specific provider. Because we did not find any significant effects, neither in the pooled sample nor in the rural and poor sub-groups, we can therefore not conclude that there has been a quality effect.

Contracting NGOs for the management of primary health care delivery has been suggested to be an effective way of increasing the use and quality of health care in low-income countries (X. Liu et al., 2008; Loevinsohn & Harding, 2005; Palmer & Mills, 2006). Over the past decade, all four provincial health departments in Pakistan have contracted RSPs to take over the BHU management with the aim of increasing their performance. By 2010, 45% of the BHUs had been contracted. Previous evidence on contracting in Pakistan (Loevinsohn et al., 2009; Martinez et al., 2010; Tanzil et al., 2014) reported contracted districts to have higher rates of utilization, but all of these studies were based on district specific pilots, were relatively small in scale and could not claim to have estimated a causal effect.

Using a difference-in-differences approach we measure the impact of the nationwide contracting reform over the period 2001-2012. While we do not find any effect on BHU utilization in general for the full population, we do find (complete) contracting to have some effects on certain subgroups. It increased the probability of seeking care at BHUs for childhood diarrhoea by 4 pp for the poor and by 3pp for rural households. This is not a surprise as the use of BHUs is still relatively low and mostly confined to poor and rural areas. While the estimated effects are small in absolute magnitude, they do represent substantial relative increases compared to the very low baseline rates of BHU utilization (.025 for childhood diarrhoea and .021 for unknown general illness). We do not find any significant effect on self-reported quality of care, or on the likelihood of receiving ORS for childhood diarrhoea.

Our results therefore do not confirm the promises suggested by earlier, descriptive studies. One possible reason for the discrepancy could be the selection of treated and control districts in previous (often pilot) studies. However, even when restricting our sample to the districts and time periods studied in earlier papers, we could not replicate the much higher rates of BHU use reported in previous studies (results are available in Appendix 4). The differences in results are therefore likely to be driven by the unrepresentativeness of the sample used in previous studies. For example, Loevinsohn et al. (2009) could only sample two villages from every district, with one being the closest to the BHU, leading to much higher

	Model 1		Model 1a		Model 1b			
	Complete contracting (CC)		Incomplete contracting (IC)		Complete contracting (CC)		Incomplete contracting (IC)	
Seeking care for unknown general illness								
Did *not* seek care	-0.007		-0.014	**	-0.014	*	-0.017	*
	(.006)		(.007)		(.007)		(.009)	
At private hospitals/clinics	-0.011		-0.033		-0.029		-0.044	
	(.016)		(.026)		(.023)		(.043)	
At public hospitals /clinics	0.010		0.020		0.019		0.022	
	(.017)		(.027)		(.024)		(.042)	
At BHU/ RHC	0.010		0.012		0.013		0.008	
	(.007)		(.008)		(.009)		(.009)	
From other providers	0.011		0.028	**	0.026	**	0.036	***
	(.009)		(.009)		(.01)		(.007)	
At pharmacy	-0.013		-0.012		-0.015		-0.005	
	(.01)		(.009)		(.009)		(.018)	
Satisfaction with BHU	-0.084		-0.043		-0.069		0.040	
	(.084)		(.081)		(.092)		(.087)	
Seeking care for childhood diarrhoea								
Did not seek care	0.006		0.001		0.004		-0.008	
	(.012)		(.0121)		(.013)		(.0168)	
At private hospitals/clinics	-0.023		-0.050		-0.044		-0.071	
	(.026)		(.032)		(.0301)		(.0544)	
At public hospitals /clinics	0.019		0.031		0.029		0.035	
	(.019)		(.0247)		(.0228)		(.0418)	
At BHU/ RHC	0.022		0.019		0.024		0.005	
	(.014)		(.0129)		(.0148)		(.0139)	
From other providers	0.002		0.010		0.007		0.017	
	(.009)		(.0088)		(.0093)		(.0129)	
At pharmacy	-0.027	*	-0.009		-0.020		0.022	
	(.015)		(.0173)		(.016)		(.0328)	

Table 2 Effects of contracting on seeking care for unknown general illness & childhood diarrhoea

Table 2 shows coefficients from linear models including covariates as shown in appendix table 2 and 3. Standard errors (in parenthesis) adjusted for clustering on the district level. ***, **, * indicate significance at the 1%, 5%, 10% levels of significance. Model 1 include variable on complete contracting only, Model 1a includes incomplete contracting (IC) and Model 1b includes both contracting variables (CC and IC).

	non-poor	poor	urban	rural
	partial effect	partial effect	partial effect	partial effect
Care seeking for childhood diarrhoea				
Did not seek care	0.004	0.013	0.006	0.006
	(0.012)	(0.018)	(0.012)	(0.013)
At private hospitals	-0.013	-0.048	-0.020	-0.023
	(0.025)	(0.033)	(0.031)	(0.026)
At public hospitals	0.017	0.026	0.019	0.019
	(.019)	(.022)	(0.02)	(0.02)
At BHU/RHC	0.015	0.043 **	0.003	0.029 **
	(0.013)	(0.020)	(0.013)	(0.015)
From other providers	0.003	-0.003	0.005	0.001
	(0.009)	(0.01)	(0.01)	(0.009)
At pharmacy	-0.025	-0.031	-0.013	-0.032
	(0.016)	(0.017)	(0.02)	(0.015)
Care seeking for general illness				
Did not seek care	-0.005	-0.011	-0.001	-0.009
	(0.006)	(0.008)	(0.006)	(0.007)
private hospitals	-0.011	-0.006	0.001	-0.016
	(0.017)	(0.021)	(.0191)	(0.017)
public hospitals	0.004	0.024	0.004	0.011
	(0.018)	(0.018)	(0.02)	(0.018)
BHU/RHC	0.009	0.007	-0.005	0.015 **
	(0.007)	(0.008)	(0.005)	(0.008)
other providers	0.015	0.000	0.013	0.011
	(0.009)	(0.012)	(0.011)	(0.009)
pharmacy	-0.012	-0.014	-0.012	-0.013
	(0.01)	(0.012)	(0.012)	(0.01)
Satisfaction with BHU for general illness	-0.060	-0.128	-0.100	-0.079
	(0.084)	(0.094)	(0.125)	(0.087)

Table 3 Heterogeneous effects of complete contracting by poverty status and urban/rural location

Notes: Estimates obtained from OLS models and by averaging the partial effect (standard errors in parenthesis) of contracting over observations within the respective subgroup. Homogeneity test is a t-test of the null that the partial effects of the two subgroups are equal. Other notes are as with Table 2.

BHU utilization rates (34% and 22% of those reporting to seek care in RYK and BH respectively) as compared to the rates in our nationally representative data (appendix 4). In the case of Martinez et al. (2010) the selection of districts and BHUs was non-random. Only the district with a middle socio-economic ranking and with BHUs that did not have another public facility at a distance of less than three kilometres were included in the sample (Martinez et al., 2010). Tanzil et al. (2014) compared Thatta (treated) with Karachi (control), the former a rural and underdeveloped district and the latter a metropolitan city with a population of over 18 million (Tanzil et al., 2014).

There may be several potential reasons for our findings. One likely explanation for the limited impact that we observe is the *weak incentives* for BHUs and RSPs that were included in the design of the contracting reform. We could not find evidence of any additional resources provided to treated districts apart from the one-time grant for renovation of BHUs and some financial support to establish management units at provincial and district levels (Bano, 2008; Loevinsohn et al., 2009; Martinez et al., 2010; Sindh Rural Support Organization, 2009; Tanzil et al., 2014). There were also no clear performance targets set with the health departments. Furthermore, RSPs could not take any action against the staff working on regular salaries other than returning them to the health department if their performance was not satisfactory. Van de Poel et al. (2015) argued that such halfway houses have also existed in Cambodia in the early phase of contracting, and are best avoided (Van de Poel et al., 2015).

Secondly, while contracting may have improved the management of BHUs, it did not address many of the *structural weaknesses* of the primary healthcare system in Pakistan. For instance, contracting organizations were not authorized to relocate BHUs that were not easily accessible to the target population. Bhatti (2005) reported that 67% of the BHUs in their study on geographical access of primary healthcare facilities in the Punjab province were more than five kilometres away (on foot) from the target population (Bhatti, 2005b). Thirdly, in Pakistan there is hardly any functional referral system for public sector health facilities. People directly visit tertiary care hospitals even for common illnesses that can easily be managed at primary care facilities if appropriate staff and medicines are available (Siddiqi et al., 2001). While contracting did improve the availability of medicines and doctors at BHUs, apparently this has not sufficiently improved *quality perceptions* to deter patients to directly seek care at secondary and tertiary care facilities. Finally, the differences in medical practice at private and public facilities are not influenced by the contracting. Due to lack of regulation, the private clinics are not inclined to follow *clinical practice guidelines* (Berendes, Heywood, Oliver, & Garner, 2011; S. Shah et al., 2003). Poly-pharmacy, irrational use of medicines, and overuse of injections and infusions are common commercial tactics used by private clinics to attract more patients (S. Basu, Andrews, Kishore, Panjabi, & Stuckler, 2012; Raza, Khursheed, Irfan, Abbas, & Irfan, 2014; Siddiqi et al., 2002).

Very recently, PPHI has been transformed into public limited companies, independent of the rural support programs, in two provinces (Sindh and Baluchistan). The new status provides greater autonomy to expand services like, for example, the provision of preventive care, nutrition services, obstetrics-related in-patient care such as facility deliveries as well as other maternal and child health services. On the management side, PPHI Baluchistan is introducing performance based management and bidding for additional resources to upgrade BHUs to provide 24/7 maternal and child health services (PPHI Baluchistan, 2014).

There are two important limitations to our study. First, our data cannot distinguish between the use of health care at BHUs and at RHCs, while the contracting reform was only targeted at BHUs. To the extent

that the contracting reform attracts more people seeking care at the BHU first (rather than the RHC), our effect estimates could therefore be biased downward. However, the combined use of BHUs and RHCs appears too low (less than 5 %) for this switching behaviour to be a likely explanation for the small impact. Second, as the rollout of contracting did not occur in a randomized way, it is possible that there are some unobservable time-varying factors remaining, such as different district policies and circumstances, that correlate both with the contracting and health care use. The similarity in pre-contracting trends and means does suggest, however, that the parallel trends assumption is quite plausible.

Conclusion

Notwithstanding these limitations, our results imply that the contracting reform did not have a large impact on the use of public primary care. It seems imperative to critically review this reform. Contracting has contributed to the renovation of BHUs and to ensuring all-year-round availability of doctor and medicines, but this has not had a large impact on households deciding to make use of BHUs when seeking care, except for some of the poor and rural households. These findings call for additional research on other determinants that may have affected this finding, including the access and location of BHUs, the variation in medical practice in public and private clinics and the effectiveness of the referral system. Among the factors that seem essential to improve the effectiveness of contracting are: (i) a competitive and transparent bidding process, (ii) explicit performance targets, (iii) a well-designed package of service, (iv) performance-based incentives and (v) financial and management autonomy to contracted NGOs. The new stage of the reform implemented in two provinces would seem to provide greater flexibility to refine the contractual relationship between the government and the PPHI.

	2001 Raw differences		Normalized differences	2004 Raw differences		Normalized differences	Φ Change: 2001-2004	2012 Raw differences		Normalized differences	Φ Change: 2004-2012
Male	0.009	**	0.013	0.012	***	0.018	0.318	0.009	***	0.012	0.316
Currently married	-0.004		-0.005	-0.001		-0.001	0.384	-0.010	***	-0.014	0.134
Age groups											
0-5	0.007	***	0.014	0.006	**	0.012	0.850	0.003	**	0.007	0.550
5-18	0.000	*	0.000	0.009	***	0.014	0.404	0.023	***	0.034	0.070
18-40	0.000		0.000	-0.002	*	-0.003	0.992	-0.007	***	-0.011	0.333
40-60	-0.004	**	-0.009	-0.005	**	-0.010	0.900	-0.011	***	-0.022	0.277
60+	-0.003		-0.008	-0.008	***	-0.024	0.158	-0.008	***	-0.023	0.978
Child age groups											
Less than 1 year	-0.001		-0.002	-0.006		-0.011	0.934	0.014		0.022	0.477
1 year	0.018		0.028	-0.054	*	-0.087	0.017	-0.023		-0.037	0.281
2 years	-0.021	**	-0.036	0.023	**	0.039	0.081	0.015	**	0.025	0.761
3 years	-0.002		-0.004	0.037		0.070	0.073	0.002		0.004	0.194
4-5 years	0.006		0.013	0.000		-0.001	0.745	-0.007		-0.017	0.743
Education											
No formal education	0.017		0.028	0.083	***	0.118	0.004	0.082	***	0.117	0.898
Primary schooling	0.004	***	0.011	-0.033	***	-0.052	0.000	-0.017	***	-0.027	0.097
Secondary school	-0.022	***	-0.050	-0.045	***	-0.082	0.072	-0.048	***	-0.084	0.661
High school/diploma	0.001		0.005	-0.005	***	-0.017	0.607	-0.009	***	-0.031	0.603
Graduate and above	0.000		-0.002	-0.001	***	-0.005	0.862	-0.008	***	-0.028	0.405
Wealth index											
Poorest	0.065	***	0.115	0.056	***	0.100	0.986	0.083	***	0.149	0.235
Second poorest	0.028	***	0.050	0.006	***	0.011	0.479	0.015	***	0.027	0.560
Middle	-0.046	***	-0.081	0.013	***	0.022	0.030	0.003		0.005	0.459
Second richest	-0.008	***	-0.014	0.002		0.003	0.929	-0.017	***	-0.029	0.174
Richest	-0.040	***	-0.071	-0.077	***	-0.136	0.394	-0.085	***	-0.151	0.591
Female head of family	-0.023	***	-0.065	-0.022	***	-0.066	0.359	-0.031	***	-0.084	0.230
Education of head of household											
No formal education	-0.010	***	-0.015	0.043	***	0.061	0.027	0.000	***	0.082	0.345
Primary schooling	0.039	***	0.071	0.013	***	0.023	0.091	0.012	**	-0.010	0.102
Secondary school	-0.035	***	-0.060	-0.064	***	-0.106	0.124	0.000	***	-0.086	0.415
High school/diploma	-0.003	***	-0.010	0.004		0.011	0.747	0.053	*	-0.004	0.695
Graduate and above	0.009	***	0.027	0.004		0.018	0.442	0.004	**	0.008	0.945
Rural	-0.006	***	-0.009	0.054	***	0.082	0.280	0.000	***	0.082	0.959
Observations	116724			102014			218738	494467			596481

Appendix 1 Means/ difference in means of covariates in 2001-04 (baseline) & 2012 & test of differences in means & trends

Notes: Treated/Control refers to districts that got/did not get contracted by 2012. All variables are binary indicators. Raw differences in mean and normalized difference in means are provided. Normalized differences in mean are computed as the difference in mean divided by the square root of the sum of the variances. Φ Column gives the p-value from a t-test of the null that the change in the mean between 2001 and 2004 (2004 and 2012) is the same across treated and control districts. This involved restricting the data to observations from the 2001 and 2004 (2004 and 2012) surveys and regressing each variable on a treatment indicator, a year indicator and an interaction between the two, and testing whether the coefficient on the latter is zero.

Seeking care for childhood diarrhoea	Did not seek care		Sought care at private hospitals clinics		Sought care at other public hospitals clinics		Sought care at BHU/RHC		Sought care from other providers		Self-prescription from pharmacy	
Contracting	0.006		-0.023		0.019		0.022		0.002		-0.027	*
	(0.012)		(0.026)		(0.019)		(0.014)		(0.009)		(0.015)	
Male	-0.002		0.005		-0.004		0.002		0.000		-0.001	
	(0.005)		(0.007)		(0.006)		(0.002)		(0.003)		(0.003)	
Child age (reference 4-5 years)												
Less than 1 year	-0.025	**	0.061	***	-0.006		-0.002		-0.019	**	-0.009	
	(0.011)		(0.016)		(0.01)		(0.006)		(0.009)		(0.007)	
1 year	-0.031	**	0.055	***	0.007		-0.008		-0.014	*	-0.008	
	(0.01)		(0.015)		(0.011)		(0.005)		(0.008)		(0.007)	
2 years	-0.019	**	0.044	**	-0.008		-0.004		-0.012		-0.001	
	(0.009)		(0.016)		(0.01)		(0.006)		(0.009)		(0.008)	
3 years	-0.004		0.000		0.018		-0.001		-0.011	*	-0.002	
	(0.011)		(0.017)		(0.012)		(0.006)		(0.007)		(0.008)	
Education of head of the household (reference no schooling												
Primary schooling	-0.001		-0.003		0.019	*	-0.007		-0.004		-0.004	
	(0.008)		(0.014)		(0.011)		(0.006)		(0.006)		(0.007)	
Secondary school	-0.018	**	0.036	**	0.003		-0.006		-0.008		-0.006	
	(0.007)		(0.011)		(0.007)		(0.005)		(0.006)		(0.005)	
High school/diploma	-0.013		0.018		0.013		-0.012		-0.009		0.003	
	(0.011)		(0.018)		(0.018)		(0.008)		(0.009)		(0.009)	
Graduate and above	-0.002		0.055	**	-0.024		-0.010		-0.007		-0.013	***
	(0.0124)		(0.02)		(0.017)		(0.008)		(0.007)		(0.007)	
Wealth index (reference richest)												
Poorest	0.041	**	-0.108	***	0.033	**	-0.021	**	0.013		0.042	
	(0.012)		(0.018)		(0.011)		(0.01)		(0.01)		(0.011)	
Second poorest	0.026	**	-0.098	***	0.051	***	-0.007		-0.001		0.028	**
	(0.013)		(0.015)		(0.01)		(0.008)		(0.008)		(0.01)	
Middle	0.010		-0.092	***	0.062	***	-0.007		-0.003		0.030	**
	(0.01)		(0.016)		(0.012)		(0.008)		(0.008)		(0.009)	
Second richest	0.015		-0.052	**	0.036	**	-0.002		-0.010		0.013	**
	(0.011)		(0.016)		(0.01)		(0.009)		(0.007)		(0.007)	
Female head of family	-0.01		-0.004		-0.010		0.004		0.013		0.006	
	(0.013)		(0.019)		(0.012)		(0.009)		(0.012)		(0.015)	
Time trends (reference 2001)												
2004	-0.066	***	0.119	***	-0.047	**	0.020		-0.001		-0.025	

	(0.016)		(0.028)		(0.024)		(0.016)		(0.011)		(0.016)
2006	-0.084	***	0.153	***	-0.055	**	0.023	**	-0.014		-0.023
	(0.015)		(0.025)		(0.016)		(0.009)		(0.01)		(0.015)
2008	-0.088	***	0.166	***	-0.051	**	0.011		-0.017	*	-0.021
	(0.014)		(0.032)		(0.023)		(0.01)		(0.01)		(0.016)
2010	-0.081	***	0.136	***	-0.032		0.012		-0.021	**	-0.014
	(0.019)		(0.028)		(0.02)		(0.01)		(0.009)		(0.017)
2012	-0.087	***	0.144	***	-0.027		0.016		-0.021	*	-0.025
	(0.017)		(0.033)		(0.027)		(0.011)		(0.012)		(0.016)
Rural	0.003		-0.024	**	-0.016		0.042	** *	0.000		-0.004
	(0.008)		(0.012)		(0.01)		(0.006)		(0.004)		(0.005)
Observations	30417		30417		30417		30417		30417		30417

Appendix 2 Regression results of OLS models for (not) seeking care for childhood diarrhoea

Notes: Contracting reflects whether the district was contracted at the time of survey. Model includes district fixed effects. Standard errors (in parenthesis) are adjusted for clustering on the district level. ***, **, * indicate significance at the 1%, 5%, 10% levels of significance.

Seeking care for general illness	Did not seek care	Sought care at private hospitals clinics	Sought care at other public hospitals clinics	Sought care at BHU/RHC	Sought care from other providers	Self-prescription from pharmacy	Satisfied with the services provided at BHU
Contracting	-0.007	-0.011	0.01	0.01	0.011	-0.013	-0.084
	(0.006)	(0.016)	(0.018)	(0.007)	(0.009)	(0.01)	(0.084)
Male	0.004 *	-0.005	-0.0002	-0.002	0.003	0.000	0.012
	(0.002)	(0.003)	(0.003)	(0.001)	(0.002)	(0.002)	(0.018)
Currently married	-0.009 **	0.012 **	0.005	-0.001	-0.005	-0.003	-0.009
	(0.003)	(0.006)	(0.005)	(0.002)	(0.004)	(0.002)	(0.031)
Age (reference <5 years)							
5-18	0.024 ***	-0.054 ***	0.016 **	0.000	0.007 **	0.007 *	-0.048
	(0.005)	(0.01)	(0.007)	(0.002)	(0.003)	(0.004)	(0.033)
18-40	0.035 ***	-0.068 ***	0.023 **	-0.007 **	0.017 **	0.001	0.008
	(0.006)	(0.013)	(0.008)	(0.002)	(0.005)	(0.005)	(0.042)
40-60	0.039 ***	-0.091 ***	0.036 ***	-0.005 **	0.025 ***	-0.003	-0.070
	(0.005)	(0.014)	(0.009)	(0.002)	(0.004)	(0.005)	(0.048)
60+	0.034 ***	-0.089 ***	0.037 ***	-0.001	0.027 ***	-0.008 *	-0.147 ***
	(0.005)	(0.01)	(0.007)	(0.002)	(0.005)	(0.005)	(0.038)
Education (reference no schooling)							
Primary schooling	-0.009 **	0.008	0.003	0.001	-0.001	-0.001	0.045
	(0.003)	(0.007)	(0.006)	(0.002)	(0.003)	(0.003)	(0.028)
Secondary school	-0.004	0.001	0.007	-0.002 **	0.000	-0.002	0.098 *
	(0.004)	(0.007)	(0.006)	(0.001)	(0.005)	(0.002)	(0.04)
High school/diploma	-0.002	0.009	-0.007	0.004	-0.006	0.002	0.068
	(0.011)	(0.013)	(0.013)	(0.003)	(0.005)	(0.003)	(0.093)
Graduate and above	0.007	0.005	-0.011	-0.007 **	0.004	0.003	0.021
	(0.01)	(0.014)	(0.013)	(0.003)	(0.007)	(0.005)	(0.196)
Wealth index (reference richest)							
Poorest	0.038 ***	-0.112 ***	0.054 ***	0.002	0.018 **	0.019 **	-0.129 **
	(0.005)	(0.011)	(0.009)	(0.003)	(0.006)	(0.006)	(0.058)
Second poorest	0.028 ***	-0.090 ***	0.053 ***	0.005 **	0.004	0.017 **	-0.105 *
	(0.004)	(0.008)	(0.007)	(0.003)	(0.003)	(0.006)	(0.057)
Middle	0.013 **	-0.080 ***	0.066 ***	0.001	0.000	0.011 **	-0.110 *
	(0.004)	(0.009)	(0.007)	(0.002)	(0.003)	(0.004)	(0.056)
Second richest	0.007 **	-0.041 ***	0.036 ***	-0.002	0.001	0.009 *	-0.048
	(0.003)	(0.005)	(0.006)	(0.001)	(0.003)	(0.005)	(0.06)
Female head of family	0.008	0.005	-0.011	0.000	-0.001	-0.001	0.034
	(0.008)	(0.01)	(0.009)	(0.002)	(0.004)	(0.004)	(0.044)
Time trends (reference 2004)							
2006	-0.011 *	0.002	-0.005	0.008 **	-0.002	0.008	-0.012
	(0.006)	(0.017)	(0.012)	(0.004)	(0.007)	(0.008)	(0.071)
2008	-0.024 ***	0.029	-0.002	0.010 **	-0.006	-0.007	-0.015
	(0.006)	(0.023)	(0.023)	(0.005)	(0.009)	(0.01)	(0.075)

2010	-0.022	**	0.027		0.002		0.009	**	-0.017	*	0.000		-0.039	
	(0.007)		(0.017)		(0.02)		(0.004)		(0.01)		(0.009)		(0.095)	
2012	-0.025	***	0.036	**	0.001		0.011	***	-0.017		-0.006		0.073	
	(0.006)		(0.017)		(0.022)		(0.005)		(0.012)		0(.01)		(0.082)	
Rural	-0.002		-0.004		-0.028	***	0.020		0.008	**	0.005		0.051	
	(0.003)		(0.008)		(0.007)		(0.003)		(0.003)		(0.004)		(0.064)	
Observations	138675		138675		138675		138675		138675		138675		4652	

Appendix 3 Regression results of OLS models for (not) seeking care for unknown illness.

Notes: Contracting reflects whether the district was contracted at the time of survey. Model includes district fixed effects. Standard errors (in parenthesis) are adjusted for clustering on the district level. ***, **, * indicate significance at the 1%, 5% and 10% levels of significance.

	1. Rahim yar Khan(treated) versus Bahawalpur (control) (year 2006-07)			2. Six (control) versus six (treatment) districts in KPK, Sindh and Baluchistan provinces, (year 2010) *			3. Thatta (treated) versus Karachi (control) (year 2011)		
	control (C)	treated (T)	Test: T=C (p-value)	control (C)	treated (T)	Test: T=C (p-value)	control (C)	treated (T)	Test: T=C (p-value)
Sought care at BHU for childhood diarrhoea	0.035	0.086	0.125	0.061	0.083	0.696	0.000	0.108	0.007
Sought care at BHU for unknown illnesses	0.018	0.026	0.316	0.072	0.038	0.000	0.000	0.009	0.025
Observations	6199	8211		11789	33117		5978	24268	

Appendix 4 Means of outcomes in treated and control districts as used by other studies evaluating the contracting reform in Pakistan.

Chapter 7 Improving maternal and child health in Pakistan: a programme evaluation using a difference-in-difference analysis

Abstract

Pakistan is a country with high maternal and infant mortalities. Several large-scale foreign funded projects have targeted the improvement of maternal, neonatal and child health. We evaluate one of these, the Norway-Pakistan Partnership Initiative *(NPPI),* which implemented a capacity strengthening and social mobilisation programme in ten rural districts that was complemented by a voucher scheme in two districts and a contracting out scheme in two other districts. Drawing on data from three rounds (2009-10, 2011-12 and 2013-2014) of the Pakistan Social and Living Standards Measurement Survey (*PSLM*) we construct panel data for over 11,000 live births. Using a difference-in-difference regression framework we estimate the effectiveness of *NPPI*, and of its programme subcomponents using vouchers and contracting, on the maternal care-seeking behaviour of pregnant women. Various sections of the *PSLM* survey were combined to examine the maternal care-seeking behaviour of pregnant women in response to *NPPI*. Maternal care seeking behaviour of pregnant women was rather similar across treated and control districts. Only a weak and insignificant impact of *NPPI* on institutional deliveries and skilled birth attendance was found. However, in NPPI districts that were additionally exposed to either a vouchers scheme or which implemented the contracting out, women were more likely to seek skilled delivery assistance. We conclude that the objective to improve access to and use of skilled care was not achieved by *NPPI*. Overall, skilled birth attendance and institutional delivery was not increased under *NPPI*. The small effects that we identified for districts that implemented vouchers and contracts on the use of skilled birth attendance hold some promise for further experimentation.

Keywords

Impact Evaluation, Aid effectiveness, Difference in Difference, Low- and Middle-Income Countries, Maternal and Child Health, Vouchers, Contracting, Social Mobilization

Introduction

Pakistan is a classic case of growth without development (Easterly, 2001). Historically, the growth rate of Gross Domestic Product (*GDP*) in Pakistan has been around an average of 5% per annum (Ministry of Finance, 2018). Yet, its ranking in social development -- especially in health outcomes -- is lagging behind countries at a similar economic level (Birdsall, Malik, & Vaishnav, 2005). Pakistan missed infant and maternal mortality targets set in the Millennium Development Goals (*MDG*) 4 and 5 (Ministry of Planning, 2013). Recently, it was ranked first among the countries with the highest new-born mortality rate (Devine & Taylor, 2018).

One of the often-alleged causes of poor health outcomes is the low priority given to the health sector by successive governments when allocating public resources. According to the most recent National Health Accounts 2015-16, public spending on health was less than 1% of *GDP* (Pakistan Bureau of Statistics, 2018). Geographical disparities in resource allocation further aggravate the provision of essential health services. Nearly 80% of public spending on health was allocated to secondary and tertiary care hospitals situated in large metropolitan areas, while the remaining 20% was left for primary healthcare facilities and programmes.

While resource scarcity in the health sector still holds since the onset of the third millennium, the Government of Pakistan (*GoP*) and its development partners have prioritised maternal and child health (*MCH)* on their health agenda. As a result, the *MCH* sub-sector received a substantial increase in funding. In the recent decades, three major foreign-funded projects devoted roughly PKR 24 billion (US$ 225 million, in 2015 prices) toward improving maternal and child health: (i) the Women's Health Project (*WHP*, 2000-2006) (Asian Development Bank, 2007); (ii) the Pakistan Initiatives for Mothers and New-borns (*PAIMAN,* 2004-2010) (Atwood et al., 2010); and (iii) the Norway-Pakistan Partnership Initiative (*NPPI*, 2009-2014) (Norwegian Ministry of Foreign Affairs, 2015). During 2000-2014, these projects collectively intervened in the *MCH* delivery system of 44 districts (out of 113 in total) that cover around 40% of the population of the country, mainly in rural areas.

In this study, we evaluate the effects of the most recent of these projects, *NPPI*, on maternal care- seeking behaviour. Although there have been some earlier evaluations of the *NPPI* programme, they were all subject to various limitations on which we elaborate in the next section (Norwegian Ministry of Foreign Affairs, 2015; Population Council, 2014).

NPPI Project setup

Rural and urban disparities in wealth and health were among the worst in Sindh, the second largest but very poor province of Pakistan(Sindh Bureau of Statistics, 2005). According to the Multiple Indicator

Cluster Survey 2003-04, the maternal mortality ratio (*MMR*) in rural areas of Sindh was 410 (240 in urban areas) per 100,000 live births. The infant mortality rate (*IMR*) in rural areas was 80 (50 in urban areas) per 1,000 live births (Sindh Bureau of Statistics, 2005). The high *MMR (276 deaths per 100,000 live births;* (National Institute of Population Studies and Macro International Inc., 2008)*)* and *IMR (78 per 1,000 live births;*(National Institute of Population Studies and Macro International Inc., 2008) in Pakistan in general and in rural areas in Sindh in particular, are mainly due to the delay in, or absence of, access to skilled care for pregnant women. In rural areas of the province, 23% of pregnant women (68% in urban areas) were assisted by a skilled birth attendant, and 29% of pregnant women (72% in urban areas) had sought skilled antenatal care (*ANC*) (Sindh Bureau of Statistics, 2005). Most of these health disparities are associated with inequalities in the distribution of wealth: multidimensional poverty for 2014-15 in rural Sindh was 75.5% (10.6% of the urban population)(UNDP, 2016). Second, many studies identified supply-side challenges that limited the choices for pregnant women to seek care from the district-based healthcare delivery system (Jafarey, 2002; Mahmud et al., 2011; Midhet et al., 1998; N. Shah et al., 2009).

The Norway-Pakistan Partnership Initiative *(NPPI)* was considered an important investment programme for several reasons (Population Council, 2014). First, it was one of the first foreign-funded projects that was implemented exclusively in one province. Second, NPPI was the first project that was implemented under the *OneUN* Programme involving three *UN* agencies (*UNICEF, UNFPA,* and *WHO)* with the government of Sindh. Third, it was a resource-intensive (approximately US$ 23 million) large-scale project covering ten rural districts in Sindh. Finally, it innovated by adopting supply-side (contracting out) and demand-side (vouchers) financing tools to stimulate the use of *MCH* services by pregnant women (Norwegian Ministry of Foreign Affairs, 2015; Population Council, 2014). The main objective of *NPPI* was to reduce maternal, neonatal, and child mortality in the ten selected districts (see the map of Sindh in Appendix A). According to the project plans, the selection of treatment districts was based on their vulnerability in maternal, new-born, and under-five mortality as well as below average functioning health systems (Norwegian Ministry of Foreign Affairs, 2015; Population Council, 2014).

To achieve its objectives, *NPPI* envisaged more skilled and institutional-based care for pregnant women. A two-pronged strategy simultaneously targeted healthcare providers and communities. First, resources were devoted to enhancing the capacity of healthcare providers in routine and emergency management of obstetric and new-born care. This included trainings of medical professionals on clinical skills, as well as provision of equipment, supplies, and medicines to health facilities. Second, community health workers were engaged in spreading knowledge and improving practices of appropriate maternity care. Furthermore, *NPPI* trained and deployed nearly 200 community midwives to facilitate community based skilled birth attendance. Finally, *NPPI* also provided technical assistance to include more *MCH* in the graduate and

post-graduate curriculum of medical and public health education, as well as to improve quality of health management information systems and maternal mortality registration (Norwegian Ministry of Foreign Affairs, 2015; Population Council, 2014).

In addition, two of the ten treatment districts were exposed to a *voucher scheme* and two other districts to a *contracting out* scheme, while the remaining six districts were exposed only to the common interventions in treatment districts(Norwegian Ministry of Foreign Affairs, 2015).

UNFPA supervised the voucher scheme in two districts. It contracted a Non-Governmental Organisation *(NGO) Greenstar Social Marketing* to implement the scheme *that* aimed to minimise financial barriers to access institutional-based *MCH* services to women of poor families (Population Council, 2014). Vouchers could be redeemed at 48 public and private health facilities. Eligible women were provided with voucher booklets (monetary value of PKR 13,776, approximately US$ 83) for antenatal care (*ANC)* visits, institutional births *(IB)* including normal vaginal and Caesarean section delivery, postnatal care (*PNC)* visits, key vaccinations, family planning *(FP)* service, and transportation costs (Norwegian Ministry of Foreign Affairs, 2015).

The *contracting scheme* was supervised by *UNICEF*. The management of 22 public health facilities was contracted out to the *NGO* Integrated Health Services (*IHS*) (Population Council, 2014). *IHS* was tasked to improve the quality and volume of *MCH* services through a set of interventions agreed in the *Memorandum of Understanding* that included operational management, deployment of staff, provision of supplies and equipment, and social mobilisation of the target communities of the contracted facilities.

The NPPI project review

The effectiveness of *NPPI* has been reported in a project completion report (Norwegian Ministry of Foreign Affairs, 2015) and an independent study conducted by the Population Council (Population Council, 2014). The final report of *NPPI* submitted to the Norwegian government concluded that most of the physical and financial targets were achieved (Norwegian Ministry of Foreign Affairs, 2015). On the supply side, the project provided multiple inputs to 95-100% of the facilities to enable them to manage the maternal and child healthcare needs of the target population (Norwegian Ministry of Foreign Affairs, 2015). Against the target of 28 facilities, by the end of the project, 22 health facilities were providing 24/7 *MCH* services in two *NPPI* districts. On the demand side, for nearly two years, 39,923 voucher booklets were distributed of which 41% were redeemed (UNDP, 2016).

The project completion report assessed the impact as a before and after comparison of maternal, infant, and neonatal mortality in Sindh from the Pakistan Demographic and Health Surveys (*PDHS*) 2006-07 and 2012-13. While the infant mortality rate had dropped from 81 to 74 per 1,000 live births, the neonatal

mortality rate had remained stable (from 53 to 54 per 1,000 live births) in Sindh (UNDP, 2016). On the services delivery side, *ANC* coverage by a skilled provider increased from 70.4% to 78.2%, and deliveries attended by a skilled person increased from 44.4% to 60.5% between 2006-07 and 2012-13 respectively (UNDP, 2016). A major limitation of this evaluation is that it did not compare health outcomes in treated districts to those in control districts not covered by *NPPI*.

In 2014, the Population Council compared four treated *NPPI* districts (Larkana, Jamshoro, Umerkot, and Badin) with two control districts (Naushehro Feroze and Tando Allahyar). The inclusion criteria of the treatment districts were multiple project interventions, the presence of all three *UN* agencies, and a secure environment. The selection of control districts was based on similar development indicators and the absence of other large-scale health interventions (Population Council, 2014). Using data from two rounds of the Pakistan Social and Living Standards Measurement Survey (*PSLM),* the authors calculated the coverage of essential *MCH* services comparing treated (*T*) and control (*C*) districts at baseline (2008-09) and at the end-line (2012-13) of the project period. The results show that during this period, coverage of skilled birth attendance increased by 12.3%-points (*C*) and 14.6%-points (*T*) while *IB* increased by 7.6%-points (*C*) and 16.4%-points (*T*). *ANC* and *PNC* visits increased by 0.8%-points (*C*) and 3.9%-points (*T*), and 1%-point (*C*) and 17.1%-points (*T*) respectively (Population Council, 2014).

Compared to the evaluation report of the project team, the Population Council's analysis was an improvement but still suffered from several shortcomings: (i) it associated all births reported to the year of survey, while these births referred to a three-year recall period; (ii) the study did not isolate the effectiveness of crucial programme subcomponents like the contracting and voucher scheme; and (iii) generalizability of the results is unclear given the possible bias in the selection of four (out of ten) treatment districts and two (out 17) control districts.

We aim to improve on these estimates by using a more robust estimation strategy. To make better use of the timing of events, first, we obtained the birth dates from different parts of the *PSLM* survey and second, we extracted the exact timing of the roll-out of *NPPI* and its components from project reports. This allows us to (i) use an additional round of the *PSLM* (2013-14) and (ii) to obtain estimates of the effectiveness of the contracting and voucher schemes: two essential programme subcomponents.

Methods

Data

Our data were drawn from three rounds (2009-10, 2011-12, and 2013-14) of the Pakistan Social and Living Standards Measurement Survey. Starting in 2001, the *PSLM* is an on-going cross-sectional survey designed to track progress on the *MDG*s and poverty reduction strategies of the Government of Pakistan (Pakistan

Bureau of Statistics, 2020). The maternal health section of the survey contains questions related to the health-seeking behaviour of women who have delivered a live birth in the three years preceding the survey. More specifically, these questions pertain to the use of *ANC*, *TT* vaccinations, place of delivery, and *PNC*. Combining data from the three rounds of PSLM provided a raw sample of 95,910 women who had delivered a live birth in the past three years. To link the maternal care-seeking behaviour of these women to the *NPPI* project we needed more specific information on the timing of (a) when health care was used and (b) when and where *NPPI* was implemented.

To determine this more precisely than the broad three-year window, we exploited the information on timing (year and month) of the most recent live births as reported in the immunisation section of the *PSLM*. As a result, we created a new time series with the time variable equal to the year of birth as opposed to the year of data collection in the survey. This reduced the sample size to 77,885 pregnancies, as many women who reported maternal health care use in the past three years did not report to have any children below the age of three.

To define the actual implementation period of *NPPI,* we went beyond the documented project period because the findings of the project midterm report indicated that the actual start of activities was often later than the anticipated starting dates. We define this as the *effective project period* which reflects the period of core physical activities. In general, the *effective project period* was shorter than the documented project period. Moreover, in 2014 *USAID* started the Maternal and Child Health Integrated Program *(MChip)* which was implemented in 15 districts of Sindh, including five *NPPI* districts (Maternal and Child Health Integrated Program, 2018). To avoid contamination, we dropped the year 2014 from our analysis leaving the effective project period to 2012-2013. To check for pre-treatment parallel trends, we define the pre-treatment period as 36 months preceding the *effective project period*, i.e., 2009-2011.

We further restricted the sample to the Sindh province and excluded three urban districts, namely Karachi, Hyderabad, and Sukkur from the control units as well as districts that were exposed to the interventions of the *PAIMAN* project (2004-2010)(Atwood et al., 2010). The final sample used in this paper for the *NPPI* evaluation consists of 11,686 women who delivered a live birth in the 18 rural districts of Sindh. We estimate the target population of *NPPI* intervention districts for the project period 2010-2014.

Only maternal health care seeking for births could be used to evaluate *NPPI* effectiveness as the date of birth of the most recent child born could only be associated with obstetric deliveries, as the timing for *ANC, TT* vaccination, or *PNC* is not captured in PSLM surveys.

We examine four types of choices related to maternal health-seeking. Thereby, we assume that household choices regarding the place of delivery are sequential. In the first instance, the household chooses whether (or not) to seek care for the delivery outside their home. If they prefer institutional birth, the next choice is between a public or a private facility. These choices are influenced by multiple factors, including -- but not limited to -- socio-economic and cultural aspects, access to health services, quality of care, and health of the pregnant woman. Figure 1 provides a graphical description of the demand for maternal health services and the sample sizes for each type of demand in the *PSLM*.

When estimating the effects of *NPPI* we control for demographic and socio-economic characteristics of mothers and households. Mother characteristics include age and number of years of schooling. At the household level, we include the formal education and gender of the household head.

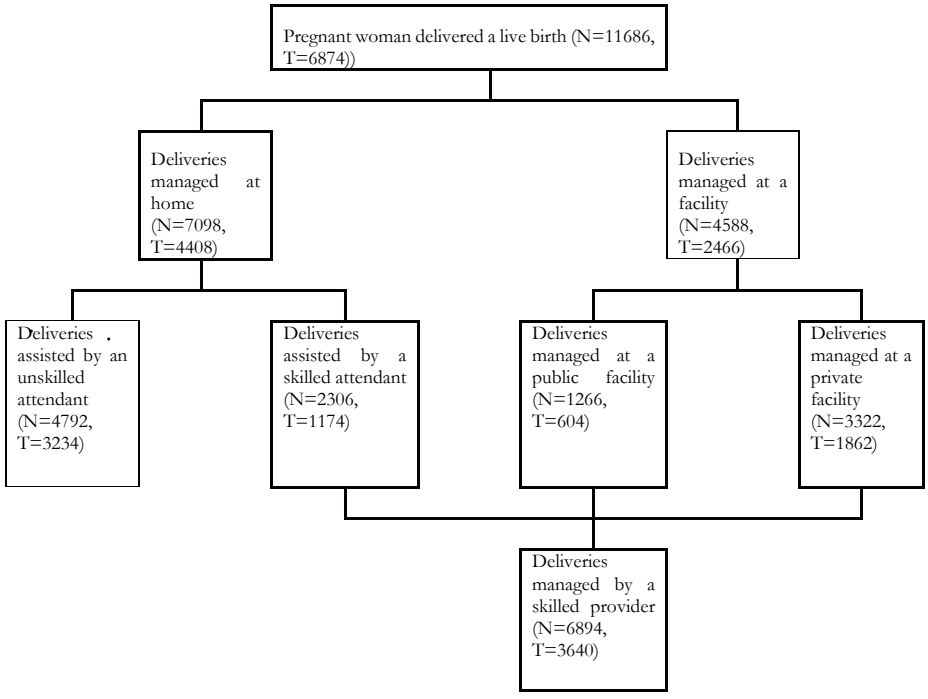


Figure 1 Maternal care-seeking behaviour of women who delivered a live birth in 2009-2013 (PSLM data)

Note: N denotes total sample size; T denotes sample in treated districts. Sample size excludes mothers who reported maternal health seeking but whose most recent birth was more than three years ago. *PAIMAN* treatment districts are excluded from the sample.

To account for the policy focus on rural areas and the percentage of the population below the poverty line, we also include rural residence and socio-economic status (*SES*) of the household. To account for household *SES*, we constructed an asset index by Principal Component Analysis using data on household assets and dwelling conditions as recorded in the surveys. Earlier evidence suggests that this type of wealth index provides a very good proxy for household economic status in the absence of expenditure data (Lindelow, 2006).

Analysis

We use a difference-in-difference (*DID*) approach (Wing, Simon, & Bello-Gomez, 2018) to evaluate the effectiveness of *NPPI* by comparing outcomes in districts that were exposed to the *NPPI* project (all treated districts) and those without such exposure (control districts). We estimate linear models for each binary outcome variable (Wing et al., 2018) for the following binary outcomes: births with skilled assistance, institutional births, home-based skilled births, and births at private facilities (Figure 1). We test for the overall effect of *NPPI* using a *DID* model with time and district fixed effects(Wing et al., 2018). The model is as follows:

$$y_{i,d,t} = \beta NPPI_{i,d,t} + \Omega X_{i,d,t} + \tau_{i,d,t} + D_{i,d,t} + \varepsilon_{i,d,t} \qquad (1)$$

where $y_{i,d,t}$ is an indicator of whether the respondent (mother) *i* used health care for her most recent birth in district d at time *t*. $NPPI_{i,d,t}$ reflects whether a district d in which mother *i* delivered birth was treated by *NPPI* at time *t* and the parameter β estimates the treatment effect of *NPPI*. X_{idt} is a vector of individual and district control variables at time *t* while Ω is a vector of coefficient estimates for these control variables, $\tau_{i,d,t}$ and $D_{i,d,t}$ indicate year and district level fixed effects to account for unobserved but time-invariant district heterogeneity and for the time trend in the use of services that is common to all districts. $\varepsilon_{i,d,t}$ is a normally distributed error term. We adjust the standard errors for clustering at the primary sampling unit and robust to heteroscedasticity (Newey and West, 1987).

We test for possible heterogeneity in the effects of the three separate component interventions of *NPPI,* i. e., contracting and voucher scheme, each in two treatment districts, and the remaining treatment districts of *NPPI*. In this case, we compare districts that received each intervention at a particular time interval with those that did not receive any intervention (controls).

$$y_{i,d,t} = \alpha VOU_{i,d,t} + \delta CON_{i,d,t} + \gamma C_{i,d,t} + \Omega X_{i,d,t} + \tau_{i,d,t} + D_{i,d,t} + \varepsilon_{i,d,t} \qquad (2)$$

α, δ and γ capture the separate treatment effects in districts with vouchers (*VOU)*, contracting (*CON*) and other districts of *NPPI*.

The identifying assumption is that the utilisation of services in treatment districts would have followed the same time trend as in control districts if no project activities had been undertaken(Wing et al., 2018) This is the so-called parallel trends assumption *(PTA)*. To test whether our assumption of parallel trends holds pre-treatment, we perform two checks. First, we visually inspect the graphs of proportions and 95% confidence intervals (obtained by normal approximation) of the selected outcomes for the treated and control districts in the period of analysis. Second, we test for differential pre-treatment trends by estimating a regression using pre-treatment data only and testing whether the year fixed effects differ between the control and (later to be treated) districts. Here, we use an F-test for the joint significance of the interaction of the three lagged time dummies and a dummy indicating the treated districts. This model includes district and time fixed effects and all covariates as explained above.

Results

First, we examine whether pre-treatment trends can be considered parallel. The graphical presentation of outcome pre-trends in *NPPI* and control districts suggests a parallel picture in most of the four outcomes (see Appendix B). Second, the P-values of the F-test indicate insignificant differences in the pre-treatment outcome trends between the control and treated districts (see Appendix C). We therefore assume that the *PTA* holds for most outcomes across the full sample and the sample restricted to specific reforms.

The estimation results of the generalized *DID* analysis are provided in Table 1. While the estimated effects of most covariates show the expected patterns -- schooling and wealth generally raise the probability of seeking care -- *NPPI* does not appear to have had any significant effect on any of the outcomes. This is a very sobering finding, but it is possible that the overall effect conceals the effects of the two programme subcomponents. In Table 2 we test for differential effects of *NPPI* in the voucher and contracting districts. We find that in these districts the proportion of births with some skilled assistance—at home as well as in facility-- did increase significantly while (surprisingly and insignificantly) it fell in the remaining districts of *NPPI* which did not use vouchers or contracting (Table 2). This would suggest that the other *NPPI* components (like improving supplies at health facilities and community awareness campaigns) were counterproductive in the *NPPI* districts without vouchers or contracting interventions. None of the other maternal care-seeking behaviours were significantly affected by any of the *NPPI* components.
Rural inhabitants have a lower probability of skilled care or institutional care use, and a higher probability of seeking care from private facilities. Schooling of mothers is significantly positively associated with most of the outcomes except home-based skilled births and this is similar for schooling of the head of household (see Table 1 and Table 2).

Discussion and conclusion

Using a large and representative sample of women from the province of Sindh, we subjected the implementation of *NPPI* to a rigorous test of effectiveness. Our findings are as follows. First, our estimates confirm that also in this poor and mostly rural population of Sindh, women with low schooling and low *SES* are less likely to receive maternal care, be it skilled assistance or institutional delivery. This confirms the need to promote such behaviour to improve birth outcomes. Second, in general, we only find a weak and insignificant impact of the *NPPI* programme on the maternal care-seeking behaviour of pregnant women. For most of the outcomes that we could consider, the broader objective to improve access to and use of skilled care in the province of Sindh was not achieved by *NPPI*. This is worrisome given the large-scale attempt to improve such behaviour in general, using both demand and supply side interventions. Third, and fortunately, there are two exceptions: women in districts which used vouchers, or which implemented contracting were *more* likely to seek skilled assistance with their delivery. This is somewhat a surprising result as the mandate of the *NGOs* involved in contracting and vouchers was restricted to renovating the health facilities and distribution of vouchers to be redeemed at health facilities respectively. Such efforts of *IHS* or *Greenstar Marketing* in their respective districts were not intended to improve births at home irrespective of the type of assistance.

The finding of increased skilled birth assistance was *not* obtained for the remaining *NPPI* treatment districts; on the contrary, we even find it decreased such assistance. It suggests that the provision of supplies and equipment, staff trainings and the public awareness campaigns – which were implemented across all *NPPI* districts – were not successful in improving maternal care-seeking behaviour, and possibly even counter-productive.

Compared to earlier work, our study offers several improvements. First, exploiting the timing of births, we construct a six-year panel of over 11,000 live births in treated and control districts from a representative sample of women drawn from the *PSLM* surveys done both before and after the introduction of *NPPI* intervention. Second, access to official documents of *NPPI* helped us to define treated and control districts, the effective project period, and the pre-treatment period.

	Skilled births			Institutional Births			Home-based skilled births			Births at private facilities		
	Co-efficient (95% Confidence Intervals)			Co-efficient (95% Confidence Intervals)			Co-efficient (95% Confidence Intervals)			Co-efficient (95% Confidence Intervals)		
NPPI districts	0.00	(-0.05 / 0.04)		-0.01	(-0.05 / 0.03)		0.01	(-0.05 / 0.08)		0.05	(-0.01 / 0.11)	
a. Mother characteristics												
15-18 years												
19-40 years	-0.02	(-0.05 / 0.01)		-0.02	(-0.05 / 0.01)		-0.02	(-0.06 / 0.01)		-0.05 **	(-0.09 / -0.01)	
41-60 years	-0.05 **	(-0.08 / -0.02)		-0.06 **	(-0.09 / -0.03)		-0.03	(-0.07 / 0.01)		-0.08 **	(-0.13 / -0.03)	
No schooling												
up to primary schooling	0.06 ***	(0.03 / 0.09)		0.09 ***	(0.06 / 0.12)		0.01	(-0.04 / 0.05)		0.02	(-0.02 / 0.06)	
>primary & ≤ middle	0.08 ***	(0.05 / 0.12)		0.14 ***	(0.10 / 0.18)		0.00	(-0.06 / 0.06)		0.02	(-0.03 / 0.06)	
>middle & ≤ high School	0.09 ***	(0.05 / 0.14)		0.16 ***	(0.10 / 0.21)		0.05	(-0.07 / 0.17)		0.00	(-0.07 / 0.07)	
Graduate and above	0.10 ***	(0.05 / 0.14)		0.19 ***	(0.13 / 0.25)		0.00	(-0.19 / 0.18)		0.09 **	(0.03 / 0.15)	
b. Family characteristics			)			)			)			)
Rural	-0.10 ***	(-0.13 / -0.07)		-0.12 ***	(-0.16 / -0.09)		-0.04	(-0.09 / 0.01)		0.05 *	(0.02 / 0.09)	
SES Q1												
SES Q2	0.11 ***	(0.08 / 0.14)		0.06 ***	(0.03 / 0.09)		0.09 ***	(0.06 / 0.12)		0.02	(-0.03 / 0.06)	
SES Q3	0.15 ***	(0.12 / 0.19)		0.11 ***	(0.07 / 0.14)		0.13 ***	(0.08 / 0.17)		0.02	(-0.03 / 0.07)	
SES Q4	0.21 ***	(0.17 / 0.25)		0.21 ***	(0.16 / 0.25)		0.17 ***	(0.11 / 0.23)		0.11 ***	(0.06 / 0.17)	
SES Q5	0.26 ***	(0.21 / 0.30)		0.29 ***	(0.23 / 0.34)		0.28 ***	(0.18 / 0.38)		0.20 ***	(0.14 / 0.26)	
Female Head	-0.03	(-0.11 / 0.06)		0.01	(-0.08 / 0.10)		-0.05	(-0.16 / 0.06)		0.07	(-0.04 / 0.18)	
Head no schooling												
up to primary schooling	0.03 **	(0.00 / 0.05)		0.04 **	(0.01 / 0.06)		0.00	(-0.03 / 0.03)		0.01	(-0.03 / 0.05)	
>primary & ≤ middle	0.04 **	(0.02 / 0.07)		0.05 ***	(0.03 / 0.08)		0.01	(-0.02 / 0.05)		0.02	(-0.02 / 0.05)	
>middle & ≤ high school	0.07 ***	(0.04 / 0.11)		0.10 ***	(0.06 / 0.13)		0.01	(-0.03 / 0.06)		0.09 ***	(0.04 / 0.13)	
Graduate and above	0.08 ***	(0.04 / 0.12)		0.11 ***	(0.07 / 0.15)		0.02	(-0.04 / 0.08)		0.09 ***	(0.05 / 0.14)	
N	11032			11032			6,656			4,376		

Table 1 Probability of seeking care of women who delivered a live birth during 2009-2013

Table shows effect of NPPI on the probability of each outcome estimated using multiple linear regression on treatment effect, all covariates (as explained in table 1, year and district fixed effects. Confidence Intervals obtained using Standard Errors (SE) adjusted for clustering at level of primary sampling units. District fixed effect estimates are not included in the table but can be provided upon request.

	Skilled births						Institutional Births						Home-based skilled births						Births at private facilities					
	Co-efficient		(95%	Confidence	Intervals)		Co-efficient		(95%	Confidence	Intervals)		Co-efficient		(95%	Confidence	Intervals)		Co-efficient		(95%	Confidence	Intervals)	
Voucher districts	0.06	*	(-0.01	/	0.12)		0.03		(-0.03	/	0.09)		0.05		(-0.04	/	0.13)		0.04		(-0.04	/	0.12)	
Contracting districts	0.14	***	(0.07	/	0.21)		0.00		(-0.07	/	0.07)		0.17	***	(0.08	/	0.26)		0.08		(-0.02	/	0.19)	
Other NPPI districts	-0.08	**	(-0.13	/	-0.02)		-0.03		(-0.08	/	0.02)		-0.05		(-0.12	/	0.02)		0.04		(-0.03	/	0.11)	
a. Mother characteristics																								
15-18 years																								
19-40 years	-0.02		(-0.05	/	0.01)		-0.02		(-0.05	/	0.01)		-0.02		(-0.06	/	0.01)		-0.05	**	(-0.09	/	-0.01)	
41-60 years	-0.05	**	(-0.08	/	-0.02)		-0.06	**	(-0.09	/	-0.03)		-0.03		(-0.06	/	0.01)		-0.08	**	(-0.13	/	-0.03)	
No schooling																								
up to primary schooling	0.06	***	(0.03	/	0.09)		0.09	***	(0.06	/	0.12)		0.00		(-0.04	/	0.05)		0.02		(-0.02	/	0.06)	
>primary & ≤ middle	0.08	***	(0.05	/	0.11)		0.14	***	(0.10	/	0.18)		0.00		(-0.06	/	0.06)		0.02		(-0.03	/	0.06)	
>middle & ≤ high School	0.09	***	(0.05	/	0.14)		0.16	***	(0.10	/	0.21)		0.05		(-0.06	/	0.17)		0.00		(-0.07	/	0.07)	
Graduate and above	0.09	***	(0.05	/	0.14)		0.19	***	(0.13	/	0.25)		0.00		(-0.18	/	0.17)		0.09	**	(0.03	/	0.15)	
b. Family characteristics																								
Rural	-0.09	***	(-0.13	/	-0.06)		-0.12	***	(-0.15	/	-0.09)		-0.04		(-0.09	/	0.01)		0.06	**	(0.02	/	0.09)	
SES Q1																								
SES Q2	0.11	***	(0.08	/	0.14)		0.06	***	(0.03	/	0.09)		0.09	***	(0.06	/	0.12)		0.02		(-0.03	/	0.06)	
SES Q3	0.15	***	(0.12	/	0.19)		0.11	***	(0.07	/	0.14)		0.13	***	(0.08	/	0.17)		0.02		(-0.03	/	0.07)	
SES Q4	0.21	***	(0.18	/	0.25)		0.21	***	(0.17	/	0.25)		0.17	***	(0.11	/	0.23)		0.11	***	(0.06	/	0.17)	
SES Q5	0.26	***	(0.22	/	0.30)		0.29	***	(0.24	/	0.34)		0.28	***	(0.18	/	0.38)		0.20	***	(0.14	/	0.26)	
Female Head	-0.02		(-0.11	/	0.06)		0.01		(-0.08	/	0.10)		-0.04		(-0.15	/	0.07)		0.07		(-0.04	/	0.18)	
No schooling																								
up to primary schooling	0.03	**	(0.00	/	0.05)		0.04	***	(0.01	/	0.06)		0.00		(-0.03	/	0.03)		0.01		(-0.03	/	0.05)	
>primary & ≤ middle	0.04	**	(0.01	/	0.07)		0.05	***	(0.03	/	0.08)		0.01		(-0.02	/	0.04)		0.02		(-0.02	/	0.05)	
>middle & ≤ high School	0.07	***	(0.04	/	0.10)		0.10	***	(0.06	/	0.13)		0.01		(-0.04	/	0.06)		0.09	***	(0.04	/	0.13)	
Graduate and above	0.08	***	(0.04	/	0.12)		0.11	***	(0.07	/	0.15)		0.02		(-0.04	/	0.08)		0.09	***	(0.05	/	0.14)	
N	11032						11032						6,656						4,376					

Table 2 Probability of seeking care of women who delivered a live birth during 2009-2013

Table provides heterogeneous effects of each of the reforms carried out in NPPI. Other notes are same as in table 1

Third, the births panel allowed us to adopt a generalised *DID* design with two-way fixed effects to control for time-invariant unobserved heterogeneity across districts and the common time trends that allow for a better-controlled comparison than the before-after *DID* design on which the Population Council's study was based on. Fourth, demographic and socioeconomic characteristics of the household and the women allowed us to control for time-variant characteristics at the individual level.

However, our study also faced certain limitations. By extracting the dates of birth, we were able to isolate the timing of effects more accurately, but in doing so, we lost almost 20% of the original sample, thereby reducing the power of the test. Another limitation of our analysis was that we had to exclude other maternal outcomes like seeking *ANC* and *PNC* or *TT* vaccination because their timing was not recorded in the surveys. We could also not examine neonatal morality since *PSLM* reported only the live births. Finally, we had to drop 1,635 births that occurred in 2014, a year that overlapped with the *MChip* project (Maternal and Child Health Integrated Program, 2018).

The evidence on the effectiveness of contracting in the Pakistan health sector is somewhat mixed (Loevinsohn et al., 2009; M. A. Malik, Van de Poel, & Van Doorslaer, 2017). A few studies demonstrated an improvement in health seeking of pregnant women when this was encouraged with demand side financing. For example, earlier local observational studies find that the distribution of *MCH* vouchers to the poorest of pregnant women increased institutional births in district Jhang (*adjusted odds ratio (AOR)* 1.41; 10 treated and 10 control union councils (UC, smallest administrative unit)) and in Dera Ghazi Khan (*AOR* 4.04; 7 *UC*s pre- and post-treatment) in the province of Punjab respectively (Agha, 2011a, 2011b). More recently, a study by Habib et al. (2019) experimented with a *MCH* intervention package in the flood-affected areas of Dadu District. Besides the interventions that are like interventions in the remaining districts of *NPPI*, an emergency fund was established to cover transport expenses of pregnant women in low-income families requiring urgent transportation to health facilities. The results show significant gains in wide-ranging *MCH* outcomes including service delivery (double difference of 33.1% and 30.5% in skilled birth attendance and institutional deliveries respectively; (Habib et al., 2019).

The *voucher and contracting schemes* seem to have had some success in improving the management of *MCH* interventions, by showing effects that were not observed in the other *NPPI* districts. Earlier research has claimed that the social mobilisation strategy and provision of supplies and equipment could deliver, if coupled with innovative strategies to ensure availability of medical staff at the health facilities especially in rural areas. For example, Chaudhri et al. (2013) managed the staff shortage in district-based health facilities in the Chakwal district by bringing in medical doctors from a tertiary care hospital in Rawalpindi on a rotational basis. The results of their before and after quasi-experimental design indicated that the objectives were broadly achieved, i.e., fivefold increase in out-patient visits to the target health facilities, twofold

increase in admissions and in institutional births (Chaudhri, Bano, Noreen, & Ejaz, 2013). Another study, Jokhio et al., (2005), implemented the safe motherhood intervention package in three *talukas* (sub-districts) of Larkana district that included an intervention like *NPPI* community midwives' scheme, that is, training of Traditional Birth Attendants and supply of delivery kits to conduct normal deliveries at home. The shortage of doctors at health facilities in the treated *taluka* hospitals was managed by bringing-in obstetricians from Larkana City on a rotational basis. After six months of the randomised intervention, a significant decline was observed in perinatal mortality (*AOR* 0.7) and maternal mortality (*AOR* 0.74) in the three treatment *talukas* compared to the controls (four *talukas*)(Jokhio, Winter, & Cheng, 2005). These findings suggest that the routine practice of human resource management in public sector is not sufficient to improve the availability of medical professionals in rural areas. At least for contracting scheme, we could confirm that *IHS* better managed their human resources with tools such as staff *hire-and fire* and market based financial incentives for medical professionals.

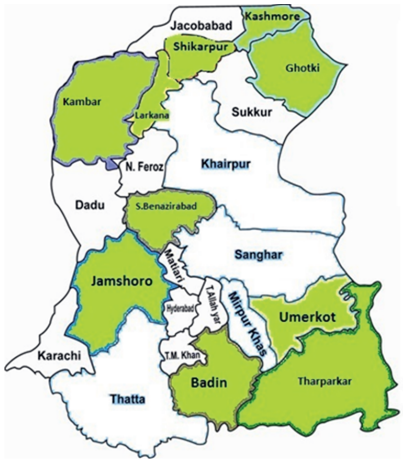
In general, our findings do not confirm earlier claims of overall success of *NPPI* (Norwegian Ministry of Foreign Affairs, 2015, Population Council, 2014). A similar discrepancy can be observed between the claims made in the final evaluation report of *PAIMAN* project (Atwood et al., 2010)to those of an independent evaluation by Rashid (2015). For example, using data from baseline (2005) and end line (2010) surveys, the *PAIMAN* final evaluation report claimed that skilled births increased by 11%-points in project districts (Atwood et al., 2010). However, using data of *PSLM* rounds 2004-05 and 2012-13, Rashid (2015) finds that women in *PAIMAN* districts were *less* likely (*OR 0.76*) to make use of skilled assistance during their births than women living in control districts (Rashid, 2015). Recently, an evaluation of contracting of primary healthcare facilities in Pakistan that had used data of six rounds of *PSLM* also rejected (M. A. Malik, Van de Poel, et al., 2017) earlier claims of effectiveness based on data collected from community and facility surveys conducted in treated and control districts (Loevinsohn et al., 2009). Such discrepancies call for improving the quality of programme evaluations to enhance the evidence base of health policies.

Since the dawn of the 21st century, the *GoP* and its development partners have focused primarily on maternal and child health, often relying on sporadic, short-term projects that have demonstrated little effect. *NPPI* is one such example, that implied substantial resources on a carefully designed package of interventions. We can only speculate about potential reasons for the lack of effect of *NPPI*. Some of these reasons are embedded in the short-term project cycle approach of *NPPI*. These have been mentioned in the progress and evaluation reports such as the delay in the release of funds and the slow progress on a few interventions as well as challenges in operational management between the government and the implementing partners that led the Norwegian government to an extensive revamp of activities including restricting the plans of extension beyond 2014 (Norwegian Ministry of Foreign Affairs, 2015).

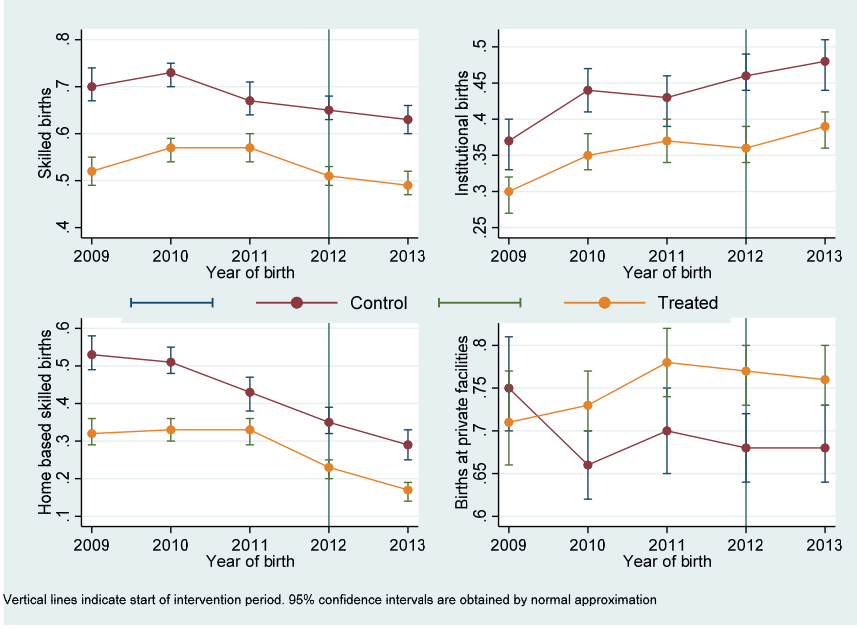
In the recent past some of the South Asian countries followed a slightly different approach that enabled them to successfully improve maternal and child health (S. M. Ahmed et al., 2016; Ahsan et al., 2016; Kuruvilla et al., 2014). For example, Bangladesh and Nepal adopted an integrated and long-term investment model to achieve *MDG* targets related to maternal and under-five mortalities. In Bangladesh, this strategy involved the integration of 128 discrete projects and the enhancement of budgetary allocations sustained between 1998 and 2013 (Ahsan et al., 2016). In Nepal, the government established mechanisms to align donor resources with national priorities and adopted a long-term plan 2002-2017 for the integrated delivery of services with community health volunteers and to address financial barriers to access health services (S. M. Ahmed et al., 2016). Besides, their investments in the health sector in Bangladesh, Nepal, and Sri Lanka were coupled with parallel investments in improved education and gender equality which may have had spill-over effects on the health sector (Kuruvilla et al., 2014).

Concluding, our findings do not support earlier reports about programme effectiveness of *NPPI*. Despite substantial investment, in general, the low uptake of *MCH* services calls for revisiting the intervention model of *MCH* projects including *NPPI*. The small effects identified for vouchers and contracts on skilled birth attendance, however, still hold some promise.

Appendices



Appendix 1 Sindh district map (NPPI districts are highlighted in green)



Vertical lines indicate start of intervention period. 95% confidence intervals are obtained by normal approximation

Appendix 2 Proportion of births in treated and control districts of NPPI

	All NPPI districts		Voucher districts		Contracted districts		Other NPPI districts	
	Sample size	p values	Sample size	p values	Sample size	p values	Sample size	p values
All skilled births	1933	0.47	427	0.62	489	0.65	1017	0.48
Births at any facility	1187	0.81	325	0.07	260	0.05	602	0.68
Home-based skilled births	746	0.62	102	0.84	229	0.33	415	0.55
Births at private facilities	884	0.05	250	0.01	175	0.49	459	0.05

Appendix 3 Robustness check for pre-treatment parallel trends

Table provides P-values of the join test of significance to test pre-treatment parallel trends in 2009-2011. These values are obtained from an F-test that tests the nulls that the change in the proportions of outcomes in pre-treatment years is same across treatment and control districts of all pre-treatment years. Control variables include year and district fixed effects and a vector of covariates that includes age and schooling of mothers, schooling of the head of household, the socio-economic status of the household, whether household inhabited in rural areas and whether household was headed by a female at the time of survey. Reference group for skilled births, institutional births, home-based skilled births, and births at private facilities are all unskilled births, home-based births, home-based unskilled births, and births at public facilities respectively. Other districts were the treated districts excluding districts where voucher and contracting schemes were implemented

Chapter 8 Discussion and conclusion

The primary objective of this thesis was to inform and aid efforts towards generating evidence-based health policies in Pakistan. Specifically, we set out to answer two research questions related to healthcare financing and the effectiveness of a few programmes that aimed to improve healthcare service utilization. In answering our first research question, we found that substantial resources were devoted to the maternal and child health sub-sector over the analysis period. Further analysis indicated that the less reliance on out-of-pocket payments and presence of a few contextual factors explained the rate of progress on under-5 and maternal mortalities.

In answering our second research question, we support the proposition on the multifaceted nature of demand for health. Socio-economic, and cultural aspects as well as the quality of health services are all factors affecting demand. We found that an overemphasis in the successive health policies on the quality of care did not incentivize either the general population or pregnant women to seek care from the government health facilities. Amongst sub-populations, those who were literate or economically more advantaged had reported better health-seeking activities. In this chapter, we first summarize methods in this thesis, then we summarize our findings related to the two research questions and address their future research and policy implications. Finally, we discuss the general limitations of our analysis and provide conclusion.

Methods summary

The methods used in this thesis are relatively innovative in the local context in which it was conducted. We applied appropriate analytical approaches and made better use of the available data as explained in the paragraphs below.

In chapters 2 and 5, case studies methodologies from the qualitative research paradigm were utilized (Creswell, Klassen, Plano Clark, & Smith, 2011; Creswell & Poth, 2016). This established the contextual relationship between healthcare financing and health service provision with health outcomes. The context provided a mechanism to critically analyze the similarities and the differences in healthcare financing, coverage of health services, and health outcomes across countries. The country case studies also contributed to developing a few research questions answered in later chapters 3, 4, 6, and 7.

In chapter 3, we made use of the methods recommended by *OECD* and *WHO* for compiling the health accounts that demonstrated improvement over the methods used by *GoP* for compiling the national health accounts of Pakistan. In chapter 4, the particular strengths of our methodology is including all possible covariates of houeshold's Out-of-Pocket Health Expenditure (*OPHE)* ; demographic, economic/social, and healthcare. The strategey to include health sector covariates, representing access to primary healthcare

and maternity needs at the household's level, contributed to the development of hypotheses that were tested later in chapters 6 and 7 respectively.

In chapters 6 and 7, to evaluate the effectiveness of *Contracting-out* and *NPPI*, we applied a *difference*-in-*difference* approach with two way fixed effects model (controlling for time-invariant unobserved heterogeneity across districts and the common time-trends) that allowed us to estimate the impact of these programs on the probability of seeking healthcare by general population and pregnant women as well as the impact on childhood diarrhoea. To further refine our estimated effects, we controlled for time-invariant characteristics at the individual level, such as the socio-economic and demographic features of the respondent and the households. Together with the tests of the parallel trend assumption, our analysis provides some credibility to our findings and improves on the methods used in earlier research that used a small sample size, did not have proper controls, and introduced selection bias through the choice of intervention districts. Access to official records of the *GoP* and development partners allowed us to 1) precisely define the timing of the use of health facilities and effective project period based on actual implementation of the project interventions, and 2) unearth issues and challenges in the design and implementation of their interventions.

Summary part 1 What were the patterns of healthcare financing in Pakistan and their relationship with health outcomes, particularly in the *MCH* sub-sector?

In part one of this thesis, we reviewed healthcare financing trends in Pakistan and compared them with Afghanistan, Ethiopia, Tanzania, Malawi, and Peru. This was followed by estimating Reproductive Maternal, Neonatal; and Child Health (RMNNCH) expenditure and determinants of *OPHE* in Pakistan. Our findings confirm that the relationship between total health expenditure (RMNCH expenditure) and health outcomes (maternal and under-5 mortalities) is unclear. In all countries included in the analyses, *RMNCH* expenditure had increased. Yet a few could claim to (nearly) reach the targets of under-5 and maternal mortalities, for example, Ethiopia and Peru. Ethiopia, a low-income country and Peru, a middle-income country achieved their respective *MDG*-4 targets with the lowest ($16.39) and highest ($148) expenditure per child respectively. Pakistan missed the target of under-5 mortality (by 2015, under-5 mortality was 81 against the target 46/1000 live births), in spite of the increase in *RMNCH* expenditure in Pakistan (by 181% over 2000-2010) that was among the highest (Ethiopia 202% over 2005-2010 and Peru 273% over 2004-2012). Breaking down total heath expenditure indicated that *OPHE* in Pakistan was >80 of total *RMNCH* expenditure, while in Ethiopia and Peru it was ≤40% of total *RMNCH*. This suggests that higher levels of *OPHE* may be a key factor explaining progress on maternal and under-5 mortality. Subsequent analysis of *OPHE* in Pakistan indicated that besides the known influences (such as economic

status, literacy, and personal hygiene), maternity-related healthcare needs and distance of > 5-kilometer to a primary healthcare facility were the factors for high reliance on *OPHE* by the households in Pakistan.

A literature review designed to find country-specific strategies within Pakistan, Ethiopia and Peru to reduce under-5 and maternal mortalities found a range of distinguishing characteristics associated with success. The review highlighted the structural and socioeconomic differences between Pakistan and Ethiopia and Peru. In Ethiopia, factors such as 1) high level of political commitment, 2) a fast-growing economy (on the average 10 % real *GDP* growth rate per annum during *MDGs* era), and 3) the *Harmonization Initiative* to streamline government and external resources to health sector could have contributed to their accelerated progress on health-related *MDGs*. While in Peru, these factors were 1) decentralization of decision making in the health sector and 2) an effective anti-poverty programme with a component on conditional cash transfer for *MCH* services. In Pakistan, the *MCH* investments were channelled through the federal government's country-wide vertical programmes that were generally centralized at the federal level and less coordinated with provincial and district levels. This resulted in fragmented and often overlapping functions among health services and their management. For example, the overlapping job description of *Lady Health Workers* (A cadre of federal vertical programme namely, national programme for Primary Healthcare and Family Planning: NPHC&FP) and *Lady Health Visitor* (a cadre of routine primary healthcare facilities). Moreover, the health management information systems of the *NPHC&FP* run parallel to the routine health management information systems for primary healthcare facilities. On the aspects of enabling factors, the situation in Pakistan was less supportive. For example, the economic growth witnessed between the period 2003-2006 (average *GDP* growth rate of 6.4% per annum) slowed and reached the lowest level by 2010 (*GDP* growth rate 1.6%). In 2010, the health sector devolved to the provinces, however, by the end of the *MDG* era (2015), little progress had been made in impacting health services use and health outcomes.

In part one of the thesis, we conclude that prioritization of polices in Pakistan did translate into substantial investments in the *MCH* sub-sector by the governments and the development partners. The progress on health related *MDGs* could only be made where such investments were coupled with an integrated approach and decentralized decision-making that coincide with economic growth and poverty reduction.

Part 2 Summary Are the claims of increased utilization of health services causally related to areas exposed to the health reforms/programmes?

Among the South Asian region, by the end of *the MDGs* era 2015, Pakistan ranked amongst the lowest on 11 of the 20 essential *MCH* interventions in the south Asian region. Between 2000-2015, Pakistan improved skilled attendance in birth (24% to 59%) and institutional births (19% to 68%), however, most of these gains were in the private sector. In the public sector, the district-based healthcare delivery system

is grossly underutilized. For example, seeking healthcare from *BHUs* in the period 2001-2015 for unknown illnesses and childhood diarrhoea increased from 2.3% to 3.4% and 2% to 5%, respectively. Births at public facilities between 2001-2011 increased from 10% to only 13%. More concerning are our findings on the interventions to revitalize the district-based public healthcare delivery system. We could not find any significant improvement in the use of *BHUs* for unknown illnesses and childhood diarrhoea in the 73 districts (out of 113) exposed to the contracting. Nor did we find any improvement in the skilled and institutional care for child-births in the ten intervention districts (of 26 districts in Sindh province) of *NPPI*.

To further explore the effect of *contracting-out* of *BHUs*, we investigated the heterogeneity of the effects across the rural areas and poorest households. To improve our understanding of the effects of *NPPI*, we investigated the heterogeneity of interventions: contracting and voucher schemes. For the contracting, we found a significant improvement in the use of *BHU* for childhood diarrhoea in rural areas (3 percentage points) and by the poorest quintile (4 percentage points). For *NPPI*, we found a significant improvement in the home-based skilled births in *NPPI* districts that were further exposed to either the contracting (13 percentage points) or the vouchers (7percentage points) schemes. Against the backdrop of an overall small improvement in the use of government facilities, these findings are insufficient to alter the general conclusion to revisit the narrow focus of *GoP* on the quality of care. Furthermore, because the objective of the contracting (chapter 6) was to improve the use of *BHUs* by the rural-poor, we the included the interaction of the rural with the poor in our *DID* model. This turned out to be insignificant, suggesting no evidence that the situation improved for the rural-poor. Similarly, the objective of *NPPI* contracting and voucher schemes was encouraging the use of institution-based care which contrasted with the effects of these schemes on skilled assistance in births at homes. We can only speculate that the intervention strategy of these schemes may have encouraged the community outreach of the maternity staff in their respective intervention districts. During our review of the public archives and the scientific literature, we identified many challenges either in their design or in their project management. For example, we struggled to find the use of evidence while designing their intervention package. Secondly, we found that the use of some explicit criteria for selecting the intervention districts was either lacking (contracting) or not followed (NPPI). Lastly, we found that there was a lack of accountability of implementing agencies towards contracting/funding agency.

In the second part of this thesis, we concluded that the low performance of a district-based healthcare delivery system is not surprising. Limitations were embedded in the design of intervention package, there were major issues related to public sector management, and a lack of accountability in the health sector.

Our findings on the socio-economic determinants of health such as wealth and schooling are consistent throughout this thesis across chapters 4, 6, and 7 and from the scientific literature (Marmot et al., 2008;

Wolff, 2011). The majority of illiterate, and dis-empowered rural-poor communities did not reap the benefits of improved quality of health services through contracting or *NPPI*. The community awareness campaigns may have raised their knowledge of health issues, but neither alter their deep-rooted culture and social norms, nor could it overcome the geographical and financial barriers to access the government health facilities. In chapter 5, among the South Asian countries, Pakistan was ranked second lowest (above Afghanistan). Literacy and women's empowerment indicators targets of *MDGs* were missed. Ingoring such factors in health policies suggest that the strategy of "*urgent concerted direct effort to improve maternal child health without waiting for economic growth or poverty alleviation as the main means for change"* (Zulfiqar A Bhutta et al., 2013) was partially effective meeting its objective.

Implications

The analyses in this thesis reviewed a set of health policies and programmes of the *MDGs* era. In 2015, the *Sustainable Development Goals (SDG)* have added few new priorities in the health sector, such as non-communicable diseases and financial risk protection against health shocks. In Punjab and Khyber Pukhtookhawa provices, the *vertical sporadic project* approach has been abadnonded by aligning the foreign development assistance for health with sector-wide reforms. Moreover, the devolution of the health sector to the provinces in 2010, is now maturing with indications of improvement in governance and accountability. The vertical *PHC* programmes are now integrating with the routine health services delivery.

However, some of the significant challenges to the health sector are still unresolved. First, although prioritizing *MCH* was appropriate in principle, our findings indicated that it was ineffective given the volume of resources devoted to it. Second, the strategy to improve the use of government health facilities by investing in the quality of care and community awareness campaigns was limited in scope given the complexities of the issue of underutilization of government health facilities. The government facilities, particularly, the *PHC* facilities (given their large size >10000), are still underutilized (3% for childhood diarrhoea in 2018-19,), while *OPHE* is still the major source (52% in 2017-2018) of financing healthcare (Pakistan Bureau of Statistics, 2020, 2021). In this regard, we propose addressing a few unexplored aspects on the demand and the supply sides of the district-based government health facilities.

On the demand side, besides the community awareness campaigns, there are generally unexplored factors that hamper the use of government health facilities (Ensor & Cooper, 2004). For example, the demand for healthcare favours seeking care from large hospitals; driven by the perception of the size of the health facility as a proxy of better quality. Moreover, health services are free at public facilities but one cannot rule out the factor of informal payments. These aspects of low demand for government health facilities were anecdotally quoted and explain weaknesses in the health services delivery in Pakistan during the *MDG*s era

(Nishtar, 2006; Nishtar et al., 2013), but these require further attention of the health policy makers and researcher.

On the supply side, our argument for improving efficiency is exploring options that are less resource-intensive. For example, an effective referral system from *PHC* facilities to the next level of care, can potentially contain costs and improve the efficiency of public spending on health. For a more effective referral system, the geographical barriers to access district-based government facilities require particular attention of health policy analysts. The literature search returned a small-scale study that reported distance as a barrier (>70) to seek care from *PHC* facilities(Bhatti, 2005a). Moreover, the successive rounds (2004-2012) of *PSLM* surveys had been reporting around 50% of the respondents not seeking care from government health facilities either due to distance or due to lack of health facility (Pakistan Bureau of Statistics, 2005-2012). Strategies need to address the issue of geographical access from both perspectives, taking services to the people and taking people to the services (O. O'donnell, 2007).

Limitations

We have described specific limitations in each chapter, here we provide the overall limitations of this thesis. These limitations are those that are relevant while drawing conclusions for future research and policy formulation. An important limitation of the thesis is the focus (in chapters 3,4, 6, and 7) on demand for healthcare. Specifically, we could relate health financing and demand for healthcare with health outcomes under-5 and maternal mortalities, this relationship was mainly contextual and non-causal. A second limitation is that in our programme evaluation efforts, we were unable to control for those factors that are known to hamper access and use of health services such as natural calamities, conflict, and civil war which had intensified during the *MDGs* era. Finally, our findings on *MCH* policies and programmes may lack generalizability when NPPI was evaluated. Although it was a large-scale programme, there were many other projects on *MCH* to achieve health-related *MDGs* that could confound our analyses. We can only speculate about their success against the backdrop of an overall underutilization of government health facilities and similarities between their intervention package with the intervention package of *NPPI*.

Conclusion

Our analysis has shown that, by several metrics, Pakistan has not performed as well as other comparable countries in improving its healthcare systems. There are a range of reasons for this underperformance. Yet the argument of resource scarcity to the health sector is an invalid one. Historic underperformance does call for improving the credibility of health investment. Besides the focus on the quality of services at government health facilities, a few promising developments have taken place in the health sector since 2015. For example, the initiation of financial risk protection schemes for inpatient and maternity care for

the population living below the poverty line. Lastly, the law and order situation of the country has significantly improved. Coupled with enhanced investment in the education sector, particularly in female literacy, an active judiciary, and a vibrant electronic media that are contributing to the efforts on improving accountability and transparency in public policy, the findings of this thesis are timely and relevant to the efforts to improve the responsiveness of the health system in Pakistan.

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Summary

Pakistan is considered a classic case of growth without development as its performance on social development including health is not very encouraging. The private sector dominates in healthcare finance: private households contribute 60% of total health expenditure, and in healthcare delivery more than50% of the population seeks care from private providers. The government of Pakistan (GoP) has adopted a series of strategic attempts to improve access to and use of public health facilities and thus reduce the financial burden of health-seeking on households. These include, for example, the district-based health infrastructure development (in the eighties), the sector-wide approach (in the nineties), and the prioritization of Maternal and Child Health (MCH) (since2000). The latter strategy was part of the efforts to achieve the health-related *Millennium Development Goals*.

Despite large-scale investments in the health sector, by the end of the *MDG* era Pakistan had missed the targets of health related *MDGs*. Moreover, little was known about the relative effectiveness of most of these investments. In the field of healthcare financing, neither resource-tracking was routinely carried out, nor were the contents and format of the existing health accounts useful for health policy analysis. The evidence, before 2015, on the effectiveness of the significant programmes and reforms was limited to some project completion reports of the Pakistan government to a few studies which employed simple before and after comparison research designs.

The research aim of this thesis is to support evidence-based policymaking in Pakistan. Specifically, we will answer two research questions:

1. What were the patterns of healthcare financing in Pakistan and their relationship with health outcomes, particularly in the *MCH* sub-sector?

2. Are the claims of increased utilization of health services causally related to areas exposed to the health reforms/programmes?

This thesis contains two sections. Section 1 addresses question 1. First, a review of trends in healthcare financing and health outcomes in Pakistan compared with the Countdown-to-15 countries is followed by an estimation and review of the expenditure in the Reproductive, Maternal, Neonatal and Child Health (RMNCH) sub-sector and the magnitude and the determinants of the out-of-pocket health expenditure. Section 2 addressed the second question, first by reviewing the trends of maternal and child health outcomes and health services delivery in the South Asian region and followed by two programme evaluation studies of (1) contracting of primary healthcare units and (2) the Norway Pakistan Partnership Initiatives (NPPI).

In chapter 2, we find that maternal and child health expenditure increased in all countries included in the review, namely Afghanistan, Ethiopia, Malawi, Pakistan, Peru, and Tanzania. However, only a few countries managed to achieve the targets of health related *MDG*s, e.g., Ethiopia and Peru. In Ethiopia- a low-income country, progress on *MDG*s was associated with accelerated economic growth coupled with a high-level commitment and an integrated approach for investments in *MCH* sector, while in Peru, it was associated with investments in poverty alleviation and decentralized health policymaking. Pakistan's low performance on *MDG* targets were suspected to be due to the fact that investments in the *MCH* sector were channelled through centralized vertical programs of the federal government, with many examples of fragmented efforts and often overlapping functions.

In chapter 3, we find a two-fold increase in expenditure on *RMNCH* over the period 2000-2010. Pakistan was among the countries with the highest growth in *RMNCH* expenditure and one of the countries that received record levels of foreign development assistance to their *MCH* sector. However, these efforts did not improve the utilization of *MCH* services by the poor. For example, births at public facilities increased by 3% points but remained pro-rich over 2000-2010. These findings lend some credibility to our conclusion that does not resource scarcity, but the quality of health bureaucracy, good governance, and socio-economic and behavioural aspects of health and health care seeking were the missing elements in these health policies.

In chapter 4, we explored the extent and the determinants of out-of-pocket health expenditure (OPHE) - the major source of financing in Pakistan. Our findings indicate that poor sanitation and unsafe drinking water contribute to higher *OPHE*. On the aspects of health, pregnancy-related healthcare needs at the household and distance of more than 5 kilometres to the nearest health facility were the factors which showed a strong association with higher *OPHE* by households in Pakistan.

From Part One of this thesis, we conclude that good governance and accountability through a decentralized and integrated approach to investment in the *MCH* sector demonstrated better health outcomes albeit the role of political and economic development cannot be ignored.

In chapter 5, we tracked progress on health related *MDGs* in the South Asian region including Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka. In the region, Pakistan was among the worst performers both in terms of health outcomes and in services delivery-related indicators. Pakistan did improve the skilled (24% to 59%) and institution-based care (19% to 68%) use by mothers and their new-borns, but these gains were mostly in the private sector where the rural-poor were left-out. Countries that performed better in the *MCH* sector, such as Bangladesh and Nepal, focused on community (especially women) empowerment and female literacy as the primary means to improve health outcomes, while Pakistan was ranked second-lowest (only above Afghanistan) on literacy and women's improvement.

In chapter 6, we evaluated a large-scale experiment of contracting Basic Health Units (BHUs) in 73 districts (out of 113). Using a difference-in-difference approach we find no effect of this experiment on seeking care from *BHUs* for either unknown common illnesses or for childhood diarrhoea in treated versus control districts over 2001-2012. A literature review indicated multiple issues in the design of contracts like, for example, lack of accountability of the contracted agencies towards their public sector counterpart and the fact that the contracts were limited in scope to such factors that hamper population access to *BHUs* such as their location.

In chapter 7, we evaluated a large-scale *MCH* project i.e., the Norway Pakistan Partnership Initiatives (NPPI) that was implemented in the *MCH* sector in ten rural districts (out of 26 districts) of the province of Sindh. Using a similar methodology as in chapter 6, we did not find any improvement in the skilled and institutional care for childbirths in the intervention districts of *NPPI*. Surprisingly, we did find a significant improvement in the home-based skilled births in *NPPI* districts that were further exposed to either the contracting (13 percentage points) or the vouchers (7percentage points) schemes- designed to improve institution-based care for pregnant women.

Our findings from part 2 suggest that the observed progress made in *MCH* was primarily associated with the general socio-economic development since the intervention areas did not show any significant difference from their respective controls as far health-seeking of the general population or pregnant women was concerned.

In general, the findings in this thesis indicate that the strategy to improve the use of government health facilities by investing in the quality of care and community awareness campaigns did not sufficiently consider the barriers on the demand and supply sides that contributed to the underutilization of government health facilities. For example, the popular perception of the size of the health facility as a proxy of better quality, or the informal payments made at public-- particularly primary -- healthcare facilities are a few of the demand-side factors that require particular attention of policymakers. On the supply side, geographical access to health facilities and an effective referral system can improve the use of district-based health systems and contain its costs.

Historic underperformance (also in the *MDG* era) does call for improved credibility of health investment. Since 2015, a few promising developments have taken place in the health sector such as financial risk protection plans for the poor, devolution of the health sector to the provinces, and a sector-wide approach in the health sector in a few provinces. Together with the continuation of democracy, an active judiciary, and vibrant electronic media, the findings of this thesis may contribute to better underpin efforts to improve health policymaking with an evidence base in Pakistan.

Samenvatting

Pakistan wordt beschouwd als een klassiek geval van groei zonder ontwikkeling, omdat de prestaties op het gebied van sociale ontwikkeling, inclusief gezondheid, niet erg bemoedigend zijn. De particuliere sector domineert in de financiering van de gezondheidszorg: particuliere huishoudens dragen 60% van de totale gezondheidsuitgaven bij, en in de gezondheidszorg zoekt meer dan 50% van de bevolking zorg bij particuliere aanbieders. De regering van Pakistan (GoP) heeft een reeks strategische pogingen ondernomen om de toegang tot en het gebruik van openbare gezondheidsvoorzieningen te verbeteren en zo de financiële last van het zoeken naar gezondheid voor huishoudens te verminderen. Het gaat bijvoorbeeld om de wijkgerichte zorginfrastructuurontwikkeling (in de jaren tachtig), de sectorbrede aanpak (in de jaren negentig) en de prioritering van Moeder- en Kindgezondheid (MCH) (sinds 2000). Deze laatste strategie maakte deel uit van de inspanningen om de gezondheidsgerelateerde millenniumdoelstellingen voor ontwikkeling te bereiken.

Ondanks grootschalige investeringen in de gezondheidssector had Pakistan tegen het einde van het MDG-tijdperk de doelstellingen van gezondheidsgerelateerde MDG's niet gehaald. Bovendien was er weinig bekend over de relatieve effectiviteit van de meeste van deze investeringen. Op het gebied van de financiering van de gezondheidszorg werd routinematig geen middelen bijgehouden, en evenmin waren de inhoud en het formaat van de bestaande gezondheidsrekeningen nuttig voor de analyse van het gezondheidsbeleid. Het bewijsmateriaal over de doeltreffendheid van de belangrijke programma's en hervormingen was vóór 2015 beperkt tot enkele projectvoltooiingsrapporten van de Pakistaanse regering tot enkele onderzoeken die gebruik maakten van eenvoudige onderzoeksontwerpen voor en na vergelijking.

Het onderzoeksdoel van dit proefschrift is om empirisch onderbouwde beleidsvorming in Pakistan te ondersteunen. Concreet beantwoorden we twee onderzoeksvragen:

1. Wat waren de patronen van financiering van de gezondheidszorg in Pakistan en hun relatie met gezondheidsresultaten, met name in de MCH-subsector?

2. Houden de beweringen van een toegenomen gebruik van gezondheidsdiensten een oorzakelijk verband met gebieden die blootgesteld zijn aan de gezondheidshervormingen/-programma's?

Dit proefschrift bevat twee delen. Deel 1 behandelt vraag 1. Eerst wordt een overzicht van trends in de financiering van de gezondheidszorg en de gezondheidsresultaten in Pakistan vergeleken met de Countdown-to-15-landen gevolgd door een schatting en overzicht van de uitgaven in de reproductieve, maternale, neonatale en kindergezondheidszorg (RMNCH) subsector en de omvang en de determinanten van de eigen gezondheidsuitgaven. Deel 2 ging in op de tweede vraag, eerst door de trends van de gezondheidsresultaten voor moeders en kinderen en de levering van gezondheidsdiensten in de Zuid-

Aziatische regio te beoordelen, en gevolgd door twee programma-evaluatiestudies van (1) het contracteren van eerstelijnsgezondheidszorgafdelingen en (2) de Noorse Pakistaanse partnerschapsinitiatieven (NPPI).

In hoofdstuk 2 zien we dat de uitgaven voor gezondheidszorg voor moeders en kinderen stegen in alle landen die in de review zijn opgenomen, namelijk Afghanistan, Ethiopië, Malawi, Pakistan, Peru en Tanzania. Slechts enkele landen slaagden er echter in om de doelstellingen van gezondheidsgerelateerde MDG's te halen, b.v. Ethiopië en Peru. In Ethiopië, een land met een laag inkomen, werd vooruitgang op de MDG's geassocieerd met versnelde economische groei in combinatie met een hoog niveau van inzet en een geïntegreerde benadering voor investeringen in de MCH-sector, terwijl het in Peru werd geassocieerd met investeringen in armoedebestrijding en gedecentraliseerde gezondheidszorg beleid maken. De lage prestaties van Pakistan op de MDG-doelstellingen waren vermoedelijk te wijten aan het feit dat investeringen in de MCH-sector werden gekanaliseerd via gecentraliseerde verticale programma's van de federale overheid, met veel voorbeelden van gefragmenteerde inspanningen en vaak overlappende functies.

In hoofdstuk 3 vinden we een verdubbeling van de uitgaven aan RMNCH over de periode 2000-2010. Pakistan was een van de landen met de hoogste groei in RMNCH-uitgaven en een van de landen die recordniveaus van buitenlandse ontwikkelingshulp aan hun MCH-sector ontvingen. Deze inspanningen hebben echter niet geleid tot een verbetering van het gebruik van MCH-diensten door de armen. Zo stegen de geboorten in openbare voorzieningen met 3%, maar bleven ze in de periode 2000-2010 pro-rijk. Deze bevindingen geven enige geloofwaardigheid aan onze conclusie dat niet de schaarste aan middelen, maar de kwaliteit van de gezondheidsbureaucratie, goed bestuur en sociaal-economische en gedragsaspecten van gezondheid en het zoeken naar gezondheidszorg de ontbrekende elementen waren in dit gezondheidsbeleid.

In hoofdstuk 4 hebben we de omvang en de determinanten onderzocht van de eigen gezondheidsuitgaven (OPHE) - de belangrijkste financieringsbron in Pakistan. Onze bevindingen geven aan dat slechte sanitaire voorzieningen en onveilig drinkwater bijdragen aan een hogere OPHE. Wat de gezondheidsaspecten betreft, waren zwangerschapsgerelateerde zorgbehoeften in het huishouden en de afstand van meer dan 5 kilometer tot de dichtstbijzijnde gezondheidsinstelling de factoren die een sterke associatie lieten zien met hogere OPHE door huishoudens in Pakistan.

Uit deel één van dit proefschrift concluderen we dat goed bestuur en verantwoording door een gedecentraliseerde en geïntegreerde benadering van investeringen in de MCH-sector betere gezondheidsresultaten lieten zien

In hoofdstuk 5 hebben we de voortgang van gezondheidsgerelateerde millenniumdoelen in de Zuid-Aziatische regio gevolgd, waaronder Afghanistan, Bangladesh, Bhutan, India, de Maldiven, Nepal, Pakistan

en Sri Lanka. In de regio was Pakistan een van de slechtste presteerders, zowel op het gebied van gezondheidsresultaten als op het gebied van indicatoren voor de levering van diensten. Pakistan heeft het gebruik van geschoolde (24% tot 59%) en in de instellingen gebaseerde zorg (19% tot 68%) door moeders en hun pasgeborenen verbeterd, maar deze winst was vooral in de particuliere sector waar de armen op het platteland werden buitengesloten . Landen die beter presteerden in de MCH-sector, zoals Bangladesh en Nepal, richtten zich op empowerment van de gemeenschap (vooral vrouwen) en geletterdheid van vrouwen als de belangrijkste middelen om de gezondheidsresultaten te verbeteren, terwijl Pakistan op de op één na laagste (alleen boven Afghanistan) stond op het gebied van geletterdheid en verbetering van vrouwen.

In hoofdstuk 6 evalueerden we een grootschalig experiment van het contracteren van Basic Health Units (BHU's) in 73 districten (van de 113). Met behulp van een verschil-in-verschil-benadering vinden we geen effect van dit experiment op het zoeken naar zorg van BHU's voor onbekende veelvoorkomende ziekten of voor diarree bij kinderen in behandelde versus controledistricten in de periode 2001-2012. Een literatuuronderzoek wees op meerdere problemen bij het ontwerpen van contracten, zoals bijvoorbeeld het gebrek aan verantwoordelijkheid van de gecontracteerde agentschappen jegens hun tegenhanger in de publieke sector en het feit dat de contracten beperkt waren tot factoren die de toegang van de bevolking tot BHU's belemmeren, zoals hun plaats.

In hoofdstuk 7 evalueerden we een grootschalig MCH-project, namelijk de Norway Pakistan Partnership Initiatives (NPPI), dat werd geïmplementeerd in de MCH-sector in tien landelijke districten (van de 26 districten) van de provincie Sindh. Met behulp van een vergelijkbare methodologie als in hoofdstuk 6, vonden we geen verbetering in de geschoolde en institutionele zorg voor bevallingen in de interventiedistricten van NPPI. Verrassend genoeg vonden we wel een significante verbetering in de thuisbevallingen in NPPI-districten die verder werden blootgesteld aan ofwel de contractuele (13 procentpunten) of de vouchers (7 procentpunten) regelingen - ontworpen om de zorg voor zwangere vrouwen in instellingen te verbeteren .

Onze bevindingen uit deel 2 suggereren dat de waargenomen vooruitgang in MCH voornamelijk verband hield met de algemene sociaal-economische ontwikkeling, aangezien de interventiegebieden geen significant verschil lieten zien met hun respectievelijke controles wat betreft het streven naar gezondheid van de algemene bevolking of zwangere vrouwen. bezorgd.

In het algemeen geven de bevindingen in dit proefschrift aan dat de strategie om het gebruik van gezondheidsfaciliteiten van de overheid te verbeteren door te investeren in de kwaliteit van zorg en bewustmakingscampagnes van de gemeenschap onvoldoende rekening hield met de belemmeringen aan de vraag- en aanbodzijde die bijdroegen aan de onderbenutting. van gezondheidsvoorzieningen van de

overheid. De populaire perceptie van de omvang van de gezondheidsinstelling als een maatstaf voor betere kwaliteit, of de informele betalingen die worden gedaan bij openbare, met name eerstelijnsgezondheidszorg, zijn enkele van de factoren aan de vraagzijde die bijzondere aandacht van beleidsmakers vereisen. . Aan de aanbodzijde kunnen geografische toegang tot gezondheidsvoorzieningen en een effectief verwijzingssysteem het gebruik van op districten gebaseerde gezondheidsstelsels verbeteren en de kosten ervan beperken.

Historische underperformance (ook in het MDG-tijdperk) vraagt om een grotere geloofwaardigheid van investeringen in de gezondheidszorg. Sinds 2015 hebben er in de gezondheidssector enkele kansrijke ontwikkelingen plaatsgevonden, zoals financiële risicobeschermingsplannen voor de armen, deconcentratie van de gezondheidssector naar de provincies en een sectorbrede aanpak in de gezondheidssector in enkele provincies. Samen met de voortzetting van de democratie, een actieve rechterlijke macht en levendige elektronische media, kunnen de bevindingen van dit proefschrift bijdragen aan een betere onderbouwing van inspanningen om het gezondheidsbeleid te verbeteren met een wetenschappelijke basis in Pakistan.

PhD Portfolio

Teaching Assignment

Graduate

Coordinated graduate courses in M.Sc. Health Policy and Management.

- Health Economics and Financing (3 credits) 2015-2021.
- Economic Evaluation: Theory and Practice (3 credits) 2015-2019.

Module director of Module 6 Health equity policy and ethics in Masters in Bio-Ethics Program of Aga Khan University.

Undergraduate

Year III coordinator, longitudinal theme on Evidence Based Medicine, MBBS program, Aga Khan University.

Short courses

Course Coordinator "Strategies for financing health care towards advancing universal health coverage" 26-29 March 2019, Community Health Sciences Department, Aga Khan University.

Module Director on Financing, Development & Piloting of a modular training program on hospital management, in collaboration with WHO EMRO, in the Eastern Mediterranean Region

Supervision of M.Sc. student thesis

M.Sc. Health Policy and management thesis supervisor, 2017(1), 2018 (1), 2019 (1), 2020 (2). 2021(1).

Paper accepted/presented at conferences and Seminars

Invited Speaker and Panellist: Plenary 3: Funding Maternal and Child Health, RMNCH in Pakistan: priorities for action, 21 February 2015, Division of Women and Child Health, AKU, Karachi, Pakistan.

Presenter and Panellist: Bio-ethics Grand Round, Hospital Advertising Information sharing or marketing, 29th April 2017, Aga Khan University, Karachi, Pakistan.

Accepted for oral presentation, "Cost analysis of improved stove and traditional stoves in Pakistan, iHEA Biennial World Congress on July 7-11, 2017, at Boston University in Boston, Massachusetts, USA.

Panellist: Plenary session Investment in cutting edge technology in the resource limited setting and low- and middle-income countries: How ethically justified is it? 20th National Health Sciences Research Symposium: Heart and lungs, from prevention to regeneration. 4-5 November 2017, Aga Khan University, Karachi, Pakistan.

Speaker and member expert group for National research priority setting workshop, 26-28 February 2018, Pakistan Health Sciences Research Council, Islamabad, Pakistan.

Invited speaker and panellist at First Public Health Multidisciplinary Conference, 6th April 2019, APNA institute, Jinnah Sindh Medical University, Karachi, Pakistan.

Panellist/Discussant, Seminar on Cost of violence against women and girls, 19 August 2019, Working Group for Women, Aga Khan University, Karachi, Pakistan.

Short courses and trainings participated

Workshop "Essentials of Writing a Good Scientific Paper", Department of Continuing Professional education (3 AACMI category 1 credit hours), Aga Khan University, Pakistan, December 2016.

Workshop "Where is integration in mixed methods research" Working Group for Women, Aga Kahn University, Pakistan, 14 November 2018.

Workshop "Flip Style Teaching", Department of Continuing Professional Education (3.5 AACMI category 1 credits), Aga Khan University, Pakistan, June 2018.

Short course "Sample size determination for quantitative research", Continuing Professional Education (11.5 AACMI category 1 credits), Aga Khan University, Pakistan 25-27 February 2019.

Workshop "Teaching with case studies" Department of Education and Development, Aga Khan University, Karachi, 18 April 2019.

Short course "Good Clinical Practice – Social and Behavioural Research Best Practices for Clinical Research" Collaborative Institutional Training Initiative Program, a division of BRANY, Florida, USA, 5 December 2020.

Workshop Principles of Assessment, Department of Education and Development, Aga Khan university, 3 February 2021.

Short course IRB member, Collaborative Institutional Training Initiative Program, a division of BRANY, Florida, USA, April 2021.

Short course IRB chair, Collaborative Institutional Training Initiative Program, a division of BRANY, Florida, USA, April 2021.

Research and publication (other than PhD Thesis)

Malik MA, Gul W, Abrejo F. Cost of primary health care in Pakistan. Journal of Ayub Med Coll Abbottabad. 2015;27(1):88.

Malik MA, Khan MM. Economic Burden of Mental Illnesses in Pakistan. The journal of mental health policy and economics. 2016 Sep;19(3):155-66.

Malik MA, Iqbal SP, Abrejo F. Nature, scope, and use of economic evaluation of healthcare programmes: with special reference to Pakistan. The Journal of the Pakistan Medical Association. 2017;67(5):773.

Wasay M, Malik MA. A new health care model for Pakistan. The Journal of the Pakistan Medical Association. 2019 May;69(5):608.

Khan AJ, Malik MA. Regulation, quality reporting and third-party certification of healthcare providers. The Journal of the Pakistan Medical Association. 2020 Oct 1;70(10):1811-8.

Malik MA, Azam SI, Khan AJ, Chaudhry K and Rifaq F, Spatiotemporal variation, and socio-economic factors of financial hardships of out-of-pocket health expenditure (OPHE) in Pakistan, Eastern Mediterranean Health Journal, (Forth coming).

Student Research Work Publication

Khuwaja HM, Karmaliani R, Mistry R, Malik MA, Sikandar R. Factors Influencing Low Enrolment in a Community Based Health Insurance Scheme, Karachi, Pakistan: A Mixed Methods Case Study. Bangladesh Journal of Medical Science. 2021 Feb 1;20(2):293-301.

Ali A, Malik MA, Khan UR, Khudadad U, Raheem A, Hyder A A. Cost of head injuries caused by motorcycle crash among helmet users and non-users in a public tertiary care hospital of Karachi, Pakistan. Clinicoeconomics (Forth coming).

Research Projects and grants held

Aga Khan University, Faculty Development Award for PhD, 2015, US$ 22k.

Pakistan Health Research Council, Economic burden of Tobacco in Pakistan, PKR 1.5 million, 2018-2019, Co-investigator

Council Santé, France, European Union, Sustainability Plan, budget impact and exit strategy for Programme for Improved Nutrition in Sindh, Euro 10k, September 2019- March 2020, Principal investigator.

World Health Organization, Health Expenditure and Utilization Survey, District Thatta, December 2018-August 2019, PKR 1.4 million, Principal Investigator.

Aga Khan Foundation Pakistan and KfW, Germany, Field Assessment to Review and document key features of Social Health Protection Micro-Health Insurance Initiative - Gilgit- Baltistan, December 2020-April 2021, PKR 1.5 million, Principal Investigator.

NIHR and Queen Marry University, Economic Evaluation of Randomized Control Trial |Improving outcomes for people with psychosis in Pakistan and India – enhancing the Effectiveness of Community-based care (PIECEs), September 2019- December 2023, GBP 49K, Co-Investigator.

Guest lectures

Radiation oncology grand round titled "Equity and Efficiency in Healthcare": 14-05-2016.

Bioethics grand round, Hospital Advertisement: Information Sharing or Marketing: 29-04-2017.

Guest lectures on health economics, Institute of Business Administration Karachi, 6-02-2020.

Editorial Activities

Member Scientific Committee, International Health Economics Association, Biannual Congress 12-15 July 2015 Milan, Italy.

Member peer scientific review committee, Latin American conference, International Society for Pharmacoeconomics and Outcomes Research (2017).

Member peer scientific review committee, 20th Annual European Conference, International Society for Pharmacoeconomics and Outcomes Research 2017.

Member Education committee of the Asian Consortium, International Society for Pharmacogenomics and outcomes research (2011-2019).

Associate Editor, BMC Health Services Research (since September 2019).

Paper reviewed

Asia Pacific Journal of Public Health (2016), BMC Paediatrics (2016), Applied Health Economics and Health Policy (2017), Development in Practice (2017), Journal of Global health (2018), Global Health Research and Policy (2018), P J Review (2018), PLOS one (2014, 2017, 2018), BMJ Psychiatry (2019), BMJ Open (2020), BMC Health Services Research (2019, 2020), Dow University Journal (2020), Health Economic (2020), Heliyon Journal (2020), Pakistan Journal of Women Studies (2021)

Grant Reviews

Pakistan Health Research Council "Economic and Environmental Costs and Benefits of Paper Mulberry: A case study of Islamabad". October 2015.

Pakistan Health Research Council, "The Facility of Lady Health Workers in Federally Administrated Tribal Areas (FATA)" November 2015.

UK Medical Research Council, "Electronic record and performance management strategies for effective hypertension and diabetes scale-up in Pakistan". November 2018.

Pakistan Health Research Council, "Socio-Economic Determinants of Pre-school children nutritional status, A case study of rural areas of district Rahim Yar Khan, February 2018.

Curriculum Vitae

Ashar was born and raised in the walled city of Peshawar, Pakistan, He is a graduate of Islamia College, Peshawar with majors in Economics and Statistics. Later, he obtained an M.A. in Economics from Peshawar University. He joined the department of health as Planning Officer in 1998, where he continued till 2004 on various positions related to planning, budgeting, monitoring and evaluation of health programs of the government. In 2004, he moved to York, UK, to study health economics. After completing his studies, he decided to return to Pakistan. Initially, he spent some time with Federal Ministry of Health with an advisory role on healthcare financing. In 2008, he moved to Aga Khan University, Karachi on a faculty position where he is involved in academic activities related to his area of expertise. Since 2014 he is pursuing PhD in health economics at Erasmus University. His research interest is in health seeking and demand for health and lately in program evaluation.

Ashar loves travelling to un-explored areas, reading books, and listening to music of languages unknown to him. He has two daughters, Innaya (7 years) and Asna (5 year).

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