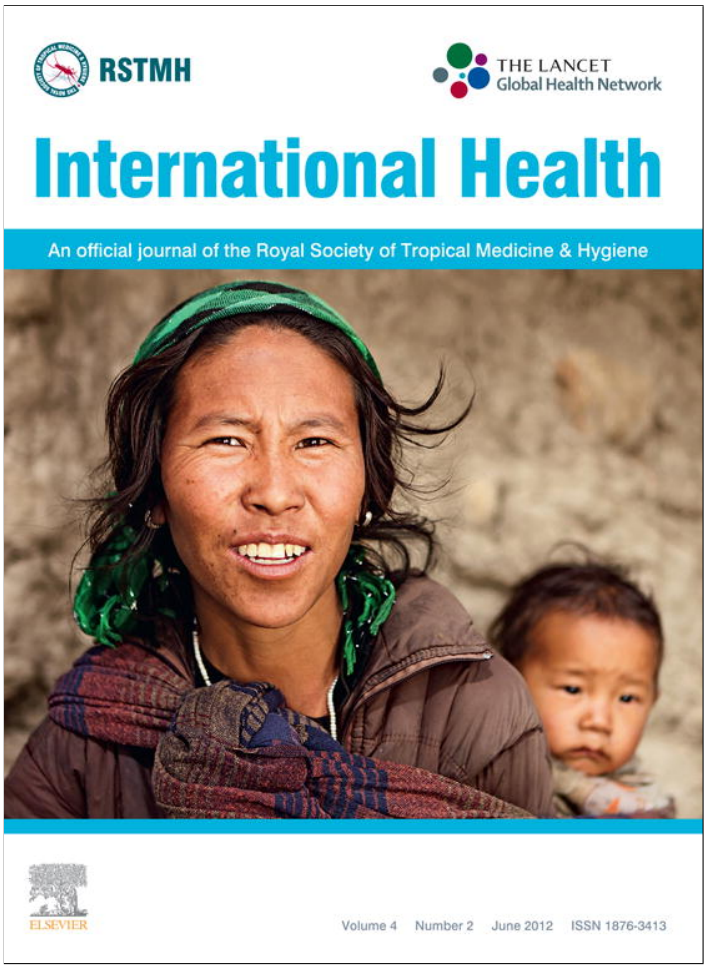

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The Maoist insurgency (1996–2006) and child health indicators in Nepal

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ABSTRACT

The association of conflict and child health indicators in Nepal was examined for the period of the Communist Party of Nepal–Maoist (CPN-Maoist) insurgency (1996–2006). National and subregional trends in neonatal protection against tetanus, measles and diphtheria–pertussis–tetanus (DPT) vaccine coverage, infant mortality, under-5 mortality, and proportion of underweight or stunted children were examined. During the period of the insurgency there were overall improvements in vaccination coverage; however, measles vaccine and DPT coverage remained static during several years of conflict. A decline in infant and under-5 mortality rates occurred: however, there were smaller improvements in stunting and underweight children. Improvements in health indicators from the Mid-western Hill subregion of the country, an area that was consistently conflict-affected, were less than those achieved nationally or by the less-affected Eastern Hill subregion. In comparison with Bangladesh and India, improvements in Nepal were the same or better, except for stunting and underweight children. Health interventions that are more easily delivered, such as vaccination, showed improvements, although the changes were less in a region of high conflict. Improvements in child nutrition indicators that necessitate multiple, coordinated interventions and access to at-risk populations over time as well as ongoing food security were not as successful. Continued commitment to development of systems for delivery of child health is important to gain improvements across all childhood health indicators.

1. Introduction

Countries in conflict and those undergoing political upheaval often have poor indicators of health. Such is true, for example, of Afghanistan, Myanmar, the Democratic Republic of Congo, Sudan and Sierra Leone.[1] Despite this, the relationship between the political situation of countries and trends in health indicators remains largely unexplored. Understanding the interaction between conflict and health could help determine whether there is cause to hope for improvement in a population's health despite the political situation. This study examined child health indicators during the period of the Communist Party of Nepal–Maoist (CPN-Maoist) insurgency in Nepal (1996–2006).

Nepal's 147 181 km^2 area is divided into five development regions (Eastern, Central, Western, Mid-western and Far-western), which are further divided into 14 regions and 75 districts. Topographically, its land falls into three distinct ecological categories: the mountains to the north; hilly areas in the central portion of the country; and the flat Terai in the south (Supplementary Figure 1A).[2] In 2006, nearly 85% of the 25.8 million population lived in less accessible rural areas. Nepal has a relatively high population growth rate (1.9% in 2005); hence, 13.1% of the population

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was under 5 years of age and 40.5% was under 14 years of age in 2006.[2,3] The gross national income per capita was US$1120 [Purchasing Power Parity (PPP) International] in 2008.[4]

The health system in Nepal closely follows the administrative divisions.[5] Each of the five regions has a Regional Hospital, Medical Store, Training Centre, Tuberculosis Centre and Laboratory, and each district has a Public Health Office to which health centres report. Thirteen of the 75 districts did not have a district hospital in 2006. District Primary Health Care Centres are served by Health Posts, which in turn are served by sub-Health Posts; at the base level are Outreach Clinics, female community health volunteers and other health workers.[6,7] Many maternal and child public health interventions are facilitated by non-governmental and international organisations. Much of the expenditure on health is private and mostly out-of-pocket.[6] Government health expenditure has never exceeded 13.7% of its total expenditure, including expenditure planned through the government health budget and all other health-related public monetary and non-monetary transactions.

Nepal was a monarchy until 1990 when widespread protest forced King Birendra to form a multiparty democracy. However, over the next 12 years the government changed as many times. In 1996, the CPN-Maoist insurgency began, with the goal of overthrowing the government and establishing a people's republic.[8] During the conflict, more than 12 000 people were killed, at least 200 000 were internally displaced and approximately 2 million fled to India.[5,9] Over time, the insurgency left no district untouched. However, the districts of Rolpa, Rukum, Jajarkot, Salyan and Kalikot in the hill and mountain areas of the Mid-western Region (Supplementary Figure 1) were greater strongholds than others and were where the CPN-Maoist insurgency began and parallel governments were established.[8,10,11] Ceasefires were agreed in 2001 and 2003 but were broken after a few months, and it was not until November 2006 that the civil war was declared over and the CPN-Maoists were formally accepted as part of the government.[12]

Political conflicts such as the CPN-Maoist insurgency can have profound implications for the development of a nation and hence the health of its population. In this context, children are a vulnerable group and are the most sensitive to situations of emergency.[13] Vaccination levels provide an indicator of health coverage, and monitoring of child nutritional and anthropometric statuses is a good measure of the health of the family. Therefore, national trends in measles and diphtheria–pertussis–tetanus (DPT) vaccine coverage, neonatal protection against tetanus, infant mortality, under-5 mortality, and the proportion of underweight or stunted children were examined over the insurgency period of 1996–2006 in order to explore a potential effect on child health in Nepal. Trends in health indicators were also compared between an area of Nepal consistently affected by the insurgency and areas that were relatively spared or not involved in the insurgency until the latter stages. Child health indicators were also compared with two other South Asian countries (India and Bangladesh).

2. Methods

To place trends into context, indicators were observed during the period 1990–2008 where possible. Specific health indicators were chosen because they represent standard measures of child health, were each available on a national and subnational basis for the time period of study, and some are used to determine progress towards achievement of Millennium Development Goal (MDG) 4. Data for national trends in Nepal, India and Bangladesh were obtained from the WHO's Global Health Observatory (GHO).[4] The WHO-GHO obtains data from national sources, household surveys, surveillance systems, international bodies such as UNICEF, and non-governmental organisations (NGO). Vaccine coverage data [neonates protected against tetanus at birth, and children under 1 year of age covered by a single dose of measles-containing vaccine or three doses of DPT (DPT3) vaccine] were obtained from the WHO-GHO for each year (1990–2008). Data for infant mortality rate [IMR; infant deaths (1 year of age or younger) per 1000 live births] and under-5 mortality rate (U5MR; probability of a child dying before reaching the age of 5 years) were available for the years 1990, 1995, 2000, 2005 and 2008. Data for children under-5 who were stunted or underweight were available for different years for each of the three countries. Health indicators were defined as per WHO standards.[4]

Gross national income per capita was obtained from the WHO-GHO database, and the health expenditure per capita was obtained from the World Bank.[14] These data were adjusted for PPP and were expressed in US dollars. Nepal foreign exchange data were from the Nepal Central Bureau of Statistics.[3]

The effect of the CPN-Maoist insurgency was examined on a subregional basis. The hill zone of the Mid-western region of Nepal was one of the earliest and most consistently conflict-affected areas throughout the insurgency period (Supplementary Figure 1B).[8,10,11,15] Indicators for this area were compared with urban areas such as the Kathmandu Valley, and the hill zone of the Eastern region, which were relatively spared of conflict or affected only in the latter stages (Supplementary Figure 1B).[8] Regional and subregional child health indicators (IMR, U5MR, vaccine coverage) as well as information on female education, fertility and antenatal care were obtained for the years 1996, 2001 and 2006 from the Nepal Family Health Survey (NFHS) (1996) and the Nepal Demographic and Health Surveys (NDHS) (2001 and 2006).[2,16,17] The NFHS and NDHS are standardised, nationally representative surveys on population and health indicators. The 1996 NFHS obtained information for 8429 women aged 15–49 years in 253 primary sampling units; the 2001 NDHS obtained information for 8726 women in 251 sampling units and the 2006 NDHS obtained information for 10 793 women in 260 units. Owing to ongoing conflict, six areas in the Mid-western Hills could not be sampled in the 2001 NDHS. Subregional child nutrition indicators were available for the years 1997/1998 (Nepal Micronutrient Status Survey, national sample size 17 471 children aged 0.5–5.0 years)[18] and 2006.[2] Poverty rates were obtained from the World Bank[15] and remittances were obtained from the Nepal Living

Standards Surveys (NLSS).[19,20] The NLSSs are standardised, nationally representative household surveys on the extent and determinants of poverty. For the 1996 NLSS, 3376 households were surveyed in 274 units, and for the 2003/04 NLSS, 3912 households were surveyed in 326 units.

3. Results

3.1. General and socioeconomic indicators in Nepal

Tourism is a significant source of Nepal's income. During the insurgency, gross foreign exchange earnings experienced two periods of decline of up to 23.8%: one from US$166.8 million in 2000 to US$106.8 million in 2002; and the other from US$179.9 million in 2004 to US$148.4 million in 2005.[3] Despite this, the gross national income per capita rose from US$510 in 1990 to US$1120 in 2008 (PPP international), an increase of 119.6% (Figure 1). This compares with a 240.7% increase in India and a 190.0% increase in Bangladesh. Some of this variation in foreign exchange from tourism could have been balanced by remittances from within Nepal and from Nepalis working in other countries.[21] These remittances accounted for 13.8% of gross domestic product (GDP) in 2006/2007 and increased substantially from 625 Nepalese rupees (NRs) per capita in 1996 to 2100 NRs in 2003/2004.[19,20,22] In addition, apart from tourism, most of Nepal's growing economy is located within the capital, Kathmandu, which was not as affected by the insurgency compared with rural areas.

The per capita expenditure on health from public and private sources is demonstrated in Figure 2. For Nepal, in 1998 it reached US$47.49 (PPP International), then declined until 2004, when it increased through 2008. Total expenditure on health in Nepal was greater than that of Bangladesh but less than for India (Figure 2).

3.2. Child health indicators in Nepal

The proportion of neonates protected against tetanus increased steadily until 2003, with an overall increase from 35% coverage in 1990 to 81% coverage in 2008 (131.4% increase) (Figure 3). Measles vaccine coverage at 12 months increased from 57% in 1990 to 79% in 2008 (38.6% increase). After reaching 81% coverage in 1999 it declined into the 70%s until 2006. DPT3 coverage increased by 90.7% over the entire period 1990–2008, but varied between 65% and 80% coverage in the years 1996–2005.

From 1990 to 2008, the IMR declined from 99 deaths per 1000 live births to 41 deaths per 1000 live births, a 58.6% decrease (Figure 4). This is mirrored by the U5MR, which

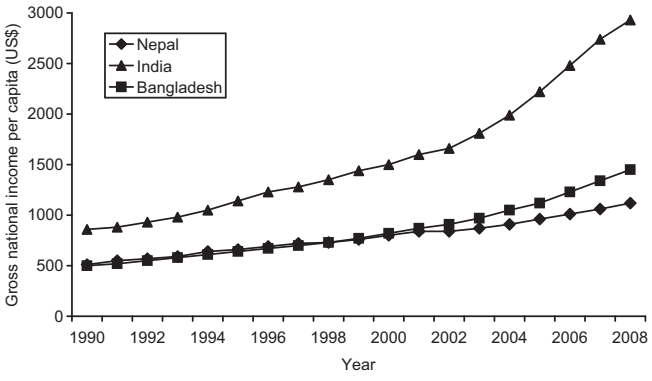

Figure 1. Annual gross national income per capita of Nepal, India and Bangladesh, 1990–2008. Figures expressed as Purchasing Power Parity dollars. Data from the WHO's Global Health Observatory.[4]

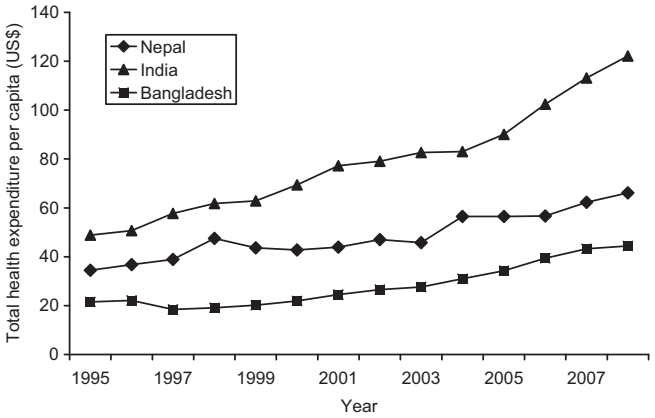

Figure 2. Total health expenditure per capita for Nepal, India and Bangladesh, 1990–2008. This represents the sum of public and private health expenditures as a ratio of total population. Figures expressed as Purchasing Power Parity dollars. Data from the WHO's Global Health Observatory.[4]

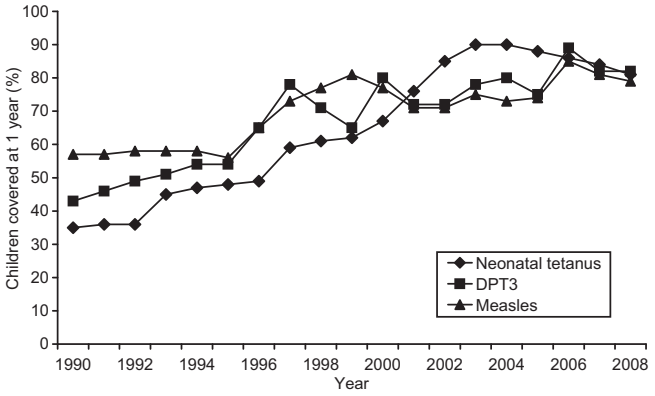

Figure 3. Proportion of neonates protected at birth against tetanus, and measles and diphtheria–pertussis–tetanus (three doses; DPT3) vaccine coverage among 1 year olds in Nepal, 1990–2008. For tetanus protection, all potential doses of tetanus received by childbearing women are calculated.[4] Data from the WHO's Global Health Observatory.[4]

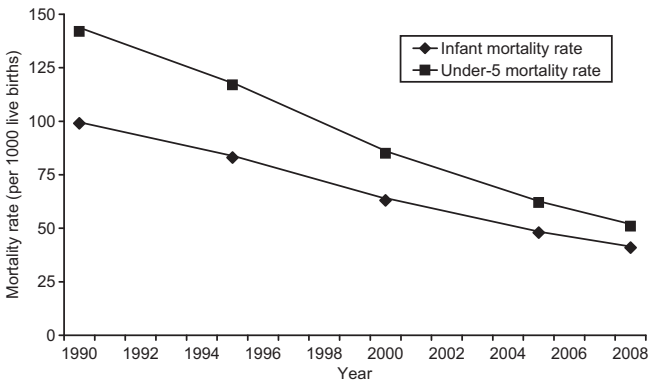

Figure 4. Infant mortality rate and under-5 mortality rate in Nepal, 1990–2008. Data from the WHO's Global Health Observatory.[4]

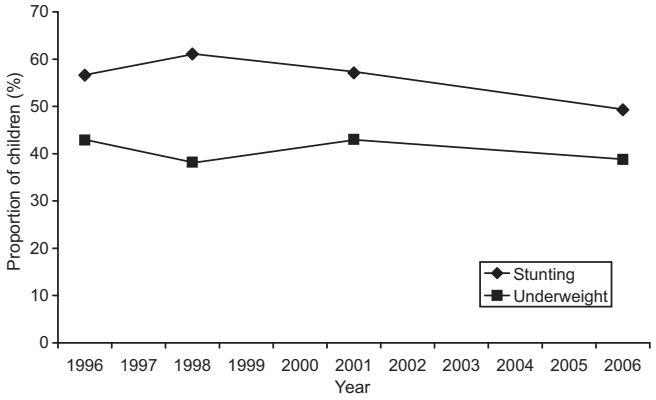

Figure 5. Child nutrition parameters of stunting and underweight in Nepal, 1996–2006. Underweight children were defined as having a weight-for-age *Z*-score of ≤−2 and stunted children were defined as having a height-for-age *Z*-score of ≤−2. Data from the WHO's Global Health Observatory.[4]

decreased 64.6% from 144 deaths per 1000 live births in 1990 to 51 deaths in 2008.

There were smaller improvements in the proportion of children under-5 who were stunted or underweight from 1996–2006 (Figure 5). Over the period, there was a 12.9% decrease in the percent of children stunted (56.6% in 1996 to 49.3% in 2006) and a 9.6% decrease in underweight children (42.9% in 1996 to 38.8% in 2006).

3.3. Comparison with child health indicators in Bangladesh and India

In comparison with Bangladesh and India (Figure 6), improvements in childhood vaccination from 1990 to 2008 were equal to or greater than those of the other two countries. Percent declines in childhood mortality over the same period were similar to Bangladesh and larger than for India, with IMR and U5MR, respectively, in 2008 of 41 and 51 for Nepal, 43 and 54 for Bangladesh and 52 and 69 for India. Improvements in the percentage of children who were stunted or underweight for 1996–2006 were less

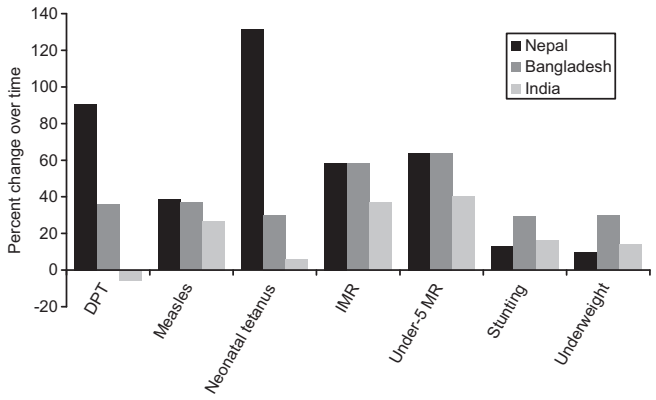

Figure 6. Child health indicators for Nepal, Bangladesh and India. The percent change over time is charted. For DPT3 (three doses of diphtheria–pertussis–tetanus vaccine), measles, neonatal tetanus and child mortality, the time period is 1990–2008. For stunting and underweight, the time period is 1996–2006 for Nepal and Bangladesh and 1993–2006 for India. IMR: infant mortality rate; under-5 MR, under-5 mortality rate. Data from the WHO's Global Health Observatory.[4]

in Nepal, although the actual percentages for 2006 were similar between the three countries: percent stunted and underweight, 49.3% and 38.8% for Nepal; 47.0% and 39.8% for Bangladesh; and 47.9% and 43.5% for India.

3.4. Child health indicators between subregions in Nepal

Table 1 presents selected social and health indicators for Nepal by national and subnational assignments for the years 1996–2006. The most conflict-affected area, the Mid-western Hill subregion, is compared with indicators on a national basis as well as those for two additional subregions: urban areas that were relatively unaffected by the insurgency, and the Eastern Hill subregion that was conflict-affected only in the latter stages of the insurgency.

Absolute improvements in poverty rate and female secondary education were similar between National, Mid-western Hill and Eastern Hill area (Table 1). The Mid-western Hill subregion achieved greater improvements in fertility rate than either that achieved nationally or by the Eastern Hill subregion as well as higher gains than the Eastern Hill subregion in antenatal care. However, in 2006, for each indicator the Mid-western Hill area had measurements that were worse than national indicators. Except for antenatal care, the indicators were also worse than those for the Eastern Hill. In 2006, the Mid-western Hill subregion had a higher percentage that was poor, fewer women achieving some secondary education and a higher birth rate. For all indicators, urban areas demonstrated improved socioeconomic and health status compared with national and subregional data.

Figure 7 demonstrates the percent changes in health indicators between national and subregional areas. The improvement in each indicator, except measles vaccination coverage, was less in the Mid-western Hill subregion than that achieved nationally or in the Eastern Hill subregion

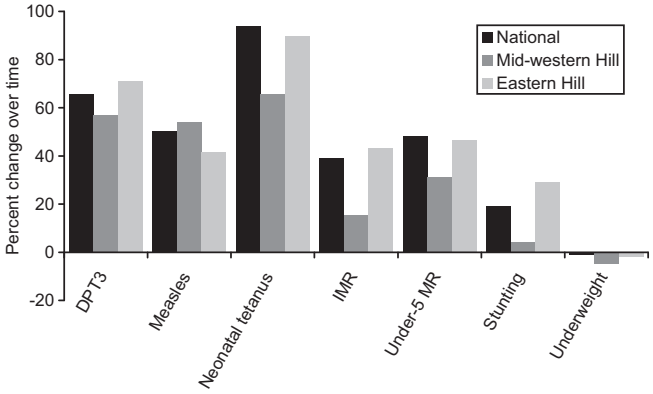

Figure 7. Child health indicators in Nepal by national and subregion areas. The percent change over time is charted. The Mid-western Hill subregion was consistently affected by the Communist Party of Nepal–Maoist (CPN-Maoist) insurgency and the Eastern Hill subregion was affected in the latter stages of the insurgency. For DPT3 (three doses of diphtheria–pertussis–tetanus vaccine), measles, neonatal tetanus and child mortality the time period is 1996–2006, with data from the Nepal Family Health Survey[17] and the Nepal Demographic and Health Surveys (NDHS).[2,16] For stunting and underweight the time period is 1997/1998–2006, with data from the Nepal Micronutrient Status Survey[18] and the NDHS.[2] IMR: infant mortality rate; under-5 MR: under-5 mortality rate.

Table 1
Comparison of socioeconomic and child health indicators for Nepal between national, urban and two subregions (Mid-western Hill that was consistently affected by the CPN-Maoist insurgency; and Eastern Hill that was affected in the latter stages of the insurgency)

Parameter	Year	Region			
		National	Urban	Mid-western Hill	Eastern Hill
Poverty rate (%)[a,15]	1995/1996	41.8	21.6	59.9	38.9
	2003/2004	30.9	9.6	44.8	29.3
Decrease in poverty rate		10.9	12.0	15.1	9.6
% decrease in poverty rate		26.1	55.6	25.2	24.7
Female secondary education (%)[b,2,16,17]	1996	8.0	19.5	3.1	8.7
	2001	9.3	23.9	4.9	8.4
	2006	20.6	27.8	19.9	24.4
Increase in female education		12.6	8.3	16.8	15.7
% increase in female education		157.5	42.6	541.9	180.5
Total fertility rate[c,2,16,17]	1996	4.6	2.9	5.5	4.1
	2001	4.1	2.1	4.7	3.8
	2006	3.1	2.1	3.5	3.1
Decrease in total fertility rate		1.5	0.8	2.0	1.0
% decrease in total fertility rate		33.2	26.3	36.0	24.6
Antenatal care (%)[d,2,16,17]	1996	23.6	66.2	9.7	19.0
	2001	27.9	74.7	7.4	29.8
	2006	43.7	84.6	28.7	26.5
Increase in antenatal care		20.1	18.4	19.0	7.5
% increase in antenatal care		85.2	27.8	195.9	39.5
DPT3 vaccination (%)[2,16,17]	1996	53.5	77.4	46.8	51.5
	2001	72.1	78.2	75.0	86.3
	2006	88.6	92.2	73.4	88.1
Increase in DPT3 coverage		35.1	14.8	26.6	36.9
% increase in DPT3 coverage		65.6	19.1	56.8	71.1
Measles vaccination (%)[2,16,17]	1996	56.6	77.2	50.8	60.4
	2001	70.6	80.6	77.5	76.5
	2006	85.0	88.9	78.2	85.5
Increase in measles coverage		28.4	11.7	27.4	25.1
% increase in measles coverage		50.2	15.2	53.9	41.6
Neonatal tetanus protection (%)[e,2,16,17]	1996	32.6	48.3	23.6	23.7
	2001	45.3	67.3	25.0	39.4
	2006	63.2	72.4	39.1	45.0
Increase in neonatal tetanus protection		30.6	24.1	15.5	21.3
% increase in neonatal tetanus protection		93.9	49.9	65.7	89.9
IMR[2,16,17]	1996	78.5	61.1	114.8	79.4
	2001	64.4	50.1	72.9	77.5
	2006	48.0	37.0	97.0	45.0
Decrease in IMR		30.5	24.1	17.8	34.4
% decrease in IMR		38.9	39.4	15.5	43.3
U5MR[2,16,17]	1996	118.3	82.2	177.8	112.8
	2001	91.2	65.9	111.0	104.8
	2006	61.0	47.0	122.0	60.0
Decrease in U5MR		57.3	35.2	55.8	52.8
% decrease in U5MR		48.4	42.8	31.4	46.8
Stunting (%)[2,18]	1997/98	61.1	44.2	68.3	59.7
	2006	49.3	36.3	65.4	42.4
Decrease in stunting		11.8	7.9	2.9	17.3
% decrease in stunting		19.3	17.9	4.2	29.0
Underweight (%)[2,18]	1997/98	36.2	23.0	43.8	32.7
	2006	38.6	23.2	45.8	33.3
Decrease in underweight		2.4	0.2	2.0	0.6
% decrease in underweight		1.0	0.9	4.6	1.8

Note: For most indicators, the dates compared are between 1996 and 2006. Indicators are defined according to WHO standards,[4] with clarifications noted. CPN-Maoist: Communist Party of Nepal–Maoist; DPT3: three doses of diphtheria–pertussis–tetanus vaccine; IMR: infant mortality rate; U5MR: under-5 mortality rate.

[a] Poverty rate determined using the Cost of Basic Needs method.[15] The poverty rate is for the entire region (Mid-western and Eastern).

[b] Women aged 15–44 years who have achieved some secondary education.

[c] Total fertility rate is the number of live births/1000 women aged 15–49 years. The fertility rate is for the entire region (Mid-western and Eastern).

[d] Antenatal care indicates the percentage of women aged 15–49 years with antenatal care from a skilled birth attendant (doctor, nurse, midwife) for last pregnancy.

[e] Two or more doses of tetanus vaccine received during the last pregnancy.

(Table 1; Figure 7). In addition, the 2006 vaccine coverage, child mortality rates, and percent stunted and underweight were all poorer than the other three comparison areas (national, urban and Eastern Hill) (Table 1).

4. Discussion

Political insurgency can have profound social, economic and health impacts. In Nepal, the tourism industry on

which Nepal depends to contribute to its gross national income, declined, most likely influenced by the Maoist insurgency.[23] Many professionals, including physicians, left the country contributing to a brain drain, and health worker numbers remained static during many of the conflict years.[5,24,25] In addition, accessibility has always been an issue owing to the country's diverse topography and weak infrastructure. The conflict made it increasingly difficult and in many cases dangerous to reach rural areas most in need of health interventions.[5,9,11,26,27] Health posts attached to village development offices were destroyed, transportation shutdowns affected the supply of medication to districts, foreign aid workers and NGOs were frequently limited in their access to remote areas, and security needs cut into the government's health budget.[11,26,28,29] Despite these challenges, Nepal saw overall gains in the decline in poverty, education of women, decline in the fertility rate, and access to prenatal services with a skilled birth attendant (Table 1).

The association of conflict during the CPN-Maoist insurgency with the health of the most vulnerable population, namely children, was explored for several indicators of child health. Prevention of neonatal tetanus, vaccination against measles and DPT, and childhood mortality all improved during the period of the insurgency (1996–2006), particularly for interventions that are more easily delivered such as vaccination (Figures 3 and 4). Although immunisation services were largely supported by the CPN-Maoists,[9,27] disruptions to infrastructure and rural access would have made supply of vaccines and delivery of services difficult. Vaccine coverage against DPT and measles did remain relatively static for several years during the conflict. Nevertheless, Nepal demonstrated equal or better gains in vaccine coverage and child mortality compared with Bangladesh and India (Figure 6). Of South Asian countries, Nepal has demonstrated the most progress towards achieving MDG4 of reducing child mortality by two-thirds.[30,31]

Health indicators that measure long-term and multifactorial nutritional changes and that necessitate multiple, coordinated interventions and access to at-risk populations over time as well as stable food security are stunting and the percent of children underweight.[32,33] There were smaller gains for children in stunting and underweight over the period of the insurgency; gains that were less than those achieved in Bangladesh (Figure 6). This suggests a lack of adequate nutrition throughout the 1990s and mid 2000s. The conflict could have affected food security by restriction of food production through the out-migration of labour, depletion of food stocks, interruption of the movement of goods and market trading, and disruption of development projects such as irrigation. Food insecurity would also lead vulnerable families to compromise on their nutritional intake.[34,35]

To examine more closely the potential impact of the conflict, the Mid-western Hill subregion was compared with Nepal as a whole and with the Eastern Hill subregion (Supplementary Figure 1; Table 1; Figure 7). The Mid-western Hill region had extensive damage to infrastructure and government buildings, disruption to livelihoods, and high casualty levels.[8,11] The highest number of killings in Nepal during the conflict was recorded in two of the districts in this region, Rukum and Rolpa. In the Mid-western Hills, except for measles, there were smaller improvements in all child health indicators (Table 1; Figure 7) and the absolute levels achieved in 2006 were lower when compared nationally or with the Eastern Hills (Table 1). It was not until 2006 that >10% of pregnant women had antenatal care with a skilled birth attendant (Table 1).

These findings suggest a correlation between the intensity of the insurgency and adverse effects upon health. However, poorer areas of Nepal were targeted by the insurgents[8,27] and these areas were also those that were most vulnerable to food insecurity.[11,34–36] Thus, poor health indicators in this subregion may reflect conditions existing prior to the insurgency. Nevertheless, the Mid-western Hill region had the triple challenge of conflict, poverty and food insecurity; conflict during the CPN-Maoist insurgency potentially affected population health through direct disruption of health services and food security.

We have reviewed child health indicators and posited an argument that the decade-long conflict of the CPN-Maoist insurgency contributed to smaller health gains and interventions requiring complex, long-term support, particularly in more conflict-affected areas. There are limitations to this argument, as not all factors that could affect health were examined in this study and much of the analysis was qualitative. In addition, the data used came from multiple sources, e.g. national surveys, regional Nepali reports and WHO sources, and have often used different methodologies, especially making comparisons between countries difficult.

Nepal has made important gains in child health despite its period of insurgency. Nevertheless, its levels of malnutrition as determined by children stunted and underweight rank it towards the bottom of the world's countries (7th worst for underweight and 12th for stunting).[37] In order to build upon its progress, it will be necessary to take advantage of the opportunities afforded by the comprehensive peace agreement now in place[38] as well as improved engagement with the international community.[39] Nepal also needs to continue to address gaps in public health with investment in health systems, especially those that reach the rural poor, and to provide training, support and deployment of skilled health workers.[5,15,40] Pursuing these options should provide ongoing hope for the health of Nepal's children.

Authors' contributions: UP conceived the idea, gathered the data on socioeconomic and childhood indicators for Nepal, Bangladesh and India, wrote the first draft, and reviewed and approved all subsequent drafts; DRH extensively revised the draft and added new data on indicators in areas of conflict within Nepal. Both authors read and approved the final manuscript. DRH is guarantor of the paper.

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Ethical approval: Not required.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.inhe.2011.12.004.

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