



ReBUILD
Consortium

Key health and conflict related indicators in Liberia and Sri Lanka

Background report

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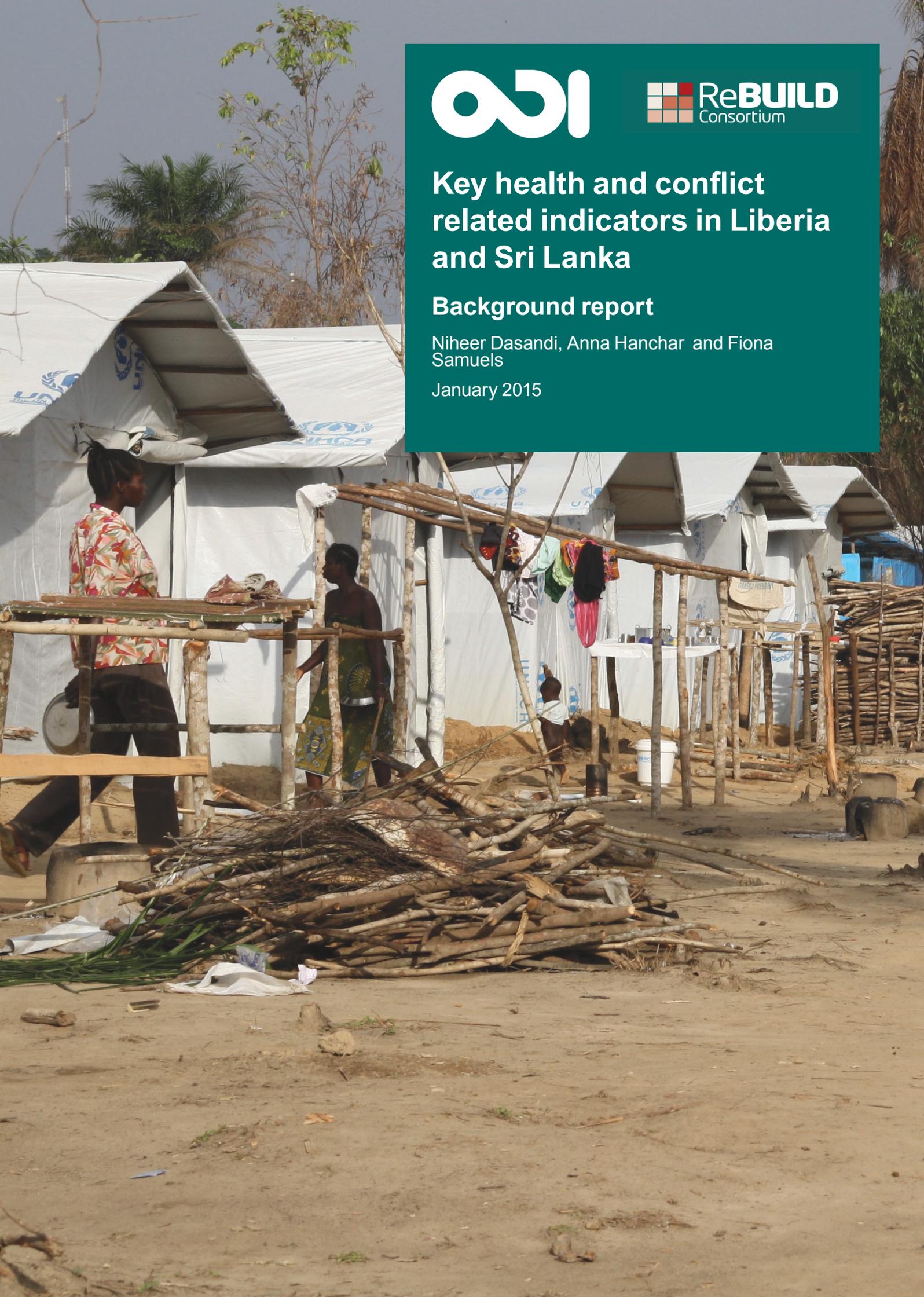


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Abbreviations

UCDP GED	Uppsala Conflict Data Program's Georeferenced Event Dataset
IMF GFS	International Monetary Fund Government Finance Statistics
DHS	Demographic and Health Surveys
COFOG	Classification of the Functions of Government
OECD	Organisation for Economic Cooperation and Development
BBC	British Broadcasting Corporation
WDI	World Development Indicators dataset collection
WHO	World Health Organisation
UNICEF	United Nations Children's Fund
UN DESA	United Nations Department of Economic and Social Affairs
HDI	Human Development Index
UNDP	United Nations Development Programme
GNI	Gross National Income
PPP	Purchasing Power Parity
USD	United States Dollars
HI	Health Index captures the health dimension in UNDP HDI

1 Quantitative analysis: terms of reference

1. Provide an analysis of the broader context in Liberia and Sri Lanka with regard to the impact of the conflicts on health more generally, and on the provision of health services.
2. Consider whether the processes uncovered in the qualitative analysis are broadly-speaking in line with general trends in the regions considered. This will enable greater light to be shed on other factors that may be linked to the issues considered in the qualitative analysis (e.g. understanding general trends regarding how adolescent girls were impacted by the conflict).
3. Analyse the financial landscape of the health systems in the two countries in order to ascertain the availability of funds to implement approaches that result from the study.

A key task in conducting the quantitative analysis will be to identify data sources and to collect relevant data.

2 Assessing availability of subnational data

As discussed in TORs, much of the analysis for this project was planned at the subnational level and required data for both Liberia and Sri Lanka for the key relationship between conflict and health and wellbeing outcomes. Several possibilities to identify data sources for these variables were investigated.

Datasets Reviewed

The datasets considered for the purpose of this project included:

- Uppsala Conflict Data Program's Georeferenced Event Dataset (UCDP GED)
- Social Conflict in Africa Database
- IMF Government Finance Statistics (IMF GFS)
- Demographic and Health Surveys (DHS)

2.1 Uppsala Conflict Data Program's Georeferenced Event Dataset (UCDP GED)¹

The Uppsala Conflict Data Program's Georeferenced Event Dataset (UCDP GED) is considered to be the most reliable, widely used and complete geo-tagged conflict subnational data dataset in academic and policy research (Eck 2012). The dataset only covers African countries and thus does not include South Asia (Sri Lanka). The UCDP GED is an event-based and georeferenced dataset on organised violence, covering three basic UCDP categories of violence: (1) state-based conflict, (2) non-state conflict, and (3) one-sided violence. The dataset covers organised violence events in Africa between 1989 and 2010 at the level of the individual event of violence. The baseline of events is coded from the media reports, and subsequently expanded to integrate information from case-specific sources like “UN and local and international NGO reports, Truth and Reconciliation Commissions, Wikileaks documents, and case-oriented research to supplement the data” (Eck 2012, 136). UCDP GED defines an event “the incidence of the use of armed force by an organized actor against another organized actor, or against civilians, resulting in at least one direct death in either the best, low or high estimate categories at a specific location and for a specific temporal duration” (Sunderberg et al., 2010). The UCDP GED dataset includes only events for conflict (or actor)-years that reach the threshold of 25 deaths per year. UCDP collects data on all fatalities in collective violence but does not make public those which do not conform to its definitional specifications (Eck 2012, 138).

There are only 550 events relating to Liberia in UCDP GED covering the period from 1989 to 2004 (both civil wars), with 416 events covering the first civil war and 134 events covering the second civil war. In total 550 events report the estimate of casualties at 27,209, with about 25 per cent of casualties coming from the region in and around the capital Monrovia (Montserrado county; Table 1).

At the same time, the conservative estimate of the deaths reported by BBC’s Liberia profile for the same period was 250,000². This makes UCDP GED unreliable with clear reporting bias.

¹ <http://www.ucdp.uu.se/ged/data.php>

² <http://www.bbc.co.uk/news/world-africa-13729504>

Table 1: Liberia: Casualties data by county (Source: UCDP GED)

adm1	year																Total
	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	
Bomi		3	5	461		518	66	1000	9			26		251	40		2379
Bong		30	1	1542	142	2868	300							240	42		5165
Gbarpolu													7	110			117
Grand Bassa		249		1	28	50	84	4							68	4	488
Grand Cape Mount		6	6	32		38	175	61						10	24		352
Grand Gedeh		42	201			22	36	14							14		329
Grand Kru						110	34	4									148
Lofa		531	47	2	1935	158	27				50	75	462	1465	902		5654
Margibi		1014			601		150							5			1783
Maryland		3		25		189	71	4		13						66	358
Montserrado		1627	8	42		66	74	3001						1	1819		6638
Nimba		45	468	1	21	276						7	1	25			844
River Cess			1		127	199	1201										1528
River Gee						31	1								370		402
Sinoe		298	13		42	603	61								7		1024
Total	45	4272	281	2106	2896	5128	2280	4088	9	13	50	101	476	2083	3377	4	27209

2.2 Social Conflict in Africa Database³

An alternative dataset mentioned in the original TORs is the Social Conflict in Africa Database (SCAD), which covers 114 geo-referenced events in Liberia. The events span the period from 1989 to 2012, with the number of events during both civil wars limited to 71. The definition of events and data collection methodology is similar to UCDP GED discussed above. However, in contrast to UCDP GED the scope of the SCAD project are protests, riots, strikes, inter-communal conflict, government violence against civilians, and other forms of social conflict (Hendrix and Salehyan, 2014).⁴ Given the low number of events reported for Liberia in SCAD, we view this dataset as being unable to provide sufficiently reliable data for the analysis of subnational level conflict related data.

2.3 IMF Government Finance Statistics (IMF GFS)

A possibility of using several additional datasets to look at the composition of health expenditure and its relationship with health outcomes was also explored.

Expenditure disaggregation is required to analyse effectiveness of financing specific health programmes. The most effective analysis would necessitate disaggregation by project. However, disaggregation by designated purpose of expenditure (e.g. health care staff salaries, malaria campaign etc) would also provide valuable information.

For this reason, the IMF Government Finance Statistics database, available from the UK Data Service, was examined for data on expenditure composition by purpose. IMF GFS contains data on outlays by functions of government, also known as the Classification of the Functions of Government (COFOG) developed by OECD. IMF GFS COFOG contains data on health expenditure broken up into medical products, appliances and equipment; outpatient services; hospital services; public health services; R&D health; and health n.e.c.

The analysis of disaggregated health expenditure would have allowed assessing government priorities, including policy priorities, and the impact of these policies on health outcome indicators. However, the data for both Liberia and Sri Lanka are missing for all years in our sample. This is flagged here since the dataset is updated regularly and it might prove useful for future projects. Ideally, governments of Sri Lanka and Liberia should be urged to submit data to IMF to increase transparency and allow for designing impact evaluation studies.

The only data on disaggregated health care expenditure is available by source of funds coming into the Treasury. This data are provided in the World Development Indicators dataset collection, where they are disaggregated into public, private and externally provided expenditure categories. The last section of this report - 'Composition of Health Expenditure: Private vs. Public' - focuses on this analysis.

³ <https://www.strausscenter.org/scad.html>

⁴ <https://www.strausscenter.org/codebooks/SCAD%203.0%20Codebook.pdf>

2.4 Demographic and Health Surveys (DHS)

Demographic and Health Surveys (DHS)⁵ data were also considered. Although the standardised surveys were administered in both Sri Lanka and Liberia, the government of Sri Lanka refused to release the data and the results are currently unavailable. This makes it impossible to compare the results with the data for Liberia, and hence DHS data was not used in the analysis below. Here, again, the government of Sri Lanka should be urged to release the data and thus make comparative analysis possible.

2.5 Data Collections Used: World Development Indicators dataset collection (WDI) and Google Public Data

The lack of data due to the issues listed above makes it impossible to investigate conflict-related variables at subnational level. Furthermore there is no comparable geo-tagged (and consequently subnational) data available for the conflict in Sri Lanka. As a result, the study used the World Development Indicators dataset collection (WDI)⁶ and the Google Public Data⁷ datasets, both of which offered reliable data (as the collection keeper the World Bank undergoes data cleaning and verification before publishing the data) and comparable data coverage for both cases. Moreover, Google Public Data, which is a collection of 130 datasets including WDI, allows clear and crisp visualisation of the data and can be effectively used in the exploratory stage of data analysis.

In relationship to this project, WDI contains a set of health related indicators drawn from WHO, UNICEF, UN DESA Population Division, and the World Bank. The dataset also contains several indicators of conflict. One of them - “Battle-related deaths” – covers the Uppsala Conflict Data Program briefly discussed above. Another one - “Internally displaced persons” - comes from Internal Displacement Monitoring Centre. Data on health expenditure, and health expenditure composition comes from WHO National Health Account database.

⁵ <http://www.dhsprogram.com/>

⁶ <http://data.worldbank.org/data-catalog/world-development-indicators>

⁷ <https://www.google.com/publicdata/directory>

3 Impact of conflict on health and provision of health services

To explore the effect of conflict on health and health outcomes the data for Liberia and Sri Lanka were extracted from the World Development Indicators dataset collection. First, the Human Development Index (HDI) and specific health measures from World Development Indicators dataset collection were used to review health and health outcomes' trends in both countries. Second, two consistent and comparable across two countries measures of conflict were collected and analysed. Third, conflict effects were related to trends in health outcome measures.

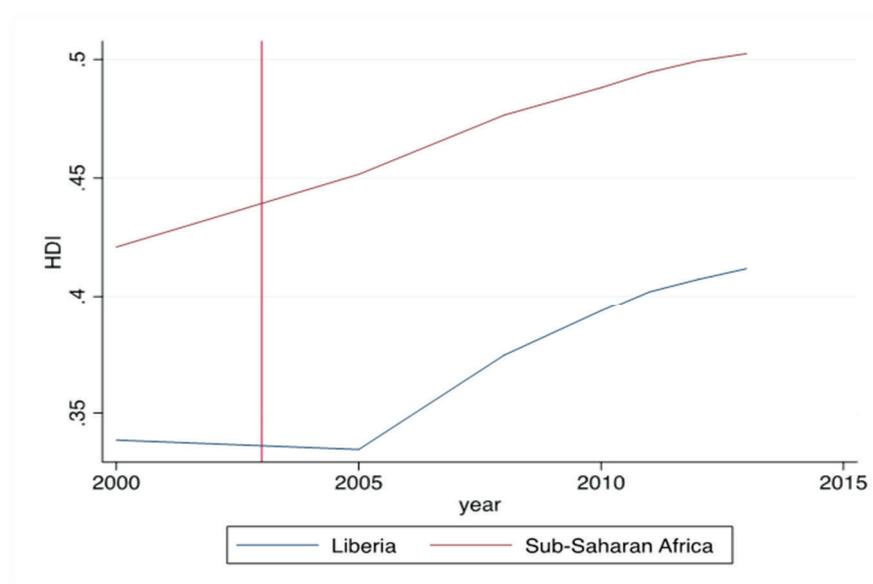
3.1 Effects of Conflict on Human Development Index (HDI)⁸

HDI developed by the UNDP is a composite index of life expectancy, education (mean years of schooling and expected years of schooling), and income (GNI per capita, PPP USD). The index can be considered a broad summary measure of wellbeing. HDI data was visualised as a broad, summative overview of the situation in both countries, linking it to broad periods of conflict.

3.1.1 Liberia

HDI index for Liberia and aggregate HDI index for Sub-Saharan Africa are plotted on Figure 1. Vertical line indicates the official end of the second civil war in Liberia.

Figure 1: HDI for Liberia and Sub-Saharan Africa



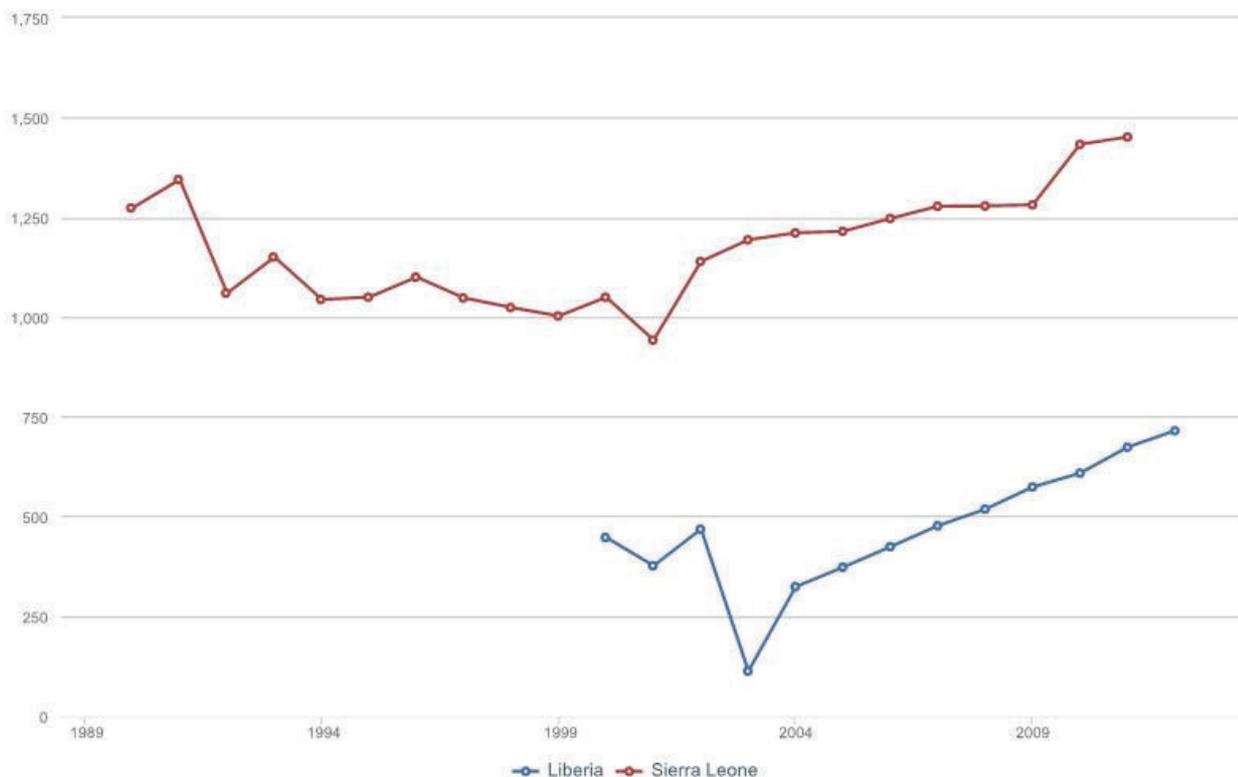
⁸ <http://hdr.undp.org/en/content/human-development-index-hdi>

It is important to note that although HDI is generally available from 1980, for Liberia the data are available only from 2000. This means that comparing pre-conflict with the post-conflict periods is not possible. However, even with this limited data the effect of civil war is evident. A dramatic increase in HDI and the trend of convergence (albeit slow) with the average level of HDI in Sub-Saharan Africa are corresponding with the end of the conflict.

Since there is no data for the before- and after-conflict period, Liberian HDI can be compared to another country with similar trends (e.g. similar levels of conflict and initial socio-economic positions). At the same time it is important to note that any comparison remains tentative, reflecting uniqueness of each case.

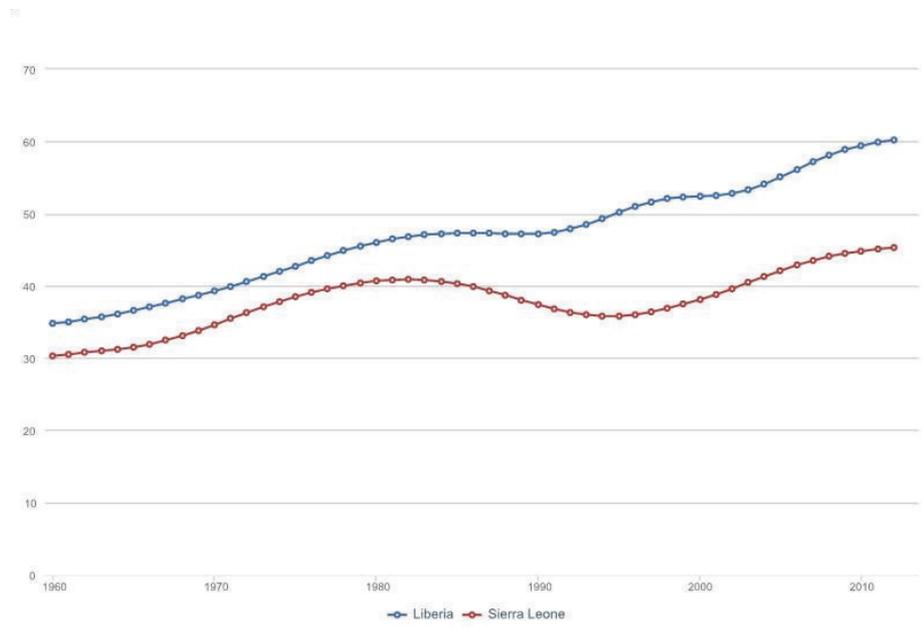
Sierra Leone seems like a good case - between 1991 and 2001 the country had undergone civil war (comparing with the civil wars in Liberia between 1980 and 2003). The comparison plots for variables most closely related to the HDI components for the two countries presented below also suggest the comparability and show that Sierra Leone can serve as a comparative case for the analysis of the effect of conflict in Liberia on wellbeing (as captured by HDI). Income data (Figure 2) shows that for the available years Sierra Leone had higher income levels than Liberia, although, again, Liberian data is missing before 2000. At the same time, life expectancy at birth is much more comparable (and available for longer period of time), with Liberia having higher levels than Sierra Leone (Figure 3). Educational data is only sporadically available and both countries are roughly comparable over the whole period (Figure 4).

Figure 2: Comparison of GNI per capita for Liberia and Sierra Leone



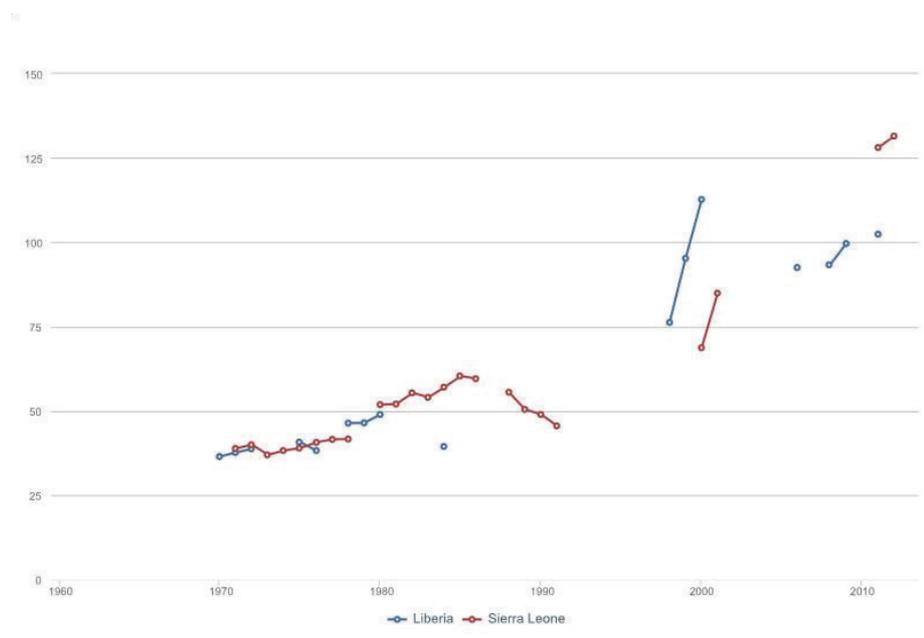
Series : GNI per capita, PPP (constant 2011 international \$)
 Created from: World Development Indicators
 Created on: 08/04/2014

Figure 3: Comparison of Life expectancy at Birth for Liberia and Sierra Leone



Series : Life expectancy at birth, total (years)
 Created from: World Development Indicators
 Created on: 08/04/2014

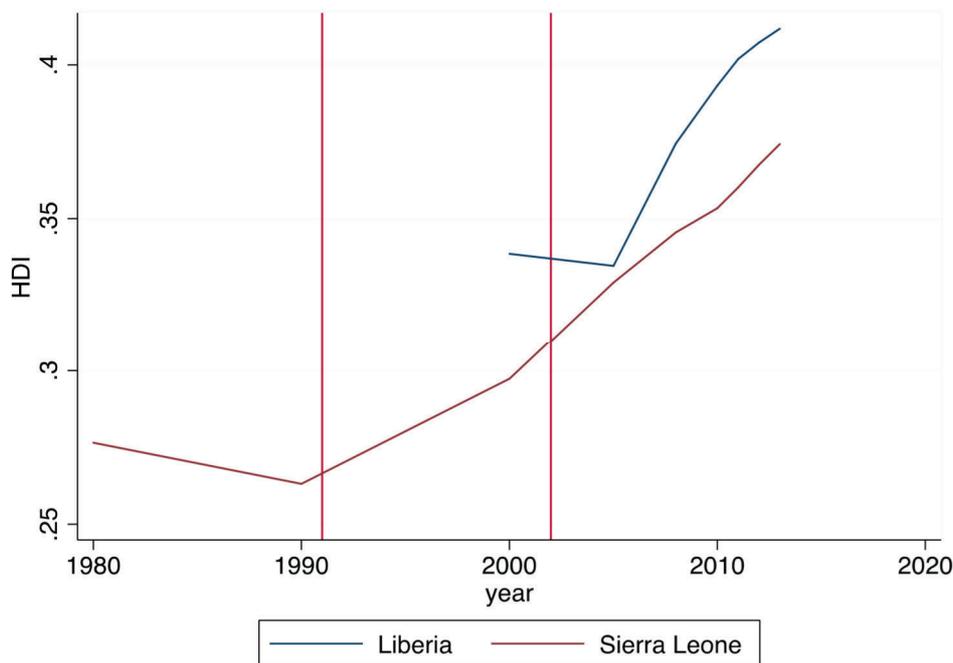
Figure 4: Comparison of School enrolment for Liberia and Sierra Leone



Series : School enrollment, primary (% gross)
 Created from: World Development Indicators
 Created on: 08/04/2014

Figure 5 below plots HDI data for Sierra Leone and Liberia. Vertical lines identify the period of civil war in Sierra Leone, where there seems to be a gradual decrease in wellbeing in the lead up to the beginning of the civil war in 1989. However, HDI was consistently increasing since 1990, seemingly unimpeded by the civil war. In contrast, in Liberia there seemed to be a rapid change in the (potentially) downward trend in HDI in 2005, after which there was a very dramatic increase in wellbeing. Such rapid, unexpected changes in the data series are often characterised as structural breaks whereby, as in our example, the data series changes its overall level and trend over time. The post-conflict increasing slope of HDI graph is substantially steeper in Liberia than in Sierra Leone. This suggests that there was a much more dramatic improvement in wellbeing upon the end of the conflict and that there seemed to be an effect of conflict on HDI in Liberia.

Figure 5: The effect of conflict on wellbeing via the comparable case of Sierra Leone



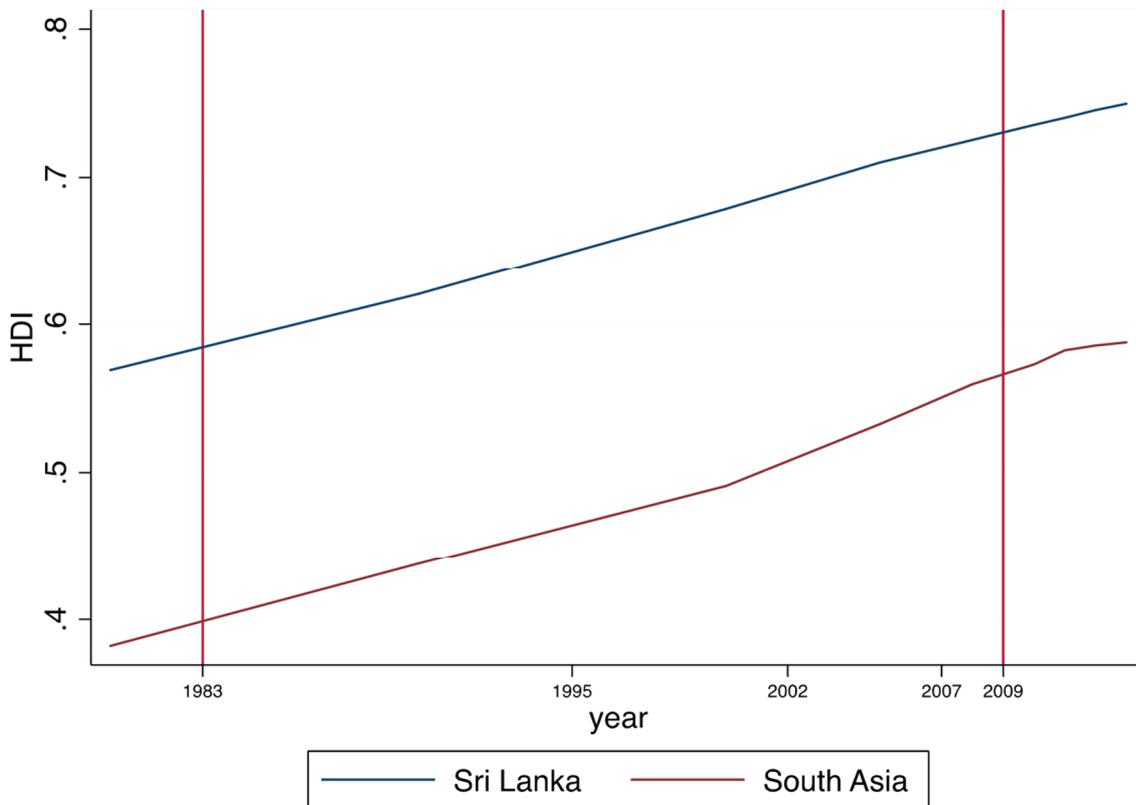
These results are based on the assumptions that UNDP uses comparable data when constructing HDI and that data in both countries is of comparable quality. At the same time the trends observable on the plots can simply represent data measurement challenges (e.g. measurement error) or inconsistent data collection practices across two countries. The latter may be due to the fact that after the end of civil wars both countries experienced significant influx of external expertise to collect and analyse data, the quality of the expertise may or may not have been coordinated with outside bodies like the UN.

Overall, comparison of Liberia and Sierra Leone suggests that conflict had a significant effect on wellbeing in Liberia, while having only a mild effect in Sierra Leone. This may be related to the severity of conflict in Liberia where it is estimated that over 200,000 people died in both civil wars, with the population of the country at around 4 million people. At the same time, it is estimated that 50,000 people died in the Sierra Leone civil war out of a total population of about 6 million people. This issue will be analysed further below.

3.1.2 Sri Lanka

Figure 6 shows the HDI trend for Sri Lanka and a comparison trend for South Asia. Vertical lines indicate the period of civil war in the country from 1983 to 2009. The ceasefire has been in place between 2002 and 2007.

Figure 6: HGI trend for Sri Lanka



The trend in Figure 6 shows that wellbeing in Sri Lanka has been consistently on the upward trajectory, well above the average level for South Asia. It also appears that the years of conflict did not affect (at least at this level of aggregation) the wellbeing in Sri Lanka. However, the end of ceasefire in 2007 seems to have translated into a slower growth rate of HDI.

It is important to note that unlike Liberia, Sri Lanka had a much more localised conflict, with much of the territory in the North and East controlled by the rebels. This means that some statistics that would be part of the Sri Lankan HDI entry are missing. Hence it is important to note that the results observed here can be more confidently applied to the areas of the country outside the conflict zone. That is the data are more reliably reflecting the situation in the country outside the immediate conflict area. It is thus inadequate to capture the effects of conflict for the part of the country contested in the civil war. A more general conclusion of the effect of conflict on human well-being may still be drawn from the data, but these data will relate to the area of the country under the control of central government and will not cover the area under the Tamil control or contested areas where the authority of the central government is not established. Overall, this produces an overall biased picture of the effects of conflict on human wellbeing in Sri Lanka since the data covers only part (even if larger part) of the country and not the part of the country most affected by the conflict.

3.2 Effects of Conflict on Health and Provision of Health Services

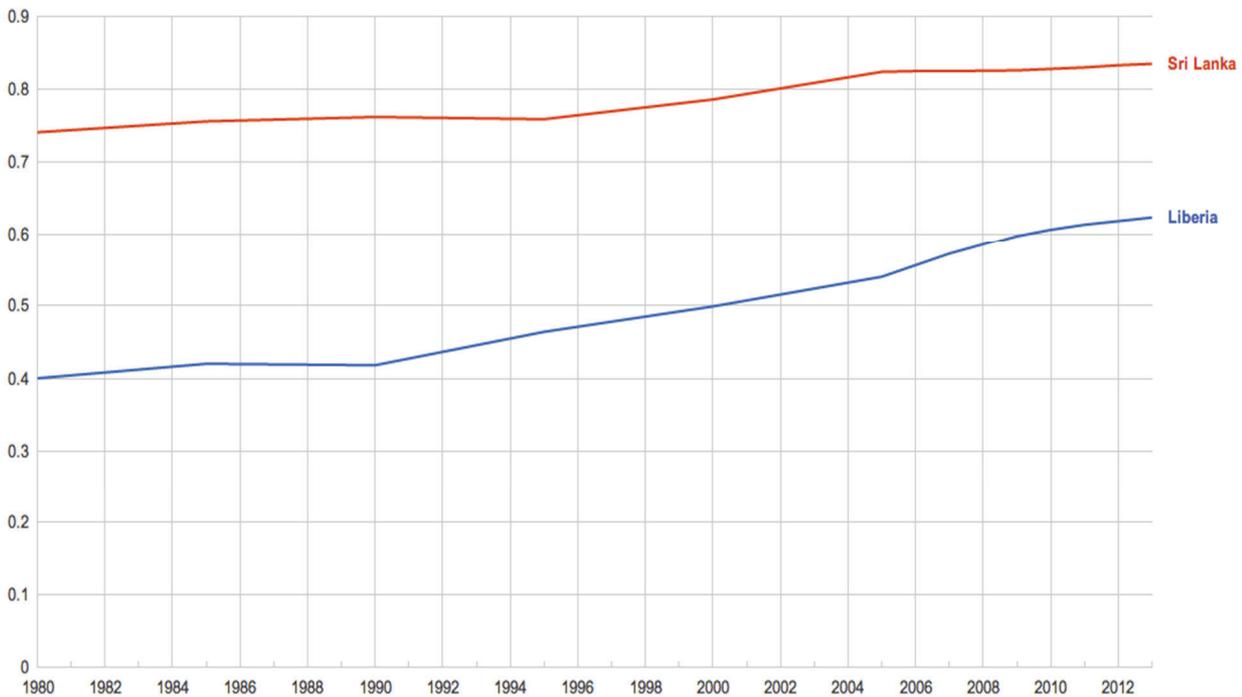
World Development Indicators dataset collection was used to compare measures of health and health outcomes for both countries.

3.2.1 Health Indicators

Health Index (HI)

One of the most basic indicators that combines information on health outcomes and provision of health services is the UNDP Health Index. Health Index captures the health dimension in UNDP HDI and consists of the data on the life expectancy at birth component of the HDI calculated using a minimum value of 20 years and maximum value of 85 years (UNDP, 2014). Figure 7 plots the Health Index for both Sri Lanka and Liberia for the period from 1980 to 2012⁹, which covers pre- and post-conflict periods in both countries. Health Index captures life expectancy at birth expressed as an index using a minimum value of 35 years and a maximum value of 85 years. As such it can be viewed as a health component of the HDI index.

Figure 7: Health Index



The data suggests that that both countries experienced increases in their HI over time.

In Sri Lanka the HI was increasing until about 1984 (around the time of the start of the civil war) and plateaued until about 1995. It then increased for a decade, and plateaued again. This latter increase in HI may only partly reflect the results of the ceasefire that lasted from 2002 to 2007 as the increase started before the ceasefire. The HI does not appear to have improved with the end of hostilities in 2009. As previously mentioned, the data may reflect the inherent coverage bias in representing only the government-controlled territory. Seemingly little direct relationship between the start and end of the civil war (also the period of ceasefire between 2002 and 2007) and the HI may reflect the fact that Sri Lankan civil war was concentrated in the areas of Tamil-majority with little effect on the rest of the country particularly in the area of health care provision. This becomes particularly visible if we compare this graph to the data for Liberia (below). We can only speculate that there was much more direct relationship of the war on the areas under the Tamil control, however there are no available information to test that.

⁹ Can be accessed directly and reproduced at <http://goo.gl/bEM180>. The plot is drawn using public data repository at Google Public Data <http://www.google.com/publicdata/directory>. Using public data repository at Google Public Data allows immediate access and visualisation of the data. However, it's impossible to download the data or adjust the plots produced by Google. This also means that we cannot add vertical reference lines to indicate the years of conflict to Google Public Data plots.

The results for Liberia show an increase in HI after the end of the civil war in 2003. However, even before that there seems to be a continuously increasing trend in HI since 1989 despite the ravaging civil war. The data seems to suggest that the HI, which remained unchanged prior to the civil war, began improving with the onset of the conflict. This is a very surprising result and may be due to the data issues for indicators that comprise HI, which are explored below:

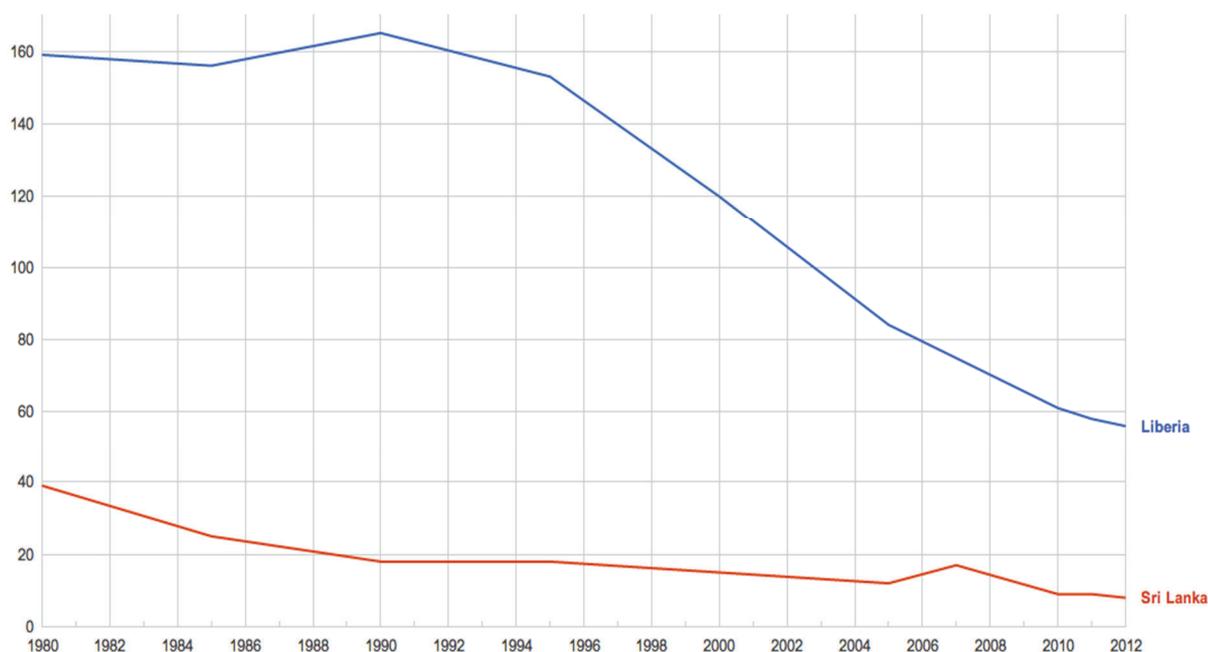
- Mortality rates, rates of survival to age 65
- More specific factors that can be associated with health outcomes and characterise health care system in general: hospital beds for 1,000 people, number of physicians per 1,000 people, DPT immunisations, and measles immunisations

3.2.2 Infant mortality rate

Mortality rate as an HI component indicator represents the number of infants dying before reaching one year of age, per 1,000 live births in a given year.

It should be noted that given improving general health standards over time there is an expected downward trend in infant mortality. Therefore the focus should be on any deviations from the downward trend.

Figure 8: Infant Mortality¹⁰



The data suggest that Liberia experienced an increase in infant mortality during the first civil war (1989-1996), after which the rate returned to its underlying trajectory and was not affected by the second civil war (1999-2003). There was also no noticeable improvement (e.g. more dramatic decrease in infant mortality rate) with the end of the civil war.

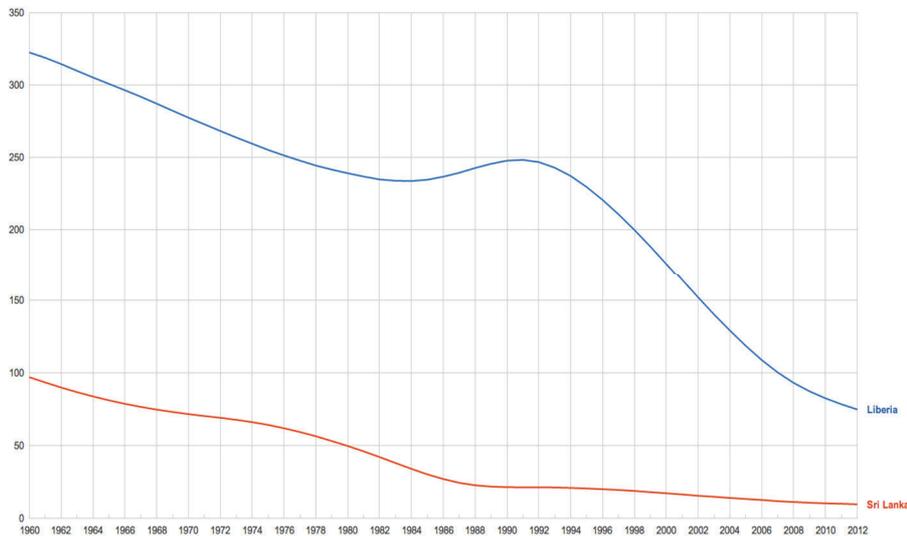
Sri Lanka seems to have experienced a rapidly decreasing infant mortality rate until the early years of the civil war (1985). The decrease slowed down in the early period of the conflict (1985-1990) and plateaued until the end of the 1990s before decreasing further. Moreover, it seems that during the ceasefire period (2002-2007) there was an increase in infant mortality rate, before it began to decrease again with the end of the war after 2009.

¹⁰ Can be accessed directly and reproduced at <http://goo.gl/P1pZ6s>

3.2.3 Under-five Mortality Rate

The under-five mortality rate represents the probability per 1,000 that a newborn baby will die before reaching age five, if subject to current age-specific mortality rates.

Figure 9: Under-Five Mortality Rate¹¹

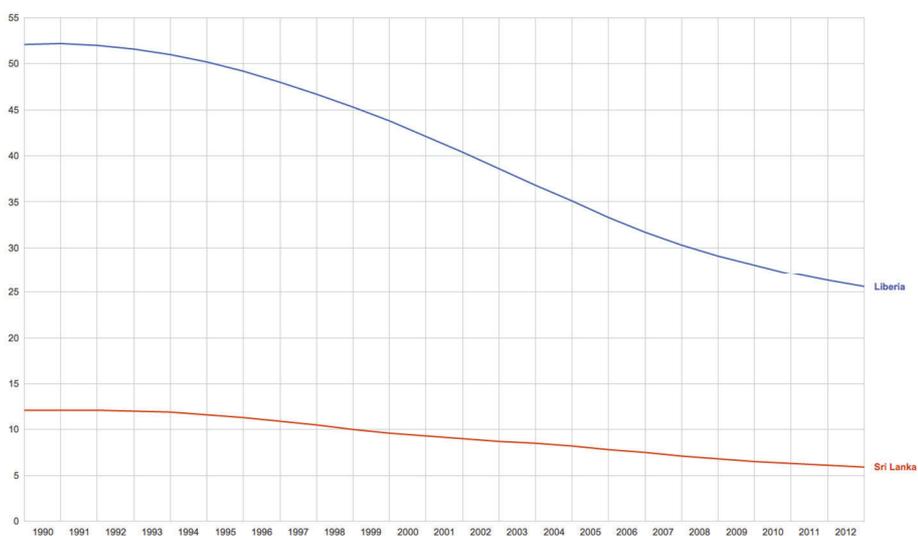


Similarly to the infant mortality rate data, an increase in the under-five infant mortality potentially as a result of the first Liberian civil war can also be observed (Figure 9). There are no corresponding observable effects of the second Liberian civil war and conflict in Sri Lanka.

3.2.4 Neonatal Mortality Rate

Neonatal mortality rate is the number of neonates dying before reaching 28 days of age, per 1,000 live births in a given year. Both countries exhibit declining trends in the data with the more dramatic decline in Liberia: from 52.1 in 1990 to 25.6 in 2013, while over the same time period Sri Lanka reduced the rate from 12.1 to 5.9.

Figure 10: Neonatal mortality rate¹²



¹¹ Can be accessed directly and reproduced at <http://goo.gl/WxLSFK>

¹² Can be accessed directly and reproduced at <http://goo.gl/Y1DrUO>.

3.2.5 Survival to Age 65

As a measure, survival to age 65 refers to the percentage of a cohort of newborn infants that would survive to age 65, if subject to current age specific mortality rates.

Figure 11: Survival to Age 65 (Males) ¹³

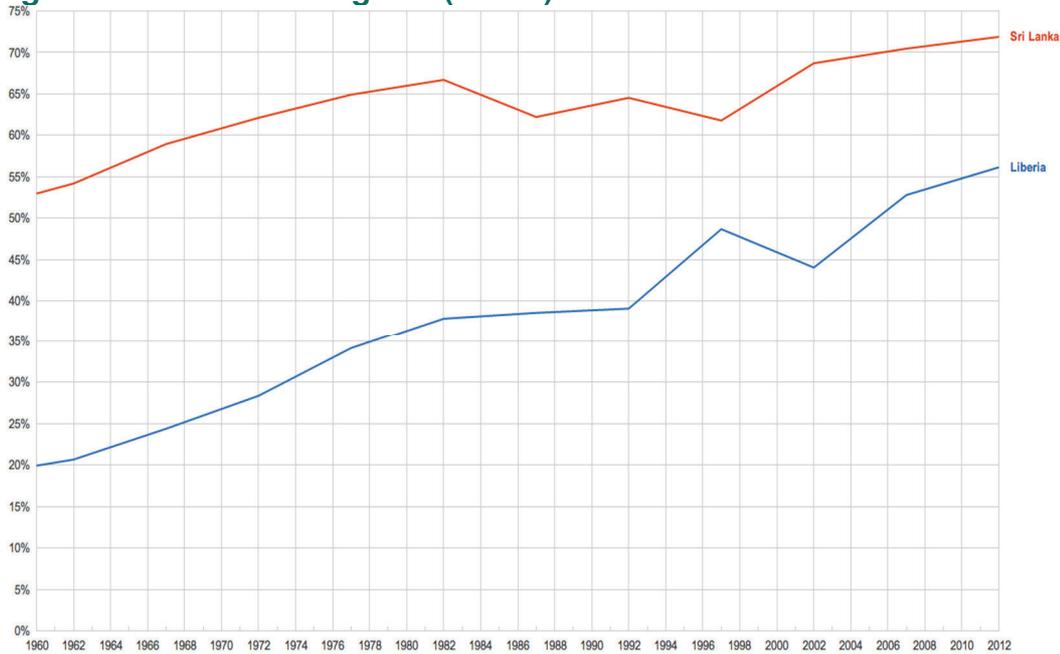
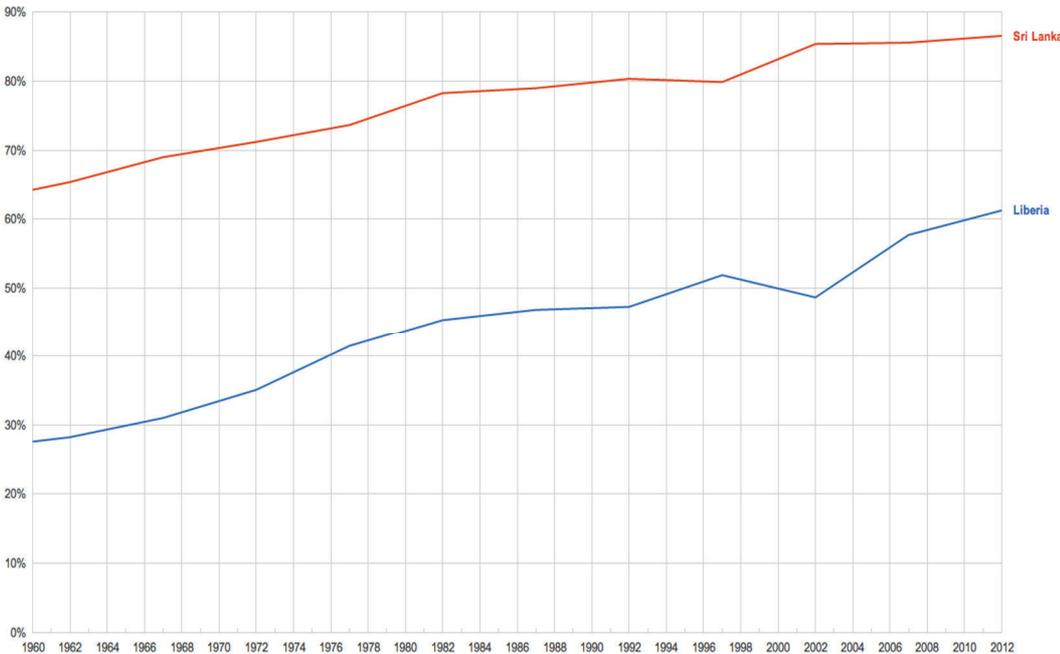


Figure 12: Survival to Age 65 (Females) ¹⁴



Data for males highlights the effect of conflict on survival rates. Sri Lanka survival rate dropped with the onset of conflict and returned to its earlier trajectory with the introduction of ceasefire. In Liberia with the beginning of turmoil starting with Doe's coup d'état in 1980 the rate plateaued, recovered slightly during the period between two civil wars, and resumed growth with the end of hostilities.

¹³ Can be accessed directly and reproduced at <http://goo.gl/qxOoKz>

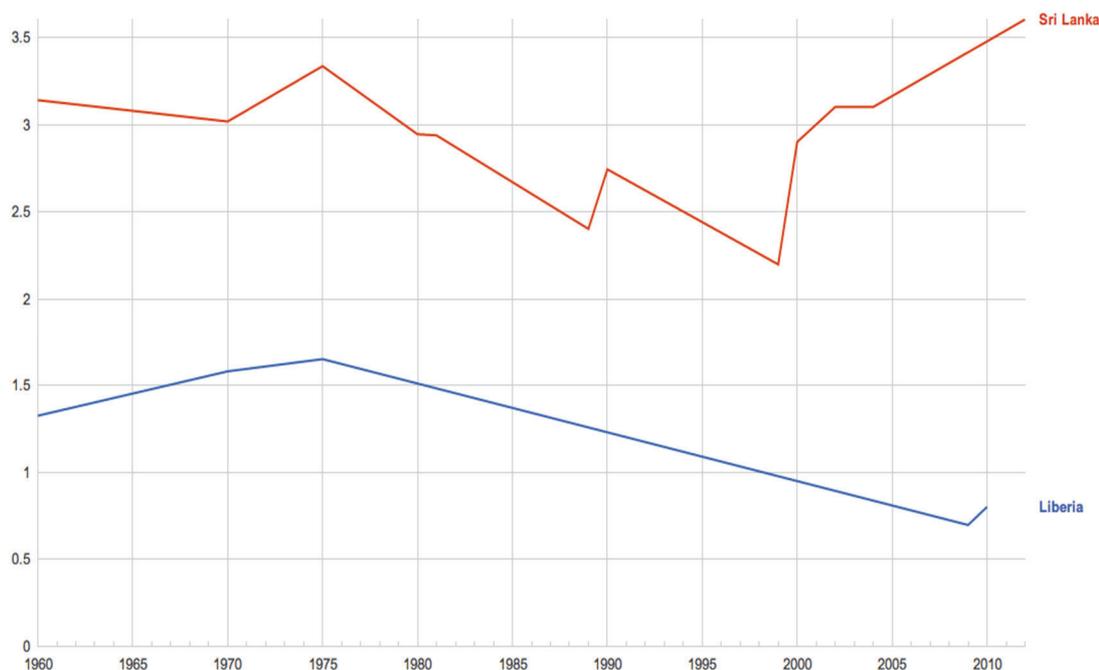
¹⁴ Can be accessed directly and reproduced at <http://goo.gl/bm38FZ>

Similarly to the male survival rates, female survival rate was increasing in Sri Lanka until the beginning of the civil war. Then it plateaued and increased in the later part of the conflict, reaching its highest level in the early 2000s. In Liberia the conflict had a dampening effect on the increasing survival rate. The end of the first civil war demarcated an increase in the survival rate for females, only for it to drop again with the start of the second civil war. The rate moved up again with the end of hostilities.

3.2.6 Number of Hospital Beds per 1,000 people

This indicator includes inpatient beds available in public, private, general, and specialized hospitals and rehabilitation centres. In most cases beds for both acute and chronic care are included.

Figure 13: Hospital Bed per 1,000 people¹⁵



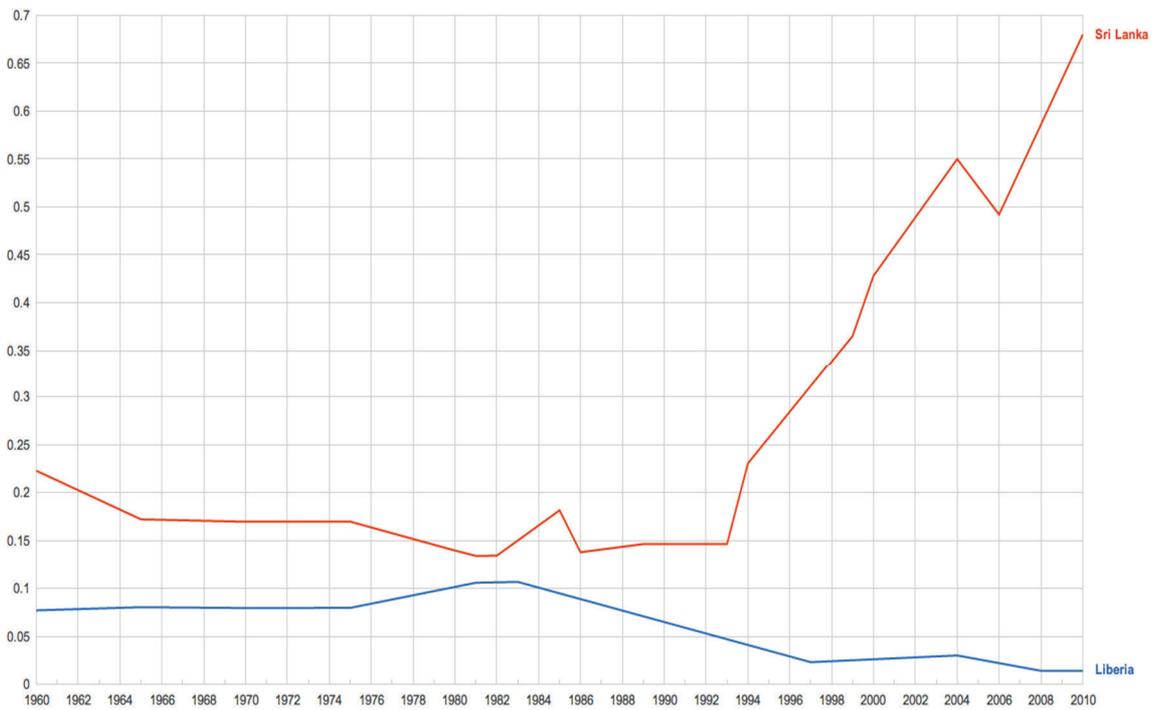
There seems to be a visible effect of conflict on this outcome measure for both Sri Lanka and Liberia. In the former country with the onset of conflict in 1980s there's a decline in the number of beds available that only started to be overcome after the ceasefire agreement in 2002. Liberia, albeit with less observations available, shows a similar decline in hospital beds availability. The decline continued beyond the end of hostilities and started to be reversed only in 2009, six years after the end of the second civil war.

3.2.7 Number of Health Professionals per 1,000 People

The data are available for two categories of health professionals: physicians and nurses and midwives. Here, physicians include generalist and specialist medical practitioners. Nurses and midwives include professional nurses, professional midwives, auxiliary nurses, auxiliary midwives, enrolled nurses, enrolled midwives and other associated personnel, such as dental nurses and primary care nurses.

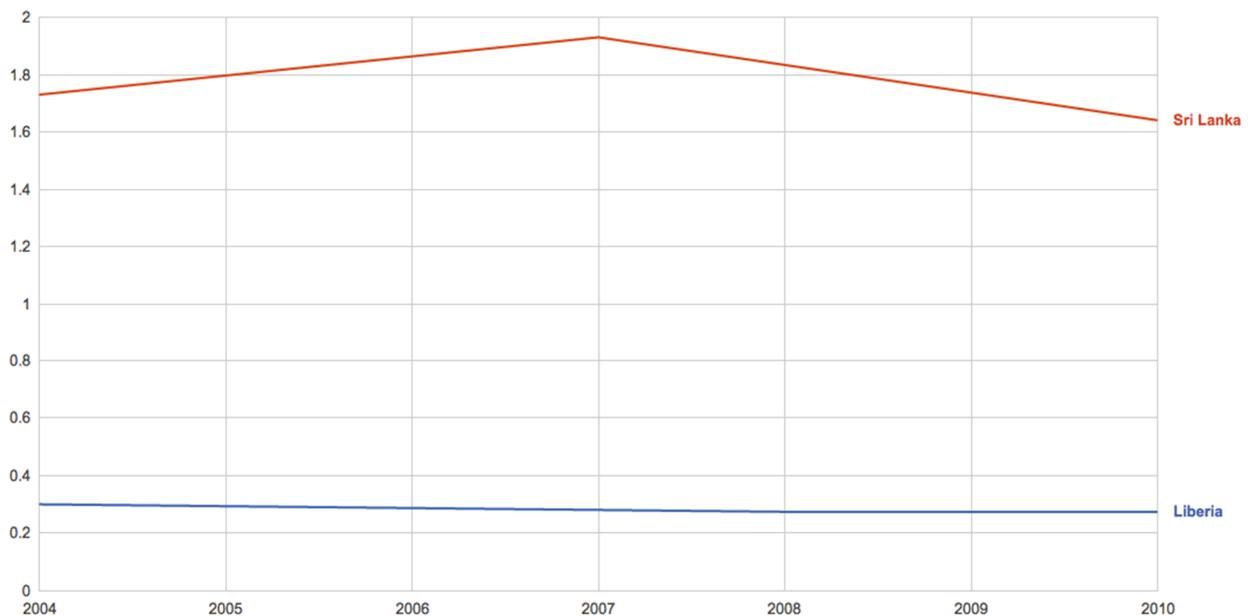
¹⁵ Can be accessed directly and reproduced at <http://goo.gl/aLyiYu>

Figure 14: Number of physicians per 1,000 people¹⁶



3.2.8 Number of nurses and midwives

Figure 15: Number of nurses and midwives per 1,000 people¹⁷



16 Can be accessed directly and reproduced at <http://goo.gl/glr2Wu>
17 Can be accessed directly and reproduced at <http://goo.gl/BS7Z8u>

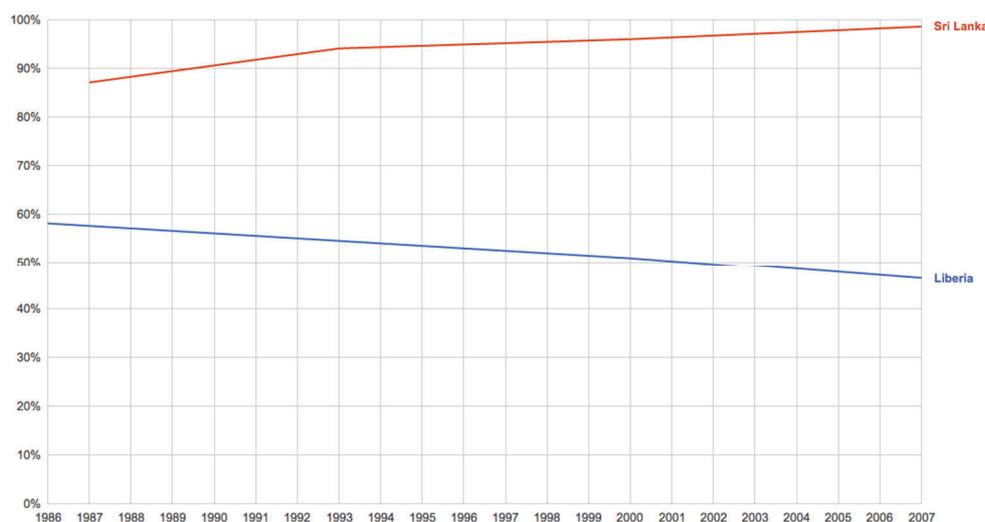
The data suggests that Sri Lanka seems to have dramatically altered its policy on training of health professionals. The ratio of nurses and midwives remained relatively stable (given the limitations of only three data points for this specific indicator). However, we have more data on the ratio of physicians, which allows us to trace it better over time. This indicator was relatively stable at an average level of 0.18 for the period since 1960 to 1993. Since 1993 the ratio of physicians per 1,000 people has increased dramatically doubling every ten years: from 0.15 in 1993 reaching 0.3 around the year 2000 and subsequently reaching 0.68 in 2010. The only change in this upward trend was the decline in the ratio from 2004 to 2006 when the ratio resumed its upward trend. Looking at the data trend there appears to be no observable effect of conflict on this supply side indicator for Sri Lanka.

In contrast, Liberia seems to have suffered from continuous brain drain of highly trained physicians since the onset of instability with the Doe's coup d'état (1980). It was a continuous decline during the first civil war but seems to have stabilised during the second civil war. However, the decline continued even after the end of hostilities, thus potentially pointing at more systemic problems in the health care sector and inability to turn around the situation quickly enough by post-conflict government. The ratio of nurses and midwives remained stable through this period, but this is based only on three data points (2004, 2007, and 2010) as the only data available.

3.2.9 Births attended by skilled health staff

Figure 19 presents the data on births attended by skilled health staff (% of total).

Figure 16: Births attended by skilled health staff¹⁸



Births attended by skilled health staff are the percentage of deliveries attended by personnel trained to give the necessary supervision, care, and advice to women during pregnancy, labour, and the postpartum period, to conduct deliveries on their own, and to care for newborns. However, for both countries the data are available for very few points in time. In Sri Lanka the rate is at 87.1% in 1987, improving to 94.1% in 1993, 96% in 2000, and finally reaching 98.6% in 2007. In Liberia the rate is 58.1% in 1986, 50.9% in 2000, and finally reaching 46.3% in 2007.

3.2.10 Immunisation Rate of Children (DPT Immunisation)

The immunization rate of children as an outcome indicator measures the percentage of children aged 12-23 months who received vaccinations before 12 months or at any time before the survey. A child is considered adequately immunized against diphtheria, pertussis (or whooping cough), and tetanus (DPT) after receiving three doses of vaccine.

¹⁸ Can be accessed directly and reproduced at <http://goo.gl/tZGeKd>

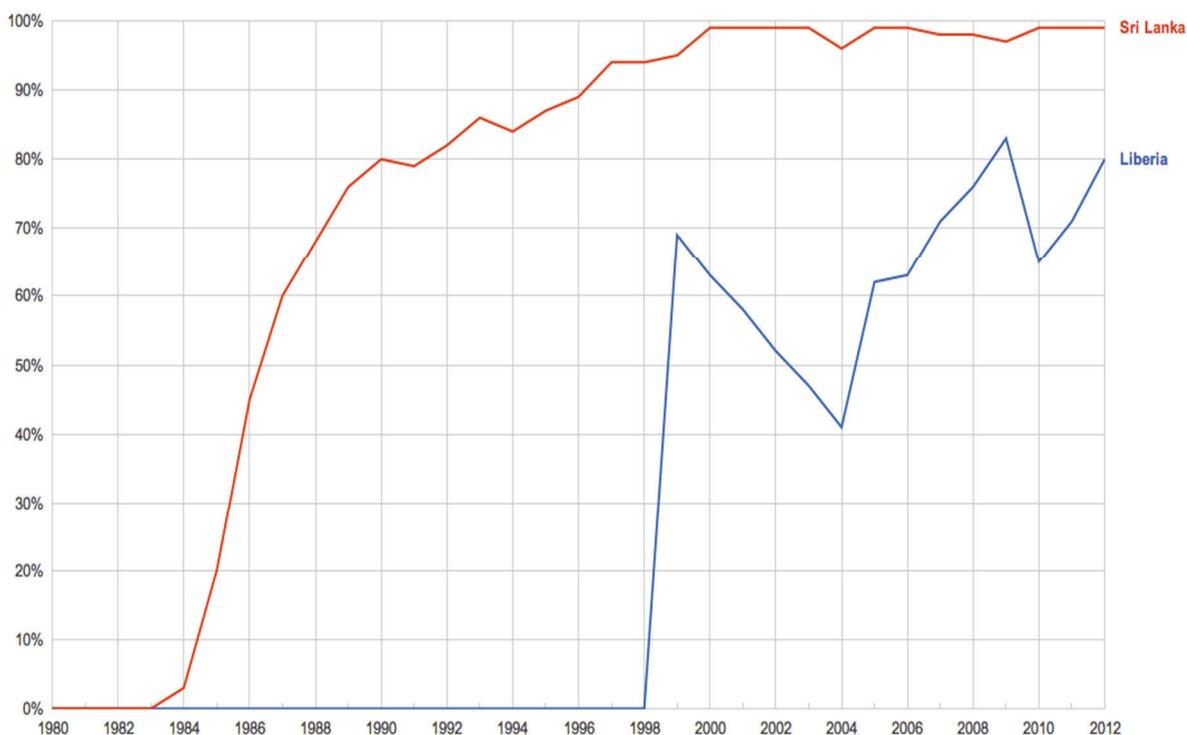
Figure 17: DPT Immunisation¹⁹

Data for Sri Lanka shows a steadily increasing rate of immunisation, without noticeable effects of the conflict (it's unclear whether, again, data includes population under rebels' control or only under central government control). At the same time, Liberia depicts drop in immunization rates due to the second civil war, with the trend improving upon the end of hostilities.

3.2.11 Immunisation Against Measles

Similar results for the effect of the second civil war in Liberia are evident from the 'immunisation against measles' indicator. Child immunisation measures the percentage of children aged 12-23 months who received vaccinations before 12 months or at any time before the survey. A child is considered adequately immunized against measles after receiving one dose of vaccine.

Figure 18: Measles Immunisation²⁰



3.2.12 Health indicators specific to females and adolescent girls

Due to data limitations, indicators presented above cannot be disaggregated by gender and age. Below we present several general indicators that are specific to females in general and girls in particular.

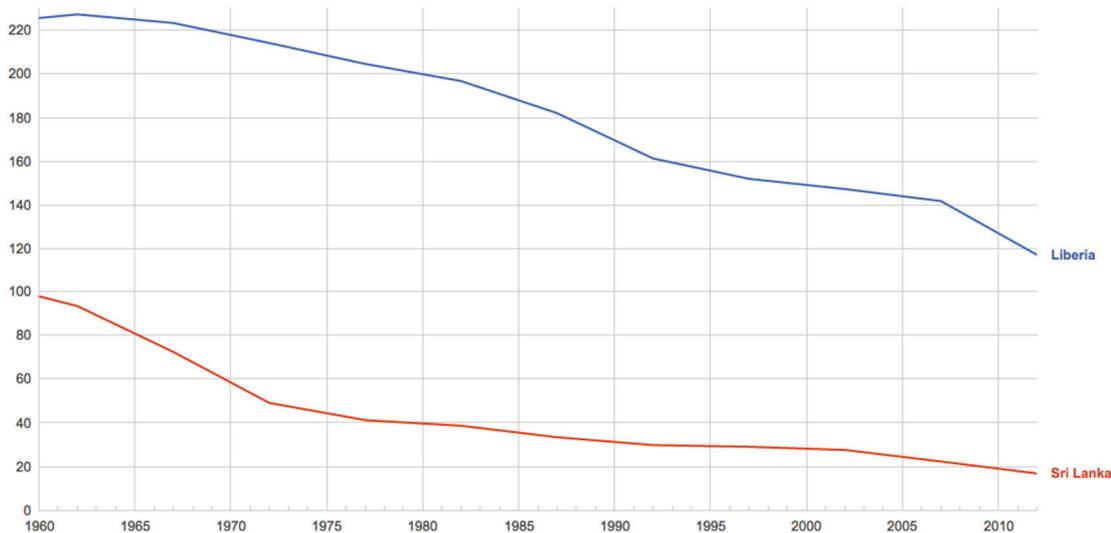
Adolescent fertility rate

The first indicator under review is the adolescent fertility rate calculated as births per 1,000 women ages 15-19.

19 Can be accessed directly and reproduced at <http://goo.gl/aJt34J>

20 Can be accessed directly and reproduced at <http://goo.gl/Tr3PKD>

Figure 19: Adolescent fertility rate²¹



The adolescent fertility rate has been declining in both countries, with Sri Lanka reducing the rate from 97.59 to 16.9 and Liberia from 225.54 to 117.43 over the same period from 1960 to 2012. The decline in Liberia has accelerated (reduction in the adolescent fertility rate has become faster) since 2007.

Total fertility rate

Additionally we can look at the total fertility rate, which represents the number of children that would be born to a woman if she were to live to the end of her childbearing years and bear children in accordance with current age-specific fertility rates.

Figure 20: Total fertility rate²²



The results for total fertility rate cannot be directly compared to the adolescent fertility rates presented above as the latter is based on real reported data while the former is a modelled data series. We can comment on the overall trends whereby in Liberia fertility rate is decreasing in both indicators. In Sri Lanka both rates have decreased over time and total fertility reached what appears to be a steady state in 1995, while adolescent fertility rate continues to decline.

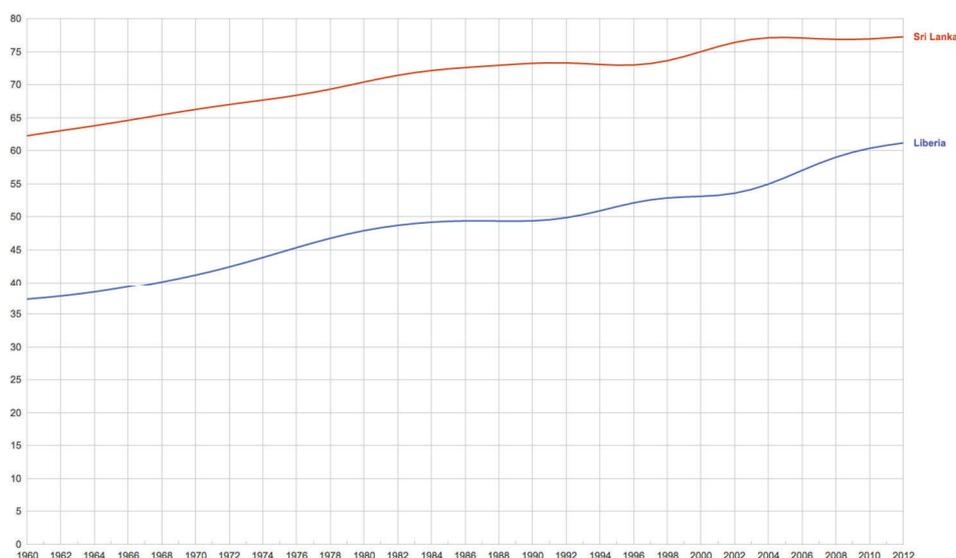
Female life expectancy

As a more general indicator of female health we can look at life expectancy for females.

21 Can be accessed directly and reproduced at <http://goo.gl/AOaWIF>

22 Can be accessed directly and reproduced at <http://goo.gl/J0tZcO>

Figure 21: Female life expectancy²³

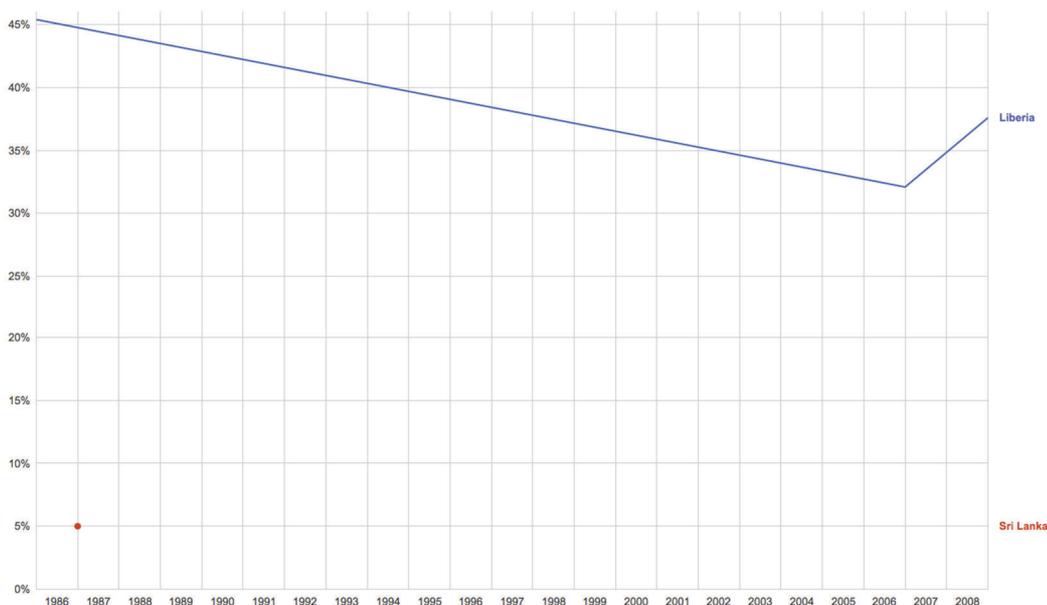


Life expectancy at birth indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life. The plot above captures the data for females only. Female life expectancy in Sri Lanka increased from 62.26 years in 1960 to 77.24 in 2012. Over the same time period Liberia experience increase in life expectancy from 37.25 to 61.18 years.

Share of teenage mothers in female population

The focus of this project is on adolescent girls, however, the data on age breakdown of pregnant women is unavailable. The only relevant indicator is the share of teenage mothers in female population. Figure 13 presents data on teenage mothers as the percentage of women ages 15-19 who already have children or are currently pregnant.

Figure 22: Share of teenage mothers in female population²⁴



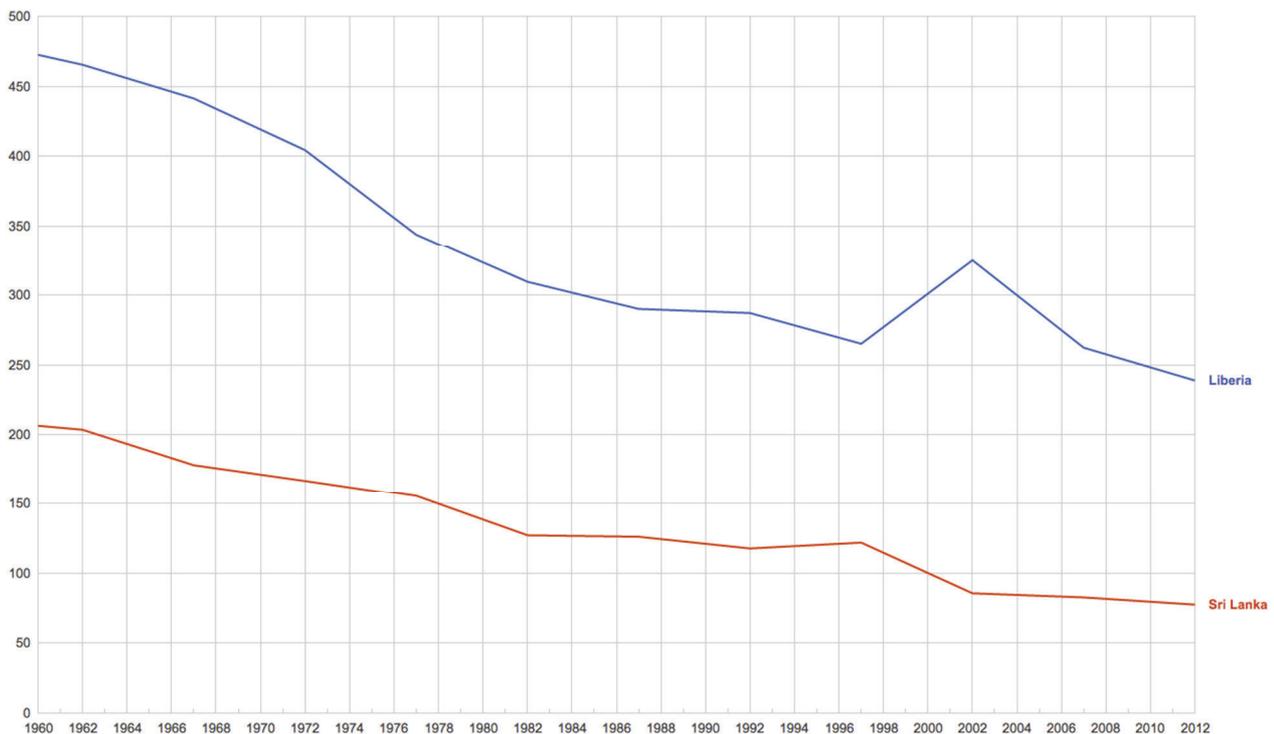
23 Can be accessed directly and reproduced at <http://goo.gl/n2y9nB>
24 Can be accessed directly and reproduced at <http://goo.gl/iBDxXY>

The data for Sri Lanka is available for only one point in time in 1987 when the share of teenage mothers was at 5%. For Liberia we have three observations: 45.4% in 1986, 32.1% in 2007, and 37.6% in 2009. Given that we have only three observations for such an extended time period it is difficult to judge whether we are observing a downward trend over time with a recent uptick or the plot presents some natural fluctuation in the data (or both).

Female mortality rate

The indicator of female mortality rate captures the probability of dying per 1,000 people between the ages of 15 and 60--that is, the probability of a 15-year-old female dying before reaching age 60, if subject to current age-specific mortality rates between those ages.

Figure 23: Mortality rate for adult females²⁵



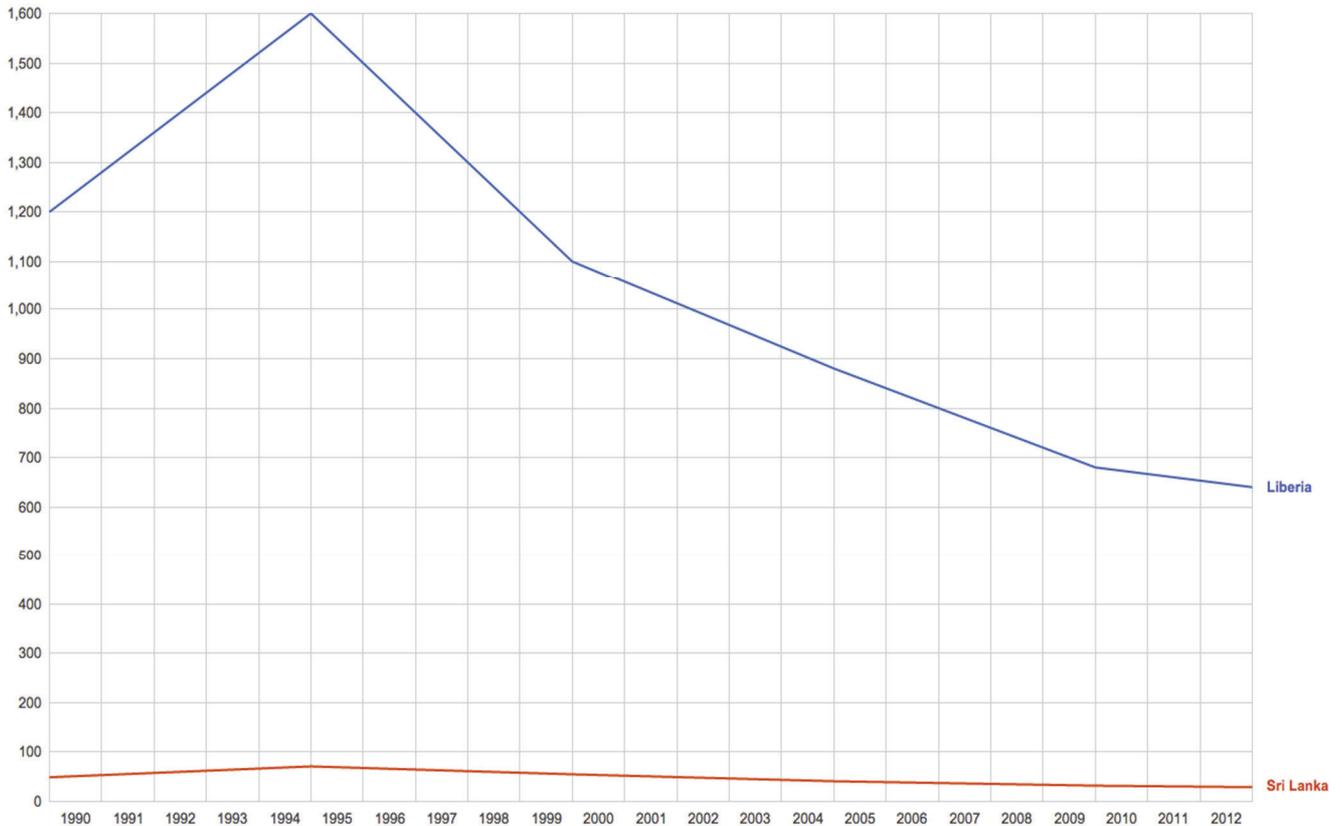
The plot shows a steady decline in female mortality rate in Sri Lanka from 1960 to 2012: from 206.39 to 77.37. Liberia has also experienced a decline in this indicator over the same time period from 472.5 to 238.69. However, there was a temporary increase in the mortality rate in Liberia in the period from 1997 to 2002, after which the rate resumed its downward trend, roughly corresponding to the Second Liberian Civil War (1999-2003).

Maternal mortality rate

Maternal mortality rate is an indicator specifically focusing on female mortality rates related to pregnancy and childbirth.

25 Can be accessed directly and reproduced at <http://goo.gl/wpR7nZ>

Figure 24: Maternal mortality rate²⁶



Maternal mortality ratio is the number of women who die during pregnancy and childbirth per 100,000 live births. Available data shows that maternal mortality rate peaked in both Liberia and Sri Lanka about the same time in 1995 at 1,600 and 71 deaths respectively. Since that time the ratio steadily declined in Sri Lanka to 29 in 2013. In Liberia the decline has been most dramatic in the period from 1995 to 2000 (from 1,600 to 1,100). Over the next decade the ratio further declined by 420. In the last three years it went down further to 640.

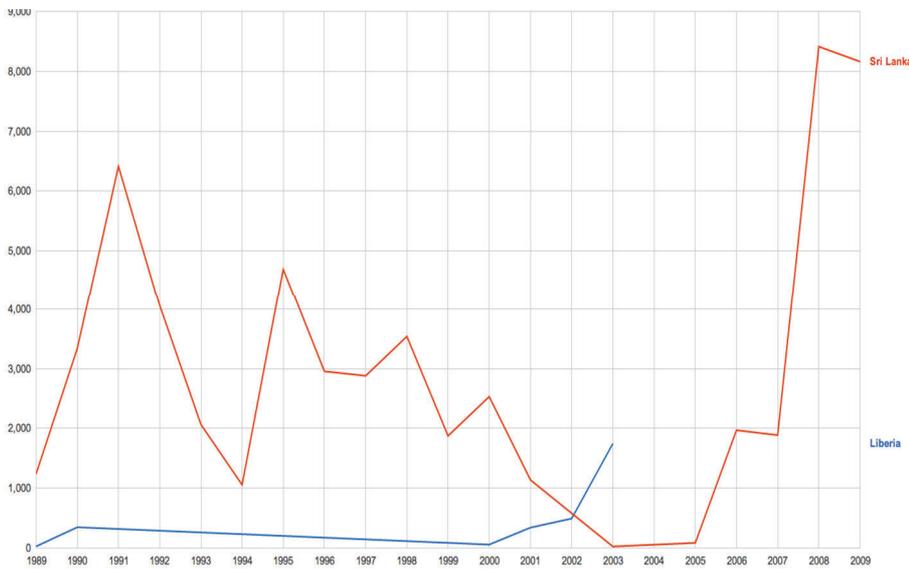
3.3 Alternative Measures of Conflict

World Development Indicators dataset collection contains two alternative measures of conflict: ‘the number of battle-related deaths’ and ‘the number of internally displaced persons’. The former is a direct measure of conflict intensity, while the latter captures both intensity and spill-over effects of conflict on civilian population.

²⁶ Can be accessed directly and reproduced at <http://goo.gl/HQDmAF>

3.3.1 Number of Battle-Related Deaths

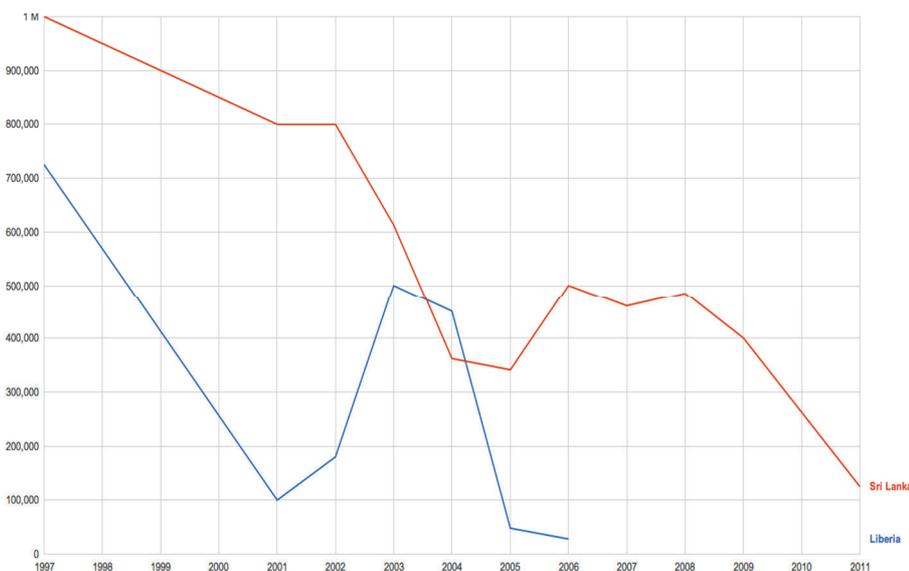
Figure 25: Battle Related Deaths²⁷



The data available for Sri Lanka is available from 1989, which is six years into the conflict, highlighting intensification of military conflict until the ceasefire in 2002. The rise in hostilities in 2005 at the breakdown of the peace process led to further intensification of violence and rapid increase in battle related deaths that peaked in 2008-2009 with the defeat of the LTTE by the government. The data for Liberia shows low intensity (in terms of battle related deaths) during the first civil war (1989-1996) and significant increase in casualties during the second civil war (1999-2003).

3.3.2 Number of Internally Displaced Persons

Figure 26: Internally Displaced Persons (High Estimate)²⁸



²⁷ Can be accessed directly and reproduced at <http://goo.gl/drSdcb>

²⁸ Can be accessed directly and reproduced at <http://goo.gl/TMSIMU>.

The data on internally displaced people in Sri Lanka shows the reduction in the numbers consistently until the breakdown of the peace process and resumption of hostilities in 2005-2005. In Liberia the end of the first civil war in 1996 led to consistent reduction of internally displaced people. After the start of the second civil war the number of internally displaced people increased again for the duration of the conflict until 2003.

3.4 Relationship between two conflict measures and indicators of health

Correlation coefficients were calculated to assess the relationship between two conflict measures and indicators of health outcomes. Due to data availability limitations, correlations for several previously discussed indicators could not be calculated. Estimation results are presented in Table 2.

Table 2: Correlation between two measures of conflict and health outcome indicators

	Battle-related deaths		Internally displaced persons	
	Liberia	Sri Lanka	Liberia	Sri Lanka
Mortality rate, under-5	-0.576	-0.175	0.662	0.884***
Mortality rate, neonatal	-0.525	-0.151	0.653	0.880***
Mortality rate, adult female	0.425	-0.0502	-0.230	0.777**
Mortality rate, adult male	0.0345	-0.143	-0.370	0.834**
Mortality rate, infant	-0.572	-0.184	0.662	0.881***
Maternal mortality ratio		0.875		
Survival to age 65, female	0.566	0.0409	-0.233	-0.766**
Survival to age 65, male	0.423	0.132	-0.0835	-0.839**
Immunisation, DPT	0.237	-0.124	-0.920**	-0.352
Immunisation, measles	0.225	-0.0946	-0.903**	-0.343
Adolescent fertility rate	-0.463	-0.322	0.661	0.847**
Fertility rate, total	-0.55	0.181	0.646	-0.799**
Life expectancy, female	0.525	0.00244	-0.595	-0.797**
Life expectancy, male	0.451	0.114	-0.648	-0.891***
Life expectancy, total	0.479	0.062	-0.623	-0.861***
N	54	54	53	53

* p<0.05, ** p<0.01, *** p<0.001

The correlation analysis suggests that there are no statistically significant correlations (at standard levels of significance) between battle-related deaths and health outcomes in both Liberia and Sri Lanka. Correlation coefficients presented above capture linear association between two variables, and here the absence of statistically significant results suggests that there is no relationship between battle-related deaths as an indicator of conflict and health outcomes.

On the other hand, our second indicator of conflict – number of internally displaced persons – exhibits several strong relationships with the health outcome measures. The results for Sri Lanka show that increases in the number of internally displaced persons are strongly associated with higher mortality rates (for both children and adults), lower probabilities of survival to age 65 (for both females and males), and lower life expectancy. It is important to note that increases in the number of internally displaced persons is also associated with lower overall fertility rates while simultaneously with higher adolescent fertility rate. This is an interesting result that should be further investigated during the fieldwork in the country that should provide access to additional and more detailed data. For Liberia, the only statistically significant relationship is the result that increases in the number of internally displaced people is associated with lower immunisation rates.

It should be noted that the results of correlation analysis presented above are very tentative given very sparse data.

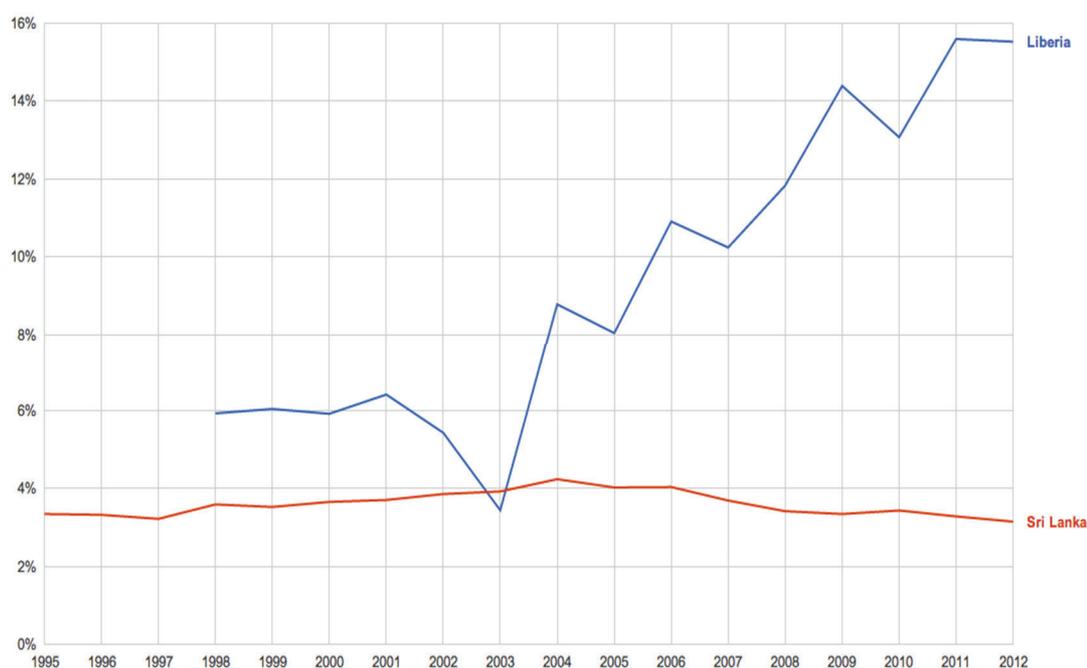
4 Assessing financial landscape of health systems

The financial landscape of health systems in Liberia and Sri Lanka was assessed based on the data from World Development Indicators dataset collection on health expenditure.

4.1 General Trends in Health Expenditure

General trends in health expenditure can be easily captured as a percentage of GDP. As a sum of public and private expenditure, health expenditure covers the provision of health services (preventive and curative), family planning activities, nutrition activities, and emergency aid designated for health but does not include provision of water and sanitation. Analysing health expenditure as a percentage of GDP also allows comparing health spending in two countries (Figure 18).

Figure 27: Health Expenditure as percentage of GDP²⁹



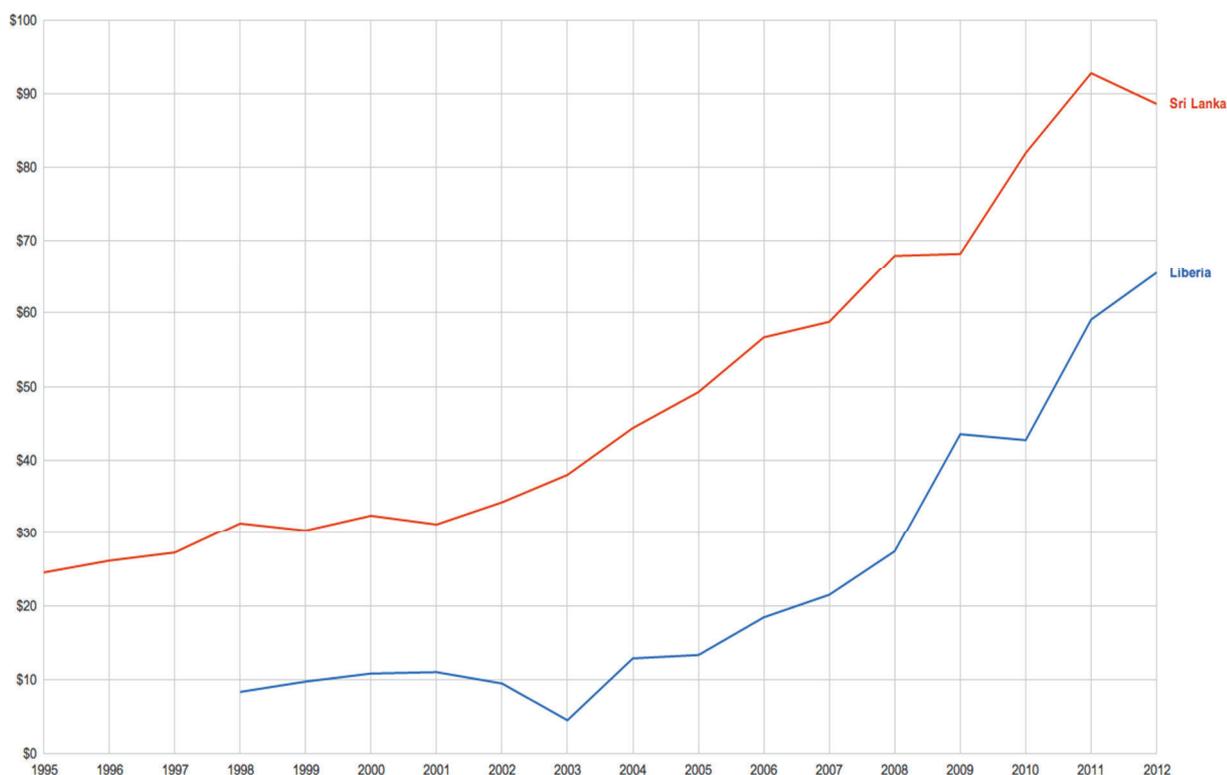
²⁹ Can be accessed directly and reproduced at <http://goo.gl/6xFzRp>.

As a share of GDP, health expenditure in Sri Lanka remained stable while it consistently increased in Liberia after the end of the civil war. Compared to Sri Lanka, Liberia seems to be devoting extremely large share of its GDP to health. Partly that can be due to the fact that the demand side on health care may be incurring comparable costs (provision of medicine and care should be of comparable prices given international market medicine and care inputs), while countries have dramatically different sizes of GDP. Thus, for example, for similar medical inputs like pharmaceuticals that have to be imported, both countries incur similar costs but for Liberia that comprises a larger share of GDP. In addition, coming out of a devastating civil war Liberia may be expected to spend large amounts of money on rebuilding the capital stock (infrastructure) of its health care system (e.g. hospitals) that was damaged during the conflict, while in Sri Lanka the share of damaged infrastructure should be smaller given regional concentration of the conflict, and given the disparities between the sizes of the economy in both countries that may also explain the trends in the figure above.

4.2 Health Care Expenditure in Real Prices

Given data availability, one way to assess the striking disparity in health care expenditure as a share of GDP is to look at health care expenditure in real prices. Below is the data on per capita expenditure in both current US dollars and in constant international dollars (with purchasing power parity adjustment).

Figure 28: Health Care Expenditure per Capita in Current US Dollars³⁰



In contrast to Figure 18 both countries seem to be spending relatively similar resources in current US dollars per capita. For example, in 2012 that was 65USD in Liberia versus 88USD in Sri Lanka.

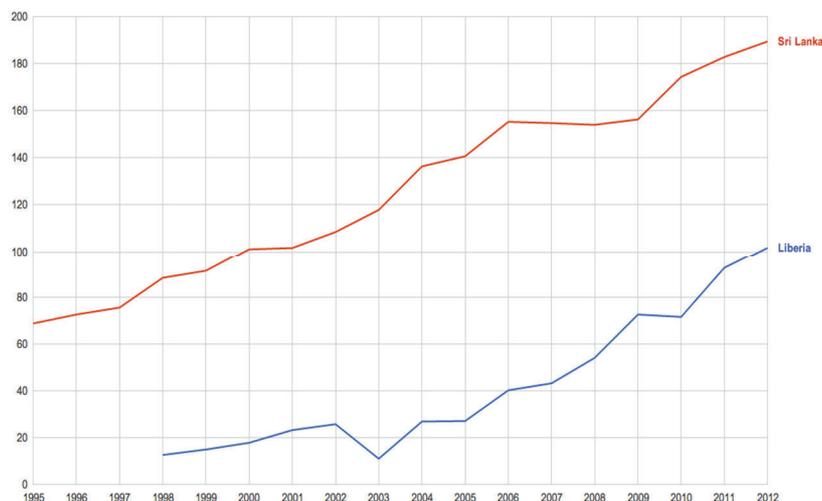
4.3 Health Care Expenditure in Constant Prices

Some of the health care provision inputs may be more localised and hence would be at different price levels for health care provision (e.g. labour of nursing and support personnel). One way to account for that is to look at per

³⁰ Can be accessed directly and reproduced at <http://goo.gl/JyCsu5>

capita expenditure in constant prices -- international dollars converted using 2005 purchasing power parity (PPP) rates.

Figure 29: Per Capita Expenditure on Health Care in Constant Prices³¹



The difference between two countries is now much bigger (189 in Sri Lanka vs 101 in Liberia), but trends for both countries appear to develop in parallel.

Given that trends in per capita expenditure in both countries are very similar, fluctuations observed in Figure 27 should reflect the changes in the denominator in the health expenditure as a % of GDP indicator. That is, fluctuations reflect wider changes in the economy rather than changes in the specific policy area of health care and health care expenditure. However, regardless of the specific explanations of the fluctuations, Figure 27 also highlights high overall level of spending on healthcare in Liberia compared to Sri Lanka. For example, in 2012 Liberia was spending 15.53% of its GDP on health care, while Sri Lanka spent only 3.15%. Table 3 below presents data on total health expenditure as percentage of GDP for Sri Lanka and Liberia and main country groups according to income level and geographical classifications. The data presented are from the World Development Indicators collection for the year 2012.

Table 3: Health care expenditure by region and country

Country Name	Health expenditure, total (% of GDP)
North America	17.21
Liberia	15.53
High income	12.22
European Union	10.19
World	10.19
Sub-Saharan Africa (developing only)	6.47
Sub-Saharan Africa (all income levels)	6.45
Upper middle income	6.19
Middle income	5.83
Low & middle income	5.83
Low income	5.36
Least developed countries: UN classification	5.23
Lower middle income	4.60
Sri Lanka	3.15

³¹ Can be accessed directly and reproduced at <http://goo.gl/yqkCHh>

In 2012 Sri Lanka spent on health care as a percentage of GDP in line with lower middle income countries. At the same time, Liberia was spending more than high income countries and higher proportion of its GDP than countries of the EU. In fact Liberia was closer to the levels of spending characteristic of North America rather than Sub-Saharan Africa. These atypical spending levels in Liberia highlight the inherent problems in its health care system given relatively lower levels of health outcomes, even when compared to Sri Lanka (that is spending much less of its GDP on health care).

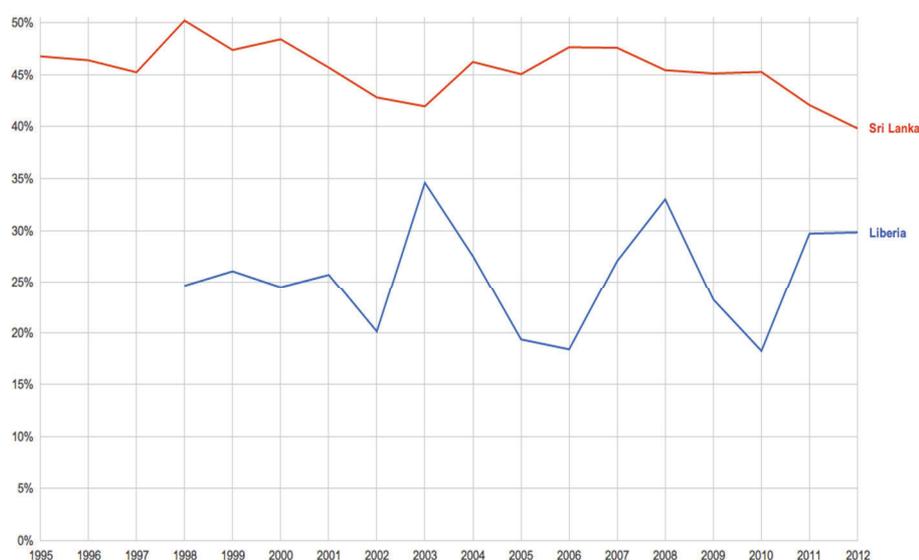
4.4 Composition of Health Expenditure: Private vs. Public

4.4.1 Public Health Expenditure

As mentioned earlier, total health expenditure is the sum of private and public health expenditures. Disaggregating total spending into these two components can help assess relative burdens on private individuals vs. the government.

Figure 21 plots public health expenditure as a percentage of total health expenditure. Public health expenditure consists of recurrent and capital spending from government (central and local) budgets, external borrowings and grants (including donations from international agencies and nongovernmental organizations), and social (or compulsory) health insurance funds.

Figure 30: Public Health Expenditure as a Percentage of Total Health Expenditure³²



The data shows that the state plays a more important role in providing funding for health care in Sri Lanka than in Liberia. Figure 21 shows summary statistic of public health expenditure in both countries.

Table 4: Public Health Expenditure as Percentage of Total Health Expenditure

	Obs	Mean	Std.Dev.	Min	Max
Liberia	15	25.45	5.07	18.23	34.6
Sri Lanka	18	45.51	2.55	39.83	50.22

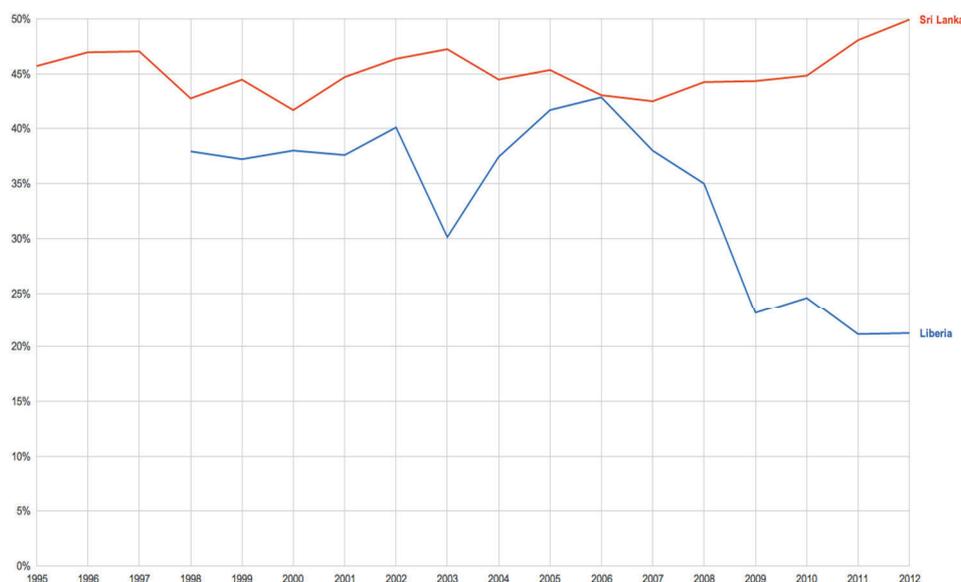
On average the Liberian state provided for a quarter of total health expenditure, while in Sri Lanka that was closer to 46 per cent. There have also been dramatic fluctuations over time in the role of the state in health care provision in Liberia (standard deviation 5), while much less so in Sri Lanka (standard deviation 2.5)(see Table 4).

32 Can be accessed directly and reproduced at <http://goo.gl/eTbU3m>

4.4.2 Private Health Expenditure

In relation to private health expenditure, data is available on out-of-pocket health expenditure as a percentage of total expenditure on health. Out of pocket expenditure captures any direct outlay by households, including gratuities and in-kind payments, to health practitioners and suppliers of pharmaceuticals, therapeutic appliances, and other goods and services whose primary intent is to contribute to the restoration or enhancement of the health status of individuals or population groups. Figure 22 below plots the data for both countries.

Figure 31: Out-of-pocket Health Expenditure³³



The difference between public spending and out-of-pocket spending captures the remaining part of private health care expenditure. This remaining portion contains private insurance, charitable donations, and direct service payments by private corporations.

Comparing Figure 31 and Table 4 suggests that Sri Lanka has very little space for private insurance, with almost all health care spending being divided between state expenditure and out-of-pocket spending. In Liberia, in contrast, there seems to be a significant component capturing private insurance, charitable donations, and direct service payments by private corporations. It is likely that this reflects the underlying theme of Liberian health care provision where a significant share of care is provided directly by international NGOs³⁴, with some estimates putting this number as high as 80 per cent³⁵. The latter data comes from the National Health Account³⁶.

4.5 Relationship Between Sources of Health Care Expenditure and Health Outcome Indicators

The relationship between sources of health care expenditure can be explored by analysing the effect of public and external funding on several available health outcomes in Liberia and Sri Lanka.

Data was collected for the share of total health care expenditure from public sources and external funds; and a linear regression models with health outcome indicators as dependent variables and two independent variables (external and government funding shares in total health expenditure) were estimated. Given small number of available observations models were built only with two independent variables. **Error! Reference source not found.** and **Error! Reference source not found.** present estimation results for Liberia Sri Lanka.

33 Can be accessed directly and reproduced at <http://goo.gl/dMyuRv>

34 <http://apps.who.int/medicinedocs/documents/s18363en/s18363en.pdf>

35 http://www.healthsystems2020.org/section/where_we_work/liberia

36 http://www.healthsystems2020.org/section/where_we_work/liberia/nha

Table 5: Government vs. External Financing of Health Care in Relationship to Health Outcome Indicators in Liberia

Liberia	Immunization (measles)	Immunization (DPT)	Life expectancy at birth (male)	Life expectancy at birth (female)	Mortality rate (infant)	Mortality rate (adult female)	Mortality rate (adult male)	Survival to age 65 (female)	Survival to age 65 (male)	Tuberculosis case detection rate
Public health expenditure	-0.235 (0.927)	-0.606 (0.792)	-0.047 (0.093)	-0.049 (0.098)	0.468 (0.839)	0.351 (1.062)	0.277 (1.219)	-0.071 (0.142)	-0.063 (0.137)	-0.304 (0.586)
External resources of health expenditure	0.690** (0.256)	0.977*** (0.219)	0.140*** (0.026)	0.148*** (0.027)	-1.214*** (0.232)	-1.143*** (0.294)	-1.008** (0.337)	0.211*** (0.039)	0.191*** (0.038)	0.620*** (0.183)
Constant	44.776* (23.833)	39.183* (20.362)	51.703*** (2.394)	53.178*** (2.524)	113.888*** (21.579)	304.930*** (27.326)	339.184*** (31.361)	49.939*** (3.658)	45.725*** (3.531)	33.613* (15.139)
Observations	15	15	15	15	15	15	15	15	15	13
R-squared	0.379	0.624	0.712	0.713	0.696	0.560	0.429	0.708	0.680	0.536

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6: Government vs. External Financing of Health Care in Relationship to Health Outcome Indicators in Sri Lanka

Sri Lanka	Immunization (measles)	Immunization (DPT)	Life expectancy at birth (male)	Life expectancy at birth (female)	Mortality rate (infant)	Mortality rate (adult female)	Mortality rate (adult male)	Survival to age 65 (female)	Survival to age 65 (male)	Tuberculosis case detection rate
Public health expenditure	-0.150 (0.337)	-0.215 (0.217)	-0.198 (0.170)	-0.172 (0.150)	0.274 (0.264)	1.804 (1.450)	3.605 (2.993)	-0.283 (0.215)	-0.397 (0.310)	-0.674 (0.809)
External resources of health expenditure	2.360** (1.050)	0.894 (0.674)	1.150** (0.528)	0.875* (0.466)	-2.142** (0.820)	-8.792* (4.513)	-18.340* (9.315)	1.296* (0.669)	1.957* (0.965)	4.824* (2.519)
Constant	100.015*** (16.163)	105.881*** (10.379)	76.228*** (8.126)	82.343*** (7.180)	3.285 (12.629)	23.896 (69.475)	88.236 (143.408)	95.077*** (10.302)	83.103*** (14.853)	87.704** (38.785)
Observations	18	18	18	18	18	18	18	18	18	18
R-squared	0.351	0.260	0.427	0.376	0.478	0.401	0.399	0.409	0.419	0.340

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Estimation results for Liberia suggest that levels of public expenditure are not associated with health outcomes. The variable that captures public health expenditure as a share of total health expenditure, is not statistically significant in any of the models. At the same time we observe strong associations between external resources of health expenditure as a share of total health expenditure in Liberia. Increases in external resources bring increases in immunisation rates, tuberculosis case detection rates, life expectancy (for both males and females) and survival rates to age 65 (for both males and females). Also increases in external resources of health expenditure are associated with decreases in mortality rates (infant, adult female, and adult male). These simple models with only two predictor variables explain from 37% to 71% of variation in the dependent variables (health outcomes) across all models.

Similar patterns are observed for Sri Lanka: there is no evidence that public health expenditure is associated with health outcomes, while external resources of health expenditure have strong statistical association with health outcome indicators. The direction of results is the same as in the estimation results for Liberia. However, the strength of the association varies across models. Given that conventional statistical significance level is considered at p<0.05 several health indicators are not associated with external resources of health expenditure at conventional levels of statistical significance. From the models fitted, only rates of measles immunisation, life expectancy at birth for males, and infant mortality rates exhibit statistically significant association with external resources of health expenditure. The models explaining the remaining indicators show only statistically weak levels of association with external resources of health expenditure variable. In addition, the models estimated on Sri Lankan data explain less variation in the dependent variables compared to similar models for Liberia: R-

squared statistic ranging from 0.26 to 0.478 – i.e. explaining between 26% and 47.8% of the variation in dependent variables across models. This suggests that focusing only on funding sources cannot provide a good picture of the drivers behind performance of health care systems in Sri Lanka while providing a reasonably good explanatory model for Liberia. Given lack of data, this issue cannot be explored further statistically, but it should be considered for in-depth, qualitative investigation in the field research stage.

As shown in Figure 30 and Figure 31, health care provision in Sri Lanka is less dependent on external financing, which nevertheless plays a very important role. In Liberia, public share of health expenditure has been stable, while private out-of-pocket share has been declining. These observations, in combination with the regression estimation results above, suggest that the state continues to rely on what was structured as emergency health care provision at the end of the civil war. Furthermore, reliance on external provision of health care is increasing over time. Inability to develop an indigenous provision of one of the most basic state services ten years after the cessation of hostilities indicates a failure of government reforms. Moreover, heavy dependence on outside health care provision (e.g. international NGOs) highlights inherent fragility of service provision in the face of potential external shocks that may, for example, force international organisation to pull out of the country, thus leading to the collapse of health care provision.

5 Conclusion

In this report we assessed potential relationship between conflict and health and provision of health care. We evaluated available data sources for both sides of this relationship -- conflict and health outcomes and health care provision, -- and assessed potential limitations of the analysis due to data limitations and potential biases in the analysis as a result of missing data.

We compared several indicators of health and health care provision in Sri Lanka and Liberia and assessed potential impact of conflict. Comparison was also done between the two countries. In addition we tried to contextualise the relationship between conflict and health by looking at local or regional comparisons. As such we compared the experience of Liberia and Sierra Leone and Sri Lanka and the South Asia region. Our analysis suggests that Sri Lanka exhibited minimal effect of conflict on general health indicators, while Liberia appeared to be more clearly susceptible to conflict effects.

We analysed this in more detailed correlational studies looking at the relationship between various health outcome indicators and two indicators of conflict: battle-related deaths and the number of internally displaced people. We find that both conflict measures are mostly not associated with health outcomes in Liberia, thus perhaps reflecting poor data availability for that country. The only statistically significant association we observe in the data is the negative relationship between the number of internally displaced people and immunisation rates. In Sri Lanka, the direct and widely used indicator of battle-related deaths is also not associated with health outcomes. However, the second indicator of internally displaced people shows significant correlation with most health outcomes apart from the immunisation rates. This may be related to the fact that in Sri Lanka the most direct effect of conflict during its long duration was on the displacement of people and consequently economic and social outcomes of such displacement rather than direct casualties of the attacks.

Finally, we analysed health care provision in both countries focusing on the available data on health care expenditure. We find that Liberian expenditure on health care as percentage of GDP is not in line with its regional neighbours or even with countries in similar income bracket but rather with economically developed high income states. Whereas Sri Lanka spends on health care about the same proportion of GDP as lower middle income country group. We also observe that public health care expenditure is not related to indicators of health care provision in both countries, while external sources of health care provision are strongly associated with the health care performance indicators in Liberia and exhibit much weaker association in Sri Lanka.

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