

First do no harm: the impact of recent armed conflict on maternal and child health in Sub-Saharan Africa

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SUMMARY

Objectives To compare the rates of under-5 mortality, malnutrition, maternal mortality and other factors which influence health in countries with and without recent conflict. To compare central government expenditure on defence, education and health in countries with and without recent conflict. To summarize the amount spent on SALW and the main legal suppliers to countries in Sub-Saharan African countries (SSA), and to summarize licensed production of Small Arms and Light Weapons (SALW) in these countries.

Design We compared the under-5 mortality rate in 2004 and the adjusted maternal mortality ratio in SSA which have and have not experienced recent armed conflict (post-1990). We also compared the percentage of children who are underweight in both sets of countries, and expenditure on defence, health and education.

Setting Demographic data and central government expenditure details (1994–2004) were taken from UNICEF's *The State of the World's Children* 2006 report.

Main outcome measures Under-5 mortality, adjusted maternal mortality, and government expenditure.

Results 21 countries have and 21 countries have not experienced recent conflict in this dataset of 42 countries in SSA. Median under-5 mortality in countries with recent conflict is 197/1000 live births, versus 137/1000 live births in countries without recent conflict. In countries which have experienced recent conflict, a median of 27% of under-5s were moderately underweight, versus 22% in countries without recent conflict. The median adjusted maternal mortality in countries with recent conflict was 1000/100,000 births versus 690/100,000 births in countries without recent conflict. Median reported maternal mortality ratio is also significantly higher in countries with recent conflict. Expenditure on health and education is significantly lower and

expenditure on defence significantly higher if there has been recent conflict.

Conclusions There appears to be an association between recent conflict and higher rates of under-5 mortality, malnutrition and maternal mortality. Governments spend more on defence and less on health and education if there has been a recent conflict. SALW are the main weapon used and France and the UK appear to be the two main suppliers of SALW to SSA.

INTRODUCTION

Ninety percent of the 150 conflicts since World War II have taken place in developing (poorly resourced) countries.¹ Since independence, Sub-Saharan African countries (SSA) have been afflicted by more conflicts than any other part of the world, some between but generally within countries. The 1990s saw the emergence of warfare in Africa as a means of accumulating wealth and power,² with violence towards civilians being the rule rather than the exception.

The impact of conflicts on maternal and child health in SSA is difficult to ascertain, as reliable data is not available in politically unstable regions. During conflict, data becomes even sparser and is of doubtful quality.³ We compared the under-5 mortality rate in 2004 and the adjusted maternal mortality ratio in countries in SSA which have and have not experienced recent armed conflict ('recent' being defined as since 1990). Given that more than half of the deaths in the under-5 age group are associated with malnutrition,⁴ we compared the percentage of children who are underweight in both sets of countries. We also compared expenditure on defence, health and education in SSA countries with and without recent conflict.

Since 1990, in 94% of conflicts, Small Arms and Light Weapons (SALW) were the only weapons used.⁵ In modern conflicts, most deaths are from preventable illness and malnutrition: over 80% of all deaths are civilian deaths,⁶ and 90% of direct deaths are caused by small arms.⁷ We have reviewed the supply of SALW to SSA.

METHODS

The probability of dying between birth and five years of age (the under-5 mortality rate) is recognized as the most appropriate indicator of the cumulative exposure to the risk

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of death during the first five years of life.⁸ The maternal mortality ratio is the number of deaths due to pregnancy related causes, when pregnant or within 42 days of delivery per 100,000 live births and provides an internationally accepted marker of the safety or otherwise of pregnancy. Data from the registration of births and deaths is one way to determine child and maternal mortality; however, many countries in Africa lack registration systems and use indirect estimates of mortality levels and trends, collected in censuses and surveys. Data from SSA have limitations in terms of quality and variations in estimates at a given time and across time periods. Data from earlier periods, especially those from censuses, are often of poor quality. Given the modesty of the decline over recent years⁸ and the question over the reliability of early data, we have used 2004 rates rather than trends to gauge the effect of recent conflict. The adjusted maternal mortality is used to account for the well-documented problems of under-reporting and misclassification of maternal deaths. The most recent review was done in 2000.

Demographic data

Demographic data and central government expenditure on health, education and defence (1994–2004) were taken from UNICEF's *The State of the World's Children* for 2006.⁹ There are 42 countries in this dataset, which includes all countries on the main continent of Africa other than those above the Sahara in North Africa—namely Morocco, Western Sahara, Algeria, Tunisia, Libya and Egypt—as well as South Africa. Madagascar is included although it is not on the main continent as its demographics are very similar to the other countries on the continent; the islands of Mauritius and Cape Verde are not included. South Africa is not included as it is generally not regarded as a developing country.

For all summaries and calculations, the Statistical Package for Social Sciences (SPSS) was used.

Conflict data

Data on conflict for these 42 countries have been taken from work by the Institute of Development Studies.² We have defined recent conflict as a country experiencing conflict, beginning or ongoing between 1990 and the present day. During this time period there have been 21 countries which experienced conflict. A conflict is arbitrarily but conventionally defined as such when there are at least 1000 conflict-related deaths per annum.¹⁰

Small arms data

Defence expenditure includes the funding of personnel, major conventional weapons and SALW. Given that SALW

were the only weapon used in 94% of conflicts, the supply of these to SSA was reviewed. The Norwegian Institute on Small Arms Transfers (NISAT), collects information on transfers of SALW from 1962 to the present day¹¹ from all available data sources. Because not all countries disclose their arms imports and exports, it is not a complete record. The database produces two types of dataset; base and mirror. For a given country, there will be reported exports (base) as well as reported imports from recipient countries (mirror). Using an agglomerated data tool, NISAT reduces the likelihood of double-counting by matching base and mirror data and deleting the least reliable transfer records (by calculating the reliability of each transfer record). We looked at the SALW transfers to the 42 SSA countries.

Statistical analysis

Countries with and without conflict were compared. The median of the two groups was compared using Mann-Whitney U test for Independent Samples. The main outcome variables are the under-5 mortality rates, rates of children being moderately underweight in 2004 and adjusted maternal mortality ratios, the last review being in 2000. We also looked at the reported maternal mortality rates for 2004.

RESULTS

Association between armed conflict, under-5 mortality, childhood malnutrition and maternal mortality ratios

There are 21 countries which have and 21 which have not experienced recent conflict in this dataset of 42 SSA. These two groups have been compared in terms of the under-5 mortality and rates of underweight children in 2004 and adjusted maternal mortality ratios. The median under-5 mortality rate in countries with recent conflict is 197/1000 live births, while for countries without recent conflict this rate is significantly lower at 137/1000 live births (Table 1 and Figure 1a). In countries which have experienced recent conflict, a median of 27% of under-5s were moderately underweight, while in those without recent conflict a median of 22% of under-5s were moderately underweight (Table 1). The median adjusted maternal mortality in countries with recent conflict was 1000/100,000 births, while for countries without recent conflict it was 690/100,000 births (Table 1 and Figure 1b). The median reported maternal mortality ratio is also significantly higher in countries with recent conflict (Table 1). There is a skilled attendant at significantly fewer deliveries if there has been recent conflict (Table 1). In countries with recent conflict, the median percentage of the population with improved water and sanitation is significantly lower. Vaccination

Table 1 Comparing the median demographics between countries with and without recent conflict

Demographic	Conflict	No Conflict	Mann-Whitney U (P) Independent-Samples
U5MR/live births (2004)	197/1000	137/1000	0.009
% of U5 moderately underweight (2004)	27%	22%	0.004
Adjusted maternal mortality ratio (2000)	1000/100,000	690/100,000	0.005
Reported maternal mortality (1990–2004)	710/100,000	520/100,000	0.044
Skilled attendant at delivery (1996–2004)	40%	61%	<0.001
Infant mortality rate/live births (2004)	115/1000	84/1000	0.002
Improved drinking water sources (2002)	57%	68%	0.026
Adequate sanitation facilities (2002)	30%	42%	0.004
1 year olds vaccinated (DTP3) (2004)	64%	80%	0.018
Primary school enrolment (1996–2004)	52%	65%	0.005
Adult female literacy rate (2000–2004)	50%	60%	0.057

coverage is lower in countries with recent conflict, as is primary school enrolment and female literacy (Table 1).

Conflict and spending on health and education

Countries vary in the amount of central government expenditure they allocate to health, education and defence (Table 2). The median expenditure on health and education is significantly lower and the median expenditure on defence significantly higher if there has been recent conflict (Figure 2).

Sources of legal trading of SALW to SSA

We have summarized the dataset provided by NISAT for the 13 years 1992–2004 for worldwide reported exports and imports of SALW, in order to look specifically at imports and the main suppliers of SALW to SSA (Table 3).

The USA is the leading exporter of small arms to all countries, followed by the UK, Italy, Germany, France, Russia and Belgium, who together supply 75% of all SALW in the world.

Table 4 relates to arms imported only into SSA, and identifies the countries responsible for 90% in value of such total imports. Here, France is the biggest contributor, followed by the UK, then Russia, China and Spain.

Licensed production in SSA

Licensed production is where a company which holds the patent for a weapon (licensor), contracts with another company to produce its product (licensee). The licensor then receives royalties which may include annual fixed payments or a fixed sum per unit produced. From the viewpoint of arms trading to SSA, there are two problems

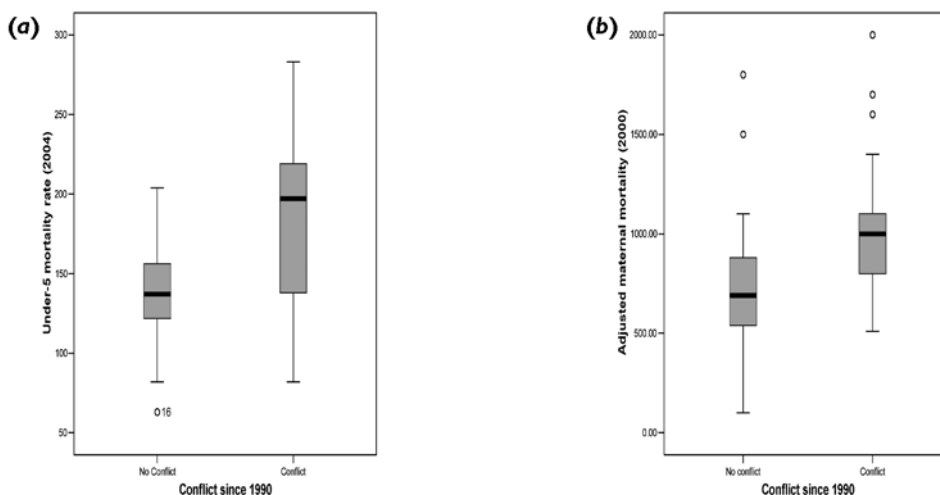


Figure 1 Mean and ranges. (a) Conflict and under-5 year mortality rates; (b) Conflict and adjusted maternal mortality rates

Table 2 Median spending on health, education and defence (1994–2004) in SSA countries with and without recent conflict

	% of central government expenditure		
	Health (1993–2004)	Education (1993–2004)	Defence (1993–2004)
Number of SSA countries where data are available	35	35	32
Conflict	3.5	10.5	14
No conflict	7	20	7
<i>P</i> *	0.01	0.003	0.015

*Independent-Samples Mann-Whitney U test

with this process. The producing country may have weaker export controls than the licensor’s home country and countries may continue to produce arms after the licence has expired.⁶ Licensed production is a way to evade export legislation and facilitate export to prohibited destinations. Legal production of small arms in developing countries generally means licensed production of foreign weapons.⁷ There are eight countries in SSA, excluding South Africa, which produce arms or ammunition.¹¹ In Kenya, for example, one factory has the capacity to produce 20 million rounds of ammunition per year under license from a Belgian company.⁷ Arms and/or ammunition production is taking place under license in Burkina Faso, Cameroon, Ethiopia, Kenya, Nigeria, Sudan, Uganda and Zimbabwe¹¹ (Table 5). Five of these eight countries have experienced recent conflict.

DISCUSSION

The principal finding is that there appears to be an association between recent conflict and higher rates of under-5 mortality, malnutrition and maternal mortality. Governments spend more on defence and less on health and education if there has been a recent conflict. SALW are the main weapon used and France and the UK appear to be the two main suppliers of SALW to SSA.

This is secondary, ecological data and causality cannot be proven. In view of the quality of the data it is not possible to use a multivariate model to clarify whether it is conflict or factors associated with conflict, such as lack of investment in health services and poor governance, which cause an increase in mortality. There are also many confounding factors such as the influence of humanitarian aid.¹² Other factors to bear in mind are that conflict may affect a country unevenly but this is countrywide data, nor can this data reflect the differences between urban and rural populations or between different sections of society. It is not possible to say that conflict is causal but this data does support the hypothesis that conflict negatively impacts child and maternal health. This may operate through a large number of pathways including disruption of health services.¹³

Guha-Sapir confirms children’s vulnerability during conflict by looking at 37 different datasets from conflict situations and comparing mortality rates during conflict with pre-conflict rates.¹² Our paper compares countrywide data between countries with similar demographics, on the same continent, to see if conflict has an effect at this level.

Bhutta has looked at available health and economic indicators for 60 countries.¹⁴ He grouped them into three

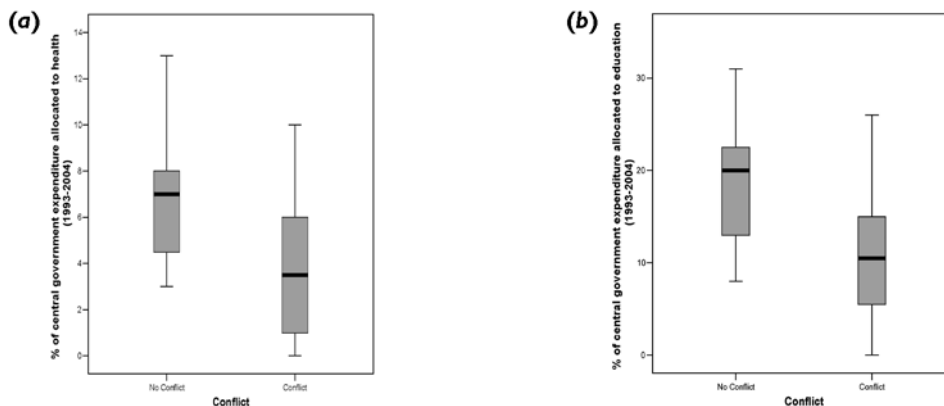


Figure 2 Mean and ranges. (a) Expenditure on health in countries with and without recent conflict. (b) Expenditure on education in countries with and without recent conflict

Table 3 Total value of SALW exports to all countries in the world for the period 1992–2004

<i>Exporter</i>	<i>Total value (millions of Euros)</i>	<i>% of total</i>
USA	31,544	37.73
UK	8303	9.93
Unspecified countries	5712	6.83
Italy	4536	5.43
Germany	4495	5.38
France	4422	5.29
Russia	2386	2.85
Belgium	1699	2.03
Brazil	1608	1.92
Sweden	1598	1.91
Austria	1374	1.64
Canada	1334	1.60
Switzerland	1291	1.55
Norway	1242	1.49
Israel	1200	1.44
Japan	1193	1.43
China	1069	1.28
Rest of world	8583	10.27
Total	83,597	100.00

groups, those representing the highest, intermediate and lowest infant mortality rate, and compared the groups in terms of government spending, population growth and the degree of corruption. Those with the highest infant mortality rate spend more on defence and less on health and are perceived to be more corrupt. Most of the group with the highest infant mortality rate were countries in SSA and they were compared with countries from other parts of the world. Our paper compares countries within SSA, the difference between the two groups being the occurrence of recent conflict.

Humanitarian impact

During the 1990s in SSA, 20% of the population were impacted by civil wars¹⁵ and deaths from violent conflict have killed more people in SSA than in any other continent in recent times.¹⁶ Conflicts in Africa have been marked by horrific levels of brutality,¹⁷ and if the incentive is greed as opposed to grievance, the protagonists may not want to negotiate a peace settlement.² Privatized warfare has an international dimension, including corporate funding of private armies and warlords accessing global markets to sell commodities using small arms as currency. Direct conflict deaths are deaths as a result of injury sustained from guns, bombs and mines. Indirect conflict deaths arise from illness

Table 4 Value of SALW imported into SSA (excluding South Africa) for the period 1992–2004

<i>Exporter</i>	<i>Total value (millions of Euros)</i>	<i>% of total</i>
France	109	15.2
UK	72	10
Russia	63	8.8
China	61	8.5
Spain	54	7.5
Italy	37	5.2
Iran	34	4.8
USA	26	3.6
South Africa	25	3.5
Brazil	24	3.4
Republic of Congo	23	3.2
Czech Republic	18	2.5
South Korea	15	2.1
Singapore	14	1.9
Slovakia	13	1.8
Romania	13	1.8
Portugal	13	1.8
Poland	13	1.8
Switzerland	11	1.5
Unspecified country	10	1.4
Rest of world	66	9.2
Total	714	100

or starvation that would not have occurred or could have been readily treated in the absence of conflict. The ratio of direct to indirect conflict deaths varies, depending on pre-existing health care, the aid available and the duration of the conflict. In SSA, a median of 23% of total deaths which occur during conflicts are directly due to conflict, with 77% of deaths due to diseases that should otherwise be easily prevented or treated.⁷

Table 5 Arms and ammunition production within countries in SSA⁷

<i>Country in SSA</i>	<i>Small arms</i>	<i>Ammunition</i>
Burkina Faso	✓	✓
Cameroon		✓
Ethiopia*	✓	
Kenya*		✓
Nigeria*	✓	✓
Sudan*	✓	✓
Uganda*		✓
Zimbabwe		✓

*Countries with recent conflict

There are 13 million internally displaced persons (IDP) and 3.5 million refugees in SSA.¹⁶ Most displaced persons are mothers and children and are at a particular risk for violence and sexual abuse.¹⁷ The UN High Commissioner for Refugees has noted that 'armed conflict is now the driving force behind most refugee flows'. In many recent internal conflicts in SSA, combatants deliberately displace local populations to further their pursuit of control over economic resources.¹⁸ Maternal mortality in the Democratic Republic of Congo doubled during the recent conflict, when there were hundreds of thousands of displaced people,¹⁹ and child mortality rates in displaced populations are 60% higher than baseline rates in the same country.²⁰ In Darfur, where 1.25 million people are displaced at the present time, children die at rates between 1 and 5.9/10,000 per day,²¹ or between 37 and 215/1000 per year. Similar rates were reported in Angola during the armed conflict there.²² Donated emergency food aid may be diverted from displaced populations to military groups. In parts of SSA only 12% of food aid reached its intended beneficiaries.²³ Many refugee camps have become militarized and displaced persons are subjected to armed violence. These camps have also been used to traffic arms.¹⁸ The relationship between conflict and the spread of HIV is complex, and influenced by the preexisting prevalence of HIV infection, population movement and health care in camps.²⁴

The opportunity costs of arms spending

It can be difficult to distinguish between cause and effect, but armed conflict is probably the single most important determinant of poverty in Africa;²⁵ it has been estimated that the economic losses due to conflict in Africa amount to almost \$15 billion annually.¹⁴ Whether or not the country has been able to continue to govern, that is provide public services, is one of the most important factors that impact on the poor. Conflict often takes place against a decline in government revenue from taxes, further compromising services. Foreign loans in foreign currency have to be repaid and during the years post conflict, an increased proportion of government expenditure is spent servicing debts.² The World Bank has criticized military spending for having 'diverted enormous resources from SSA's development', and 'consuming nearly 50 per cent of government expenditure in countries experiencing the worse destabilisation'.²⁶ One-fifth of developing world debts are reported to be due to arms imports.^{26,27}

SALW as the weapons of choice in modern conflicts in SSA

SALW are the only weapon used in the vast majority of modern conflicts. 90% of the trade in SALW worldwide is legal but more than 50% of the arms in circulation are

illegal. Most illegal arms were initially traded legally but become illegal by brokered sales, theft and corruption. Ways to evade legal controls includes producing arms under license in less well regulated countries. After conflicts, SALW become an accepted part of normal life,² and armed violence remains a problem with mortality rates higher than baseline.²⁸ The WHO and World Bank estimate that SALW violence contributes 15% of the burden of disease in developing countries.¹⁵ In the recent conflict in Rwanda, much of the killing was done with machetes. However, it was SALW in the hands of the Hutu-dominated government and militias that tipped the power balance clearly in their favour.²⁹

Since the cold war the small arms industry has become largely privatized but a license from the producing country's government is required for export. There are 1000 factories in 98 countries, half in Europe and one-third in the USA. While SALW do not cause internal conflict they do multiply the effect, and the impact of development efforts are retarded or reversed by their misuse.¹⁵ The importance of not having small arms in a society is witnessed by the crucial role that decommissioning played in the peace process in Northern Ireland. In 2006, at the UN General Assembly, 153 governments supported an Arms Trade Treaty which will prevent arms transfers which fuel conflict, poverty or human rights violations. Only the USA voted against this.³⁰ However, export control in the USA is considered to be one of the world's best¹⁸ and it is interesting in our study that despite being the major world producer, the USA is not one of the major exporters to SSA. In 1998 sixteen West African states called for a ban on the import, export and circulation of small arms in their states.

CONCLUSION

Graca Machel has said 'Governments must exercise the political will to control the transfer of arms to conflict zones particularly where there is gross violation of children's rights'.¹⁷ It is reasonable to ask, given the UK's commitment to sustainable development in SSA, if we are happy to be one of the major suppliers to a region where half of the countries have suffered recent conflict, when conflict may have a negative impact on child and maternal health and the probability that SALW are the main weapon used. In discussions about sustainable development we must firstly ensure we are not contributing in any way to its hindrance. While discussing the UK's contribution to health in developing countries,³¹ we must also discuss doing no harm.

Competing interests DS is an Honorary Medical Director, Child Advocacy International. BOH has no competing interests.

Guarantor BOH.

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