

**Accidents and poverty in the developing world:
a review of current research and thinking**

Report commissioned by the Swedish Rescue Services Agency

Final Version

29 November 2005

Bastien Affeltranger & Fredrik Thomasson

Swedish Rescue Services Agency (SRSA)
Karlstad, Sweden

TABLE OF CONTENTS

1. About the Authors	3
2. Note to the Reader	4
3. Introduction: Scope of the Report	5
4. Definitions	7
Functional definition	7
Unintentional versus intentional injury	8
Typology of accidents	9
Definitions of poverty	9
5. Poverty & Accidents: Status of Current Research	11
Paucity of information	11
Different ways of studying accidents	12
Poverty features of accidents	12
Is extrapolation from research on developed countries advisable?	13
Box 1: Childhood burns and poverty in Peru	14
Injury and mortality in the developing world	15
Table 1: Causes for deaths by sex and mortality stratum in WHO regions (estimates for 2002)	16
Table 2: Death by injury in WHO regions (estimates for 2002)	16
In a nutshell: focus and limitations of present research	17
6. Understanding Poverty - Accident Linkages	18
Before accidents	18
After accidents	19
Natural disasters and poverty	21
Poverty-accident linkages in a nutshell	23
7. Identifying Research Challenges for Tomorrow	28
Improving the epidemiological study of accidents	28
Features and patterns of accidents: understanding social processes	28
Assessing economic impacts of accidents	29
Occupational accidents: paying more attention	30
8. Involving SRSA in applied research?	31
Knowledge bases and indicators	31
Methodologies for prevention	32
Informing development assistance	32
Cost and benefits analysis of research and prevention efforts	33
Disasters, emergencies and poverty	34
9. Conclusions	35
10. References & Bibliography	37
For further information	37
Bibliography	38

1. About the Authors

Bastien Affeltranger has been doing consultancy in disaster mitigation and participatory processes since 1998. His fields of activity include: risk awareness; post-disaster needs assessment; audit of flood warning systems. References in the UN system include: UNESCO, World Meteorological Organisation (WMO), the International Strategy for Disaster Reduction (ISDR), UNU Institute for the Environment and Human Security (UNU-EHS). Additional references: public institutions; local communities. Activities in Europe, Southern Africa and SE Asia. He is now complementing Ph.D. in Geography (Laval University, Quebec, Canada). Research focus is transboundary cooperation for flood mitigation on the Mekong. Bastien Affeltranger has recently joined the French institute INERIS, where he is developing systemic risk analysis at the Division for Accidental Risks.

E-Mail: bastien.affeltranger@ineris.fr

Fredrik Thomasson has recently worked with several actors within the development sector: the World Bank, the European Commission, the Swedish Agency for International Development Cooperation (SIDA), Stockholm International Water Institute (SIWI) etc. His most recent work is concerned with issues concerning conflicts and its relations to water issues in especially Sub-Saharan Africa. He has a master in Humanitarian Assistance from Uppsala University and is still engaged in academic work at the institution of Peace and Conflict Research, at the moment working on a project commissioned by the Basque government. At present he is based at the European University Institute in Florence, having been awarded a grant by the Swedish Research Council (Vetenskapsrådet).

E-Mail: fredrik.thomasson@iue.it

2. Note to the Reader

Disclaimer

The views expressed and conclusions drawn in this paper are the sole responsibility of the authors Bastien Affeltranger and Fredrik Thomasson and do not necessarily reflect the views of the Swedish Rescue Services Agency (SRSA) / Räddningsverket (SRV). Quotations from other than English language sources are translated by the authors.

Acknowledgements

The authors acknowledge the support of resource persons contacted while drafting this report. This final version of the report also integrates comments and suggestions made at the presentation workshop of the report (31 October 2005, SRSA, Karlstad).

A note on the usage of a few words

Developing countries, South, Third world, poor countries, LICs (Low income countries) etc. We will use the concepts above alternatively, there is of course no way to assemble countries into one single group considering the particularities of each country's situation. Still, the large differences in prevention and mitigation of accidents are one of the many factors that distinguish the gap between rich and poor countries. Likewise it is misleading to assemble all "rich" countries in one group. The attitude towards accidents, both in preventing and mitigating accidents, and the resulting statistics, vary widely also within the group of developed countries.

3. Introduction: Scope of the Report

This report is a contribution to ongoing research work undertaken by the *Swedish Rescue Services Agency (SRSA)/Räddningsverket (SRV)*. This document focuses on the relation between poverty and everyday accidents. In particular, attention is paid to the linkages existing (or to be developed) between poverty reduction and the mitigation of different types of everyday accidents.

Our main approach to this topic is that accidents worsen poverty and hamper individual and collective social and economic development. However, some poverty features are likely to interact with initiatives aiming at accident prevention and/or management. These features include: education, information and level of awareness; risk perception and tradeoffs; exposure to accidents; technical and financial capacity to respond to, or cope with accidents. Fundamental questions include: Do accidents have a more negative impact on poor people than others? To what extent do accidents hinder poverty reduction and the ability of the poor people to improve their social and economic situation?

As requested in the Terms of References, disasters such as those generated by both natural and industrial hazards, have been explicitly excluded from the scope of this study. Authors of the report have however paid attention to the linkages likely to occur between everyday accidents and emergency situations caused by disasters. Questions considered include:

- What is the current status of research – both theoretical and applied – on the relation between poverty and accidents?
- How should the extension of activities of emergency agencies from crisis management into more “developmental and poverty reduction” initiatives be prepared?

It is the purpose of this report to provide an overview of existing research on the issues of accidents in the context of the developing world. This report focuses on everyday life accidents. These include: fires, traffic and public transportation accidents, occupational accidents etc. We discuss individual and collective scales of analysis.

The report is organised as follows. First, a definition of “accidents” is given, followed by a description of current research and available data. Second, the dynamics of accidents is analysed, along with linkages to poverty. The third section of the report identifies research challenges for SRSA, both for policy and action.

4. Definitions

Before discussing technical definitions of accidents it might be worthwhile reflecting on the very notion of accident itself. The traditional view on accidents and injuries is that they are random events, that is pure “accidents”. Nevertheless, the burden of injury on human societies, both in terms of disease and death is great and to a certain extent both constant and quantifiable. The veil of randomness and inevitability might be one of the factors that has detracted attention from the study of accidents and diminished the means allocated to the prevention and mitigation of the effects of these events. Lack of consistent reporting has also been a factor; accidents are often regarded with a tinge of fatalism that impedes that they are reported and registered.

Accidents should instead be considered as preventable non-random events. As such, these events could to a higher degree be addressed and mitigated, even in societies with less material resources available. Accidents are multi-faceted, involving both technical and social dimensions. Scientific and cultural features therefore need to be considered jointly when it comes to preventing and managing accidents.

From an institutional perspective, the concept of accident is frequently connected to the prevention of accidents which often relies on regulations, standards and the developments of lessons learned and “good practices”. This approach is usually sector-based and oriented towards the development of efficient risk analysis and sound response to emergency situations.

Functional definition

A functional definition of accidents can be given as: “*An accident is the destruction, partly or totally, of a technical system, with or without human losses*”. (Morel, 2002:84)¹. Accidents can be generated by four kinds of features:

- *Unknown factors*. A process whereby or wherein a factor that is unknown to system designers or actors will play a decisive role and cause an accident. An example is the unexpected influence of strong winds on the stability of long-length bridges in the 19th century;

¹ In many cases however, accidents involve only human beings, and no technical systems.

- *Combination of factors.* A process whereby various factors combine and generate unexpected consequences that were not considered in the design of the system. An example is the conjunction of multiple hazards (e.g.: natural and industrial) that cause “domino-effect” accidents or emergency situations;
- *Poor decisions.* In that case, accidents result from the making of inadequate decisions or from the inappropriate management of available data and information. In that case, the initial objective is not achieved and accidents can occur;
- *Irrational and absurd decisions.* This is a very particular type of decisions, whereby individuals and group repeatedly make decisions that go against the initial purpose of their action. These decisions are made consciously. This field of research in accidents remains largely unexplored. (Morel, 2002)

However useful to operational purposes, these approaches capture only partly the fundamental nature of accidents as social processes. A more systemic definition of accidents should therefore be considered as well. Everyday accidents are indeed social and technical processes embedded in a complex, systemic framework, with interactions and feedback loops that might or might not be easy to identify, map and monitor.

Analysing the interactions between everyday accidents and poverty features therefore requires an integrated approach that recognises the technical and social (cultural, economical, political) dimensions of the accident-poverty linkages. The analytical study of accidents also requires that epidemiological attention is paid to injury patterns.

Unintentional versus intentional injury

Accidents can also be defined as “unintentional injuries”. *Intentional* injuries are therefore excluded from the definition of accidents commonly used; these injuries include: assaults; stab wounds; homicides; injuries due to firearms; suicide and other types of self-inflicted violence. The distinction between unintentional and intentional is used below by WHO in the mortality estimates presented in table number 2. It is an important distinction to consider when assessing the strategies to adapt when designing interventions meant to mitigate the effects of accidents. In the aggregated form of the WHO statistics the extremely high incidence of intentional injury in the

form of violence in some societies is not obvious. An example is the case of the Philippines where homicide deaths in 1995 constituted 44% of the total deaths by injury. (Consunji, Hyder, 2004)

Typology of accidents

The scope of activities developed by the SRSA division Swedish Centre for Lessons Learned from Incidents & Accidents (NCO) provides a list of examples of accidents: “All kind of emergencies happen everyday: fires, domestic accidents, releases of hazardous substances, floods and forest fires”². This generic definition needs to be enhanced to illustrate the diversity of sectors, contexts and activities related to everyday accidents. These include the following:

- Transport and public transport: Road, train, sea and air;
- Fire: domestic and in industrial facilities;
- Industrial and Chemical accidents; Domestic accidents.

Definitions of poverty

The poor face higher risks in terms of everyday accidents, both in terms of exposure to potential accidents, and capacity to recover from accidents. Poverty-related features include:

- Population density in slums; poor building practices (flammable; low resistance);
- Longer travelling times to jobs and economic hubs (passenger kilometres increase risks);
- Location further from health facilities, fire-stations, etc.;
- Makeshift and informal connections to electricity, fuel, etc.;

² “It doesn’t need to happen”; SRV Website: http://www.srv.se/templates/SRV_Page_1108.aspx

Aggravation of the impacts from accidents that are especially onerous on poorer sections of the population include:

- No or very little access to legal redress;
- Scarce access to health care, both because of lack of financial means and actual physical difficulties in reaching health care facilities as underlined above;
- Poor education;
- Lack of individual or collective insurance etc.

5. Poverty & Accidents: Status of Current Research

Paucity of information

The first thing that must be mentioned when discussing accidents in a development context is regrettably that there is an evident scarcity of empirically valid data and research on the subject. The caveat to ponder when reading this paper and generally in relation to accidents in the third world is that consistent research is scarce, that background data is deficient or at times virtually non-existent and therefore conclusions can only be of a provisory character. This warning will be repeated below. We are aware of the risk of attrition but consider this conclusion as one of the most important guiding factors in all future work on the subject.

There is a general lack of data on accidents in poor countries. The causes for this are manifold. The lack of data is a general problem when investigating conditions in third world countries. A functioning national health care system is the usual source of information on injuries and death by accident. Most very poor countries lack such a comprehensive health system and the scarce resources available are seldom directed towards documenting and information gathering.

It should also be noted that the focus on accidents and prevention of accidents vary widely in the developed world. The difference between different countries' activities in this area might not always be connected to the respective income levels but are also tied to the bias of the public health system, educational levels of different groups in society, cultural factors etc. This is probably also the case in less developed societies. Many public health indicators are not immediately connected to GDP per capita (or any other likewise econometric indicator). For instance, a relatively developed country such as Turkey appears to fare worse on maternal health issues than for instance the considerably poorer Sri Lanka.

One can expect to find similar relationships between countries and their incidence of accidents and how they react, or not react, to the challenge of preventing and mitigating accidents. Future research findings might if they were presented at this point strike us as counter-intuitive. The fact is that we probably do not have enough data to base a well-founded "intuition" on. How such intuitions may govern research is discussed below.

Different ways of studying accidents

There are at least two major ways to study accidents. One way is to investigate statistics of accidents and emergencies in a given city, country, or region. Another way is to understand causal factors of injuries and deaths at the same territorial levels. A major limitation to the latter is the lack of available data, in particular in low and middle-income countries – as it is for instance the case in the Philippines and in several other Asian countries. (Consunji, Hyder, 2004:1111)

The general lack of data is further worsened by technical limitations in the statistical analysis of accidents and injuries. These limitations include: absence of defined catchments areas; lack of triage criteria for trauma admissions (e.g.: in hospitals); ill-defined criteria for consultations (e.g.: by health practitioners); under-reporting and miscoding (e.g.: during periods of political uncertainty). (Consunji, Hyder, 2004) These features add to difficulties for extrapolation of existing health data to local communities or to the general population.

Poverty features of accidents

Socio-economic data, such as income level and socio-professional category, are seldom used as criteria for epidemiological analysis of accident and injury statistics. At least two factors explain this lack of data.

The first factor might be the professional culture of health and accident professionals that still grant little importance to socio-economic features as causal factors in accident processes.

The second factor is probably the absence of specific data collection protocols in the State administration. In other words, the way accident statistics are collected (or not) by State services depends a lot on the way health priorities have been established for a given country.

Rather, discriminants usually relied upon in statistical analysis of injuries stick to basics: age, gender and type of injury. It is the socio-economic context that is missing here. Failing to connect accident statistics with socio-economic data makes it impossible to get a clear picture of the accident-poverty relationship. This lack of data is probably even more worrying in rural areas, where health services and support systems for emergency management are likely to worsen the impact of accidents. Comparison between urban and rural areas is made more difficult, which also

deprives decision-makers from relevant criteria for the allocation of often scarce resources. (Yang et al., 1996:141)

At this stage it is impossible to know to what extent both rural and urban poor populations at all seek help from existing health care facilities. A fair suspicion is that large groups of society in very poor countries never get in actual contact with such facilities because of both difficulties of transport and insufficient financial means to pay for care. Most probable is that effects of accidents, be they heightened mortality or other types of effects such as decreased income-earning capabilities etc., are underreported in especially the developing world.

Is extrapolation from research on developed countries advisable?

A general uncertainty when dealing with accident-related conditions in the developing world is whether conclusions drawn from statistics and research in developed countries can be applied to circumstances in poor countries.

The links between poverty, social groups, educational levels etc. and accidents have been considerably more investigated in developed than in poor societies. An example of an area which has been extensively researched in this respect is the relation between educational and sociodemographic characteristics and traffic accidents in the developed world. (e.g. Borrell et al., 2005; Vaez, Laflamme, 2005; Hasselberg, Laflamme, 2005)

It might seem as a possibility to transfer such findings to poorer societies. Such extrapolation does entail certain risks. Countries, though they might have in common the fact of being poor, may be fundamentally different in other respects. These differences might influence the incidence and dynamics of accidents. Another risk of basing studies on first world parameters is that the design of the research might overlook important factors that are not considered of interest in rich societies.

Box 1: Childhood burns and poverty in Peru

A team of researchers in Peru have made an excellent exposition of the issues discussed above. They investigated children burns in Peru and connected their finding to the larger context of the developing world. (Delgado et al., 2002) The study highlights how poverty, crowding, lack of education, and not being the son or daughter of the household head, are all significant risk factors. It also underlines that previous studies examining socioeconomic status markers as possible risk factors for burns have reported mixed results. Studies referred to conducted in Brazil, England, and Greece determine a positive relationship with crowding, maternal socioeconomic status, and ethnicity. Inversely a Dutch study (van Rijn et al., 1991) found that children from lower socioeconomic status were at a lower risk for burns.

In the Peruvian population, the article sustains, it is clear that children of lower socioeconomic status have a greater risk for burns. The factor most strongly related to an increased risk was the lack of running water. There is a reason for this: shantytown houses in Lima without running water represent the poorest of the poor. Also in Lima shantytowns water heaters are not affordable, and water needs to be heated for cooking and bathing. This large heated water requirement leads to the boiling of liquids in pots that are often placed on the ground to cool or conserve space.

Another important factor was maternal education. Even though education has been repeatedly associated with a risk for burns, it is not clear if this factor is simply a proxy for poverty. Lower incomes and crowding also increased the risk of burns. Scalding was the most common type of burn noted in the study.

Many studies have found that hot water from baths, showers, taps, and kettles were major causes of burns. However, the majority of the study population lacks running hot water and also frequently lacks electricity. The kitchen was the site of the majority of scalds. In Peruvian shantytowns, houses may not contain a separate room for use as a kitchen. Kitchens presumably increase the risk of burns because of the proximity to hot objects such as fire, oil, or boiling water. With the presence of a living room in the house the risk of burns decreased.

After the age of 4, girls were more prone to scalds than boys, which may be due to girls working in the kitchen. Before the age of 4, however, boys were more likely to be burned than girls. This gender difference in the first years of life has been observed in other injuries in children.

The study prognosticates that developing countries that improve their population's access to water and electricity and that have a growing middle class should witness a decrease in the incidence of burns. It still notes that the implementation of intervention programs cannot wait until development occurs. According to the authors prevention efforts are urgently needed to reduce the rate of this unacceptably common cause of injury in children, and such prevention strategies should be developed on a local level in response to risk factors identified in individual areas.

The conclusion highlights a common quandary in development work. The causes for accidents are intimately connected with the general issue of societal development. In the larger perspective the issue of cost effectiveness of accident prevention work must be compared to the costs of promoting "general" development.

Injury and mortality in the developing world

What is clear is that injury as a result of accidents is an extremely important factor in general mortality statistics. Below is a table presenting the most recent mortality data estimates (concerning the year 2002) from the World Health Organization. The statistical information does require some explanation but what is immediately clear from the second table is that the high mortality strata in the developing countries have a considerably higher risk of dying from unintentional injury than in the developed world. Commonsensical “knowledge”, such as the very much greater risk of dying in a traffic accident in the third world is made explicit.

It can be assumed that the poorest groups in already poor societies belong in the higher mortality strata which makes them not only more prone to meet an “accidental” death than a person in the developed world but also considerably more at risk than better off persons in the same society.

That most people in poor societies are more subject to accident risk than their “social counterparts” in developed societies is obviously only a general observation. In certain cases, as discussed below in the case of China, some risks actually rise with increased economical development such as increased road traffic. It is probably too early to prognosticate some kind of bell curve or standard model for how accidents risks increase with economical growth and then recedes when resources (not only material but also of an intangible kind such as information, regulation and enforcement etc.) can be allocated to prevention and management. It should also be underlined that mortality is only one facet of the effects of accidents.

Table 1: Causes for deaths by sex and mortality stratum in WHO regions (estimates for 2002)

	TOTAL						AFRICA		AMERICAS			SOUTH EAST ASIA		EUROPE			EAST. MEDITERR.		WESTERN PACIFIC	
	ALL		MALES		FEMALES		mortality stratum		mortality stratum			mortality stratum		mortality stratum			mortality stratum		mortality stratum	
							high child, high adult	high child, very high adult	very low child, very low adult	low child, low adult	high child, high adult	low child, low adult	high child, high adult	very low child, very low adult	low child, low adult	high child, high adult	low child, low adult	high child, high adult	very low child, very low adult	low child, low adult
POPULATION (000)	6 224 985		3 131 052		3 093 933		311 273	360 965	333 580	445 161	73 810	298 234	1 292 598	415 323	222 846	239 717	142 528	360 296	155 400	1 562 136
	(000)	%	(000)	%	(000)	%	(000)	(000)	(000)	(000)	(000)	(000)	(000)	(000)	(000)	(000)	(000)	(000)	(000)	(000)
I. Communicable diseases, maternal & perinatal conditions, nutritional deficiencies	18 324	32.1	9 365	31.3	8 959	33	3 245	4 426	167	482	227	625	5 143	241	166	156	92	1637	125	1 573
II. Noncommunicable conditions	33 537	58.8	17 062	57.1	16 474	60.7	1 068	1 184	2 380	1 898	268	1 341	6 082	3 489	1 590	3 131	501	1 529	937	8 076
III. Injuries	5 168	9.1	3 464	11.6	1 705	6.3	344	397	173	321	46	225	1 242	190	110	492	113	279	84	1 145

Table 2: Death by injury in WHO regions (estimates for 2002)

	TOTAL						AFRICA		AMERICAS			SOUTH EAST ASIA		EUROPE			EAST. MEDITERR.		WESTERN PACIFIC	
POPULATION (000)	6 224 985		3 131 052		3 093 933		311 273	360 965	333 580	445 161	73 810	298 234	1 292 598	415 323	222 846	239 717	142 528	360 296	155 400	1 562 136
	(000)	%	(000)	%	(000)	%	(000)	(000)	(000)	(000)	(000)	(000)	(000)	(000)	(000)	(000)	(000)	(000)	(000)	(000)
Unintentional injuries	3 551	6.2	2 307	7.7	1 244	4.6	258	230	120	168	33	149	931	137	76	321	98	196	48	779
Road traffic accidents	1 192	2.1	869	2.9	323	1.2	96	99	49	76	10	72	224	46	22	59	58	75	14	290
Poisoning	350	0.6	225	0.8	125	0.5	21	18	14	2	1	8	87	6	6	99	3	12	1	74
Falls	392	0.7	236	0.8	156	0.6	11	9	18	12	1	15	106	47	9	24	6	17	7	108
Fires	312	0.5	120	0.4	192	0.7	24	20	4	3	1	14	170	3	3	18	8	24	2	18
Drowning	82	0.7	262	0.9	120	0.4	36	29	4	15	3	14	84	4	6	28	5	21	6	126
Other unintentional injuries	923	1.6	595	2.0	328	1.2	71	56	30	58	18	26	261	32	31	94	18	47	18	162
Intentional Injuries:	1 618	2.8	1 157	3.9	461	1.7	86	167	53	154	13	76	310	53	33	170	15	83	36	366
Self-inflicted	873	1.5	546	1.8	327	1.2	15	19	35	26	2	37	209	48	23	92	9	25	35	296
Violence	559	1.0	445	1.5	114	0.4	57	77	17	119	10	28	85	4	8	61	4	22	1	65
War	172	0.3	155	0.5	17	0.1	14	71	0	8	0	10	11	0	2	17	0	35	0	3

Data from WHO 2004, please see http://www.who.int/whr/2004/report04_en.pdf for definitions and further data.

In a nutshell: focus and limitations of present research

Based on the elements above, this section identifies some major limitations of existing research on accidents and poverty.

Focus of present research:

- Data is mainly coming out of middle income countries, not low income countries
- Data is missing in countries with weak health system or deficient national statistics
- Very little information on concerted efforts of development actors in the field of accidents
- A tendency to export research methodologies and criteria to situations that require specific approaches
- Little research on accidents, if any, is focussing on the poorest segments of the population

Limitations of present research:

- Strong caution needed when adapting rich world research methodologies to poor countries
- Many sources underline the specific conditions of each situation
- In a few cases we have found data comparing rich vs. developing country conditions the results have sometimes been “counter intuitive”
- No evidence that mitigation efforts will have the same effects in different settings
- Data from health care systems seldom differentiate between social groups: analysis is difficult or impossible

6. Understanding Poverty - Accident Linkages

Before accidents

Information gap

Poor communities are likely to be ill informed about everyday accidents. This lack of information affects their capacity to a) identify features likely to cause (e.g.: home use of flammables), or to worsen accidents (e.g.: not wearing a helmet while driving motorcycles), and to b) know what measures should be taken in the immediate aftermath of an accident (e.g.: first aid moves).

At least two factors explain this lack of information: a) absence, or misunderstanding of awareness-raising campaigns for the public, and b) disconnection from social ties or networks providing “official” (i.e. State-produced) information on accidents.

The influence of the information gap is not a distinctive feature of developing countries only. In European countries for instance, education level inequalities have been found to play a role on the mortality of transportation injury. Results of a recent research show that among middle aged and elderly men those with a low educational level had a higher risk of dying in transportation accidents. Instead, no inequalities were found among women. (Borrell et al., 2005:138).

Exposure to accidents

Poverty often increases exposure to everyday accidents, in particular in developing countries. This is for instance the case of fire accidents in the Philippines, where overcrowding in urban slums may worsen the consequences of a fire outbreak. Another example is the case of Peru cited above. Additional structural features of slums contribute to the kinetics and spreading of fires. These features include: storage of flammables in house (for cooking, heating and power generation); wooden structure of houses, lack of running water etc. Many of these factors are obviously also present among poor populations in developed countries.

High vulnerability

Physical resistance of the poor to accidents can be reduced as a consequence of various factors:

- *Food security.* Malnutrition and lack of proper food/drinking water.
- *Health (1).* Uncured disease or problems caused by lack of hygiene.
- *Health (2).* Weakness caused by an existing wound or injury from a previous accident and that has not been cured due to lack of financial resources.
- *Lack of self-protection.* Due to low awareness of risks and the negligence of employers (informal or not) the poor are most probably more exposed to occupational accidents. Examples include: not wearing a helmet, a pair of gloves or safety glasses on a workplace or in a facility. Workplace accidents are consistently higher in countries with large informal economies where building work etc. is often carried out by unlicensed and uncontrolled operators. The people active in especially manual informal work belong by definition to the poorer parts of the population.
- *Cultural and political factors.* In some cases, there are cultural factors that inhibit people from relying on “modern” medicine for treating consequences of accidents. “Traditional” healthcare is chosen instead. Additional factors, such as political status in a region of country, may also prevent official declaration of accidents and injuries. This is for instance the case of illegal migrants and other social groups cast out by the central State authorities.

Assessing the vulnerability of the poor to accidents should go beyond mere physical and physiological considerations. As social groups established in a continuum of social, economic, cognitive and political features and constraints, accident prevention for poor communities requires a systemic approach to that issue.

After accidents

Injury and income generation

Accidents cause injury, which can partly or totally deprive individuals of their physical capacity to perform professional activities and other livelihood functions (farming; fetching wood and water etc.). Injury can therefore maintain or trigger poor people into a vicious cycle of poverty.

Injury and health

As a major consequence of accidents, injury has been recognised as an important emerging health problem in developing countries. However, detailed data on characteristics of injuries are often lacking in the developing world as noted above. (Murray and Lopez, 1996) This is for instance the case in China, where the limitation of the length of hospital records usually makes detailed epidemiological analysis a difficult, if not an impossible task. (Yang et al., 2005:137)

In conclusion, both fatal and non-fatal injuries have a direct impact on households' livelihood conditions and broader sustainability. Details of this interaction are given below:

Features related to fatal injuries:

- A consistent & high element of overall mortality statistics
- Deaths by unintentional injury claim ca 6 % of total world mortality (Source: WHO 2002 estimates)
- Road traffic accidents is the single most important factor with more than 2 % of deaths
- Poisoning, falls, fires and drowning are other important categories
- Poor parts of the population are generally overrepresented in the high mortality stratum
- A major impact on household income base & stability

Features related to non-fatal injuries:

- Availability of data for non fatal injury is consistently lower than for mortal injury
- The consequences of non fatal injury is thus less investigated
- This is especially the case for low income countries with scarce data collection and deficient health care systems
- Major impact on household welfare
- Effects on social and family structures
- Psychological effects (individual & collective)

Studying the linkages between poverty and accidents however reveals a set of less tangibles features and broader issues. These include:

- The traditional view on accidents and injuries is that they are random events
- Daily accidents are often considered as socially “normal” phenomena
- A common component towards accidents is thus a widespread “fatalism”
- Such fatalism may though be “rational”, there is a trade-off between risks, it may be more important to secure household income than protect yourself from accident risks
- Many factors are involved; economy, personal safety, perceptions of risk etc.

Natural disasters and poverty

Supporting sustainable development requires that attention be paid to disaster mitigation in poor segments of society. Indeed, disasters are no longer viewed as extreme events created entirely by natural forces but as unresolved problems of development. (Yodmani, 2001:2) Human communities and socio-economic infrastructure and activities threatened by natural hazards are not seen as “passive” assets anymore. A strong link exists between patterns of the social fabric on the one hand, and the bottom-line consequences of disasters on the other.

Although SRSA made it clear that natural disasters are excluded from the scope of this report, it appeared quite clear to the authors that a certain amount of attention should be given to the issue. The reasons and consequences to that choice are provided below.

- *Integrated approach to accidents.* Emergencies are not generated by everyday accidents only. Natural disasters too are likely to involve an important number of victims, and to request special technical means and response teams.
- *Disaster impacts on the poor.* As natural disasters often affect poor communities the hardest, attention needs to be paid to linkages between poverty features and disaster magnitude.
- *Sustaining socio-economic development.* Disasters trigger accidents and emergencies that have long-lasting consequences on the social fabric. These impacts jeopardise efforts aiming at poverty reduction.

Measuring poverty (in terms of data, patterns and indicators) is important to describe its relationship to natural catastrophes. (Freeman, 2000:1) Poverty is a major determinant of patterns of social vulnerability to disasters; poverty influences key features of risk. These include:

- *Exposure to hazard.* Poor communities often settle in marginal, hazard-prone areas. This is for instance the case when communities leave highland areas in the hope of finding better living conditions in (overcrowded) cities. Precarious urbanisation and building patterns usually weaken structural (physical) resistance to natural hazards, thus worsening the consequences of disasters.
- *Risk perception and tradeoffs.* To the poor, there are urgent needs other than natural hazards. These needs include: food security; income generation; securing of land tenure; safety from social/political instability; etc. Such “competing” threats to livelihood conditions of the poor often lead to risk tradeoffs whereby the prevention of everyday accidents is not ranked first on the behavioural agenda. Such tradeoffs among various risks probably are the strongest constraint to an efficient mitigation of accidents for the poor.
- *Emergency response and adaptive capacity.* The poor often lack cognitive resources to assess risks; these resources include for instance: information and knowledge on hazard characteristics and manifestations of risk. In addition, due to a lack of technical and financial resources, adaptive capacity (to emergencies) and rehabilitation capacity (to recover from a disaster/accident) are usually low and remain heterogeneous. (Dayton-Johnson, 2004:8)

For instance, a clear link of natural disasters to poverty is through infrastructure: access to infrastructure is often a measure of poverty. Infrastructure is a key component of economic growth; the loss of infrastructure may have significant indirect and secondary costs that directly impact the poor.

There are however reasons for hope, in that poor communities may have unexpected resources making them capable of coping with the consequences of accidents and/or extreme events such as natural disasters: “*Though poor communities are economically vulnerable, they very often have social, cultural and political*

capabilities to cope with disasters, which are the greatest assets in disaster management.” (Yodmani, 2001:7)

Poverty-accident linkages in a nutshell

Based on the above, several salient features can be drawn from the analysis of the poverty-accident linkages.

First, the poor appear to be more exposed to everyday accidents than other social groups. Reasons to that include exposure, response capacity and resilience features:

Exposure features:

- Population density in slums
- Poor building practices (flammable; low resistance)
- Longer travelling times to job and economic hubs (passenger kilometres increases risks)
- Makeshift and informal connections to electricity, fuel etc.

Response capacity features:

- Location further from health facilities & fire-stations
- Lower self-help capacity (first aid, etc.)

Resilience features:

- Poor knowledge of/access to legal redress
- Poor access to health care & insurance
- No clear understanding of coping mechanisms

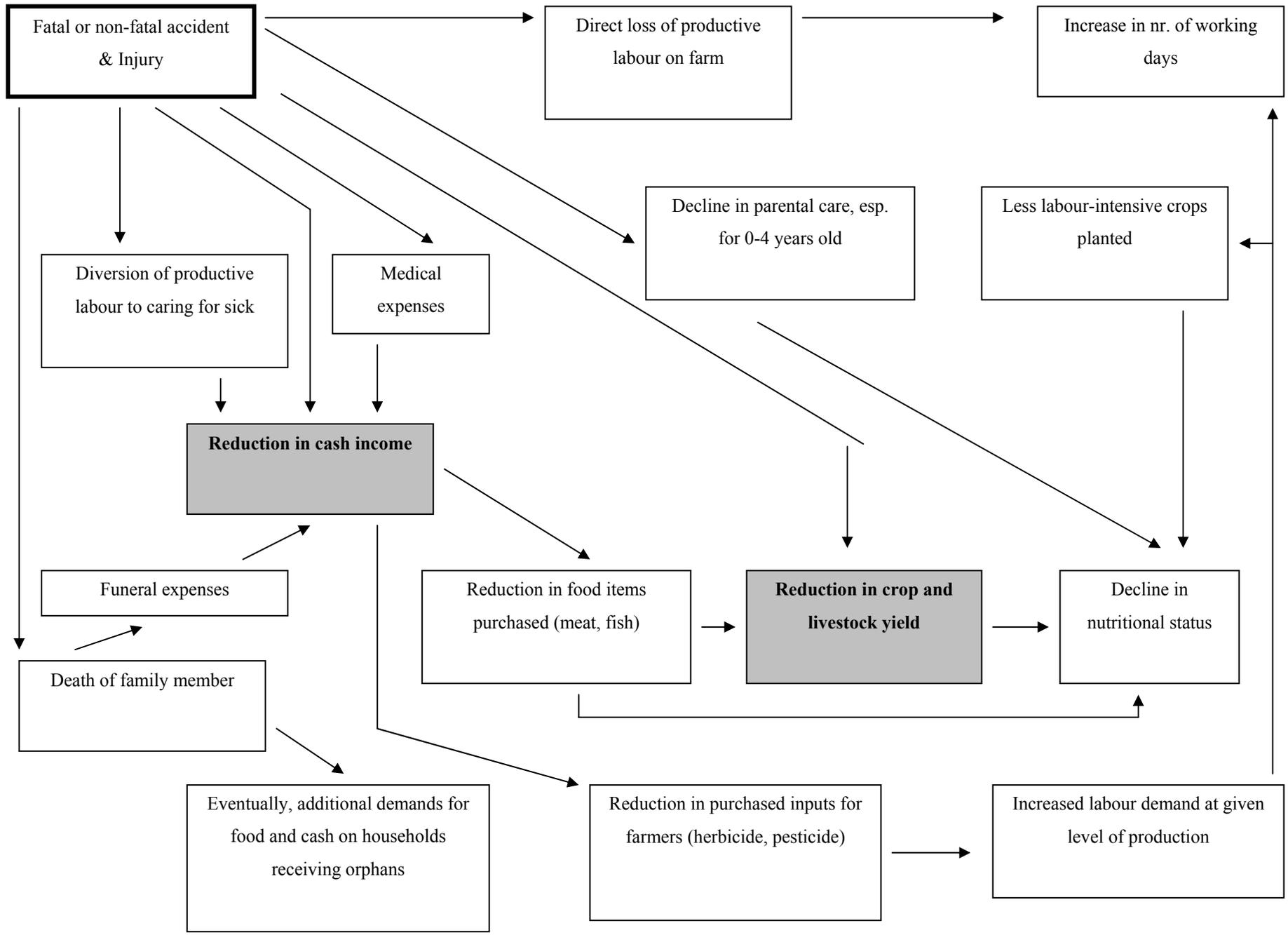
Second, vulnerable groups can be identified among the poorest segments of society. These groups are among the following:

- Most data indicates that children are one of the worst affected groups when it comes to everyday accidents
- To what extent women are worse affected than men is debatable, if especially if work place accidents are taken into account

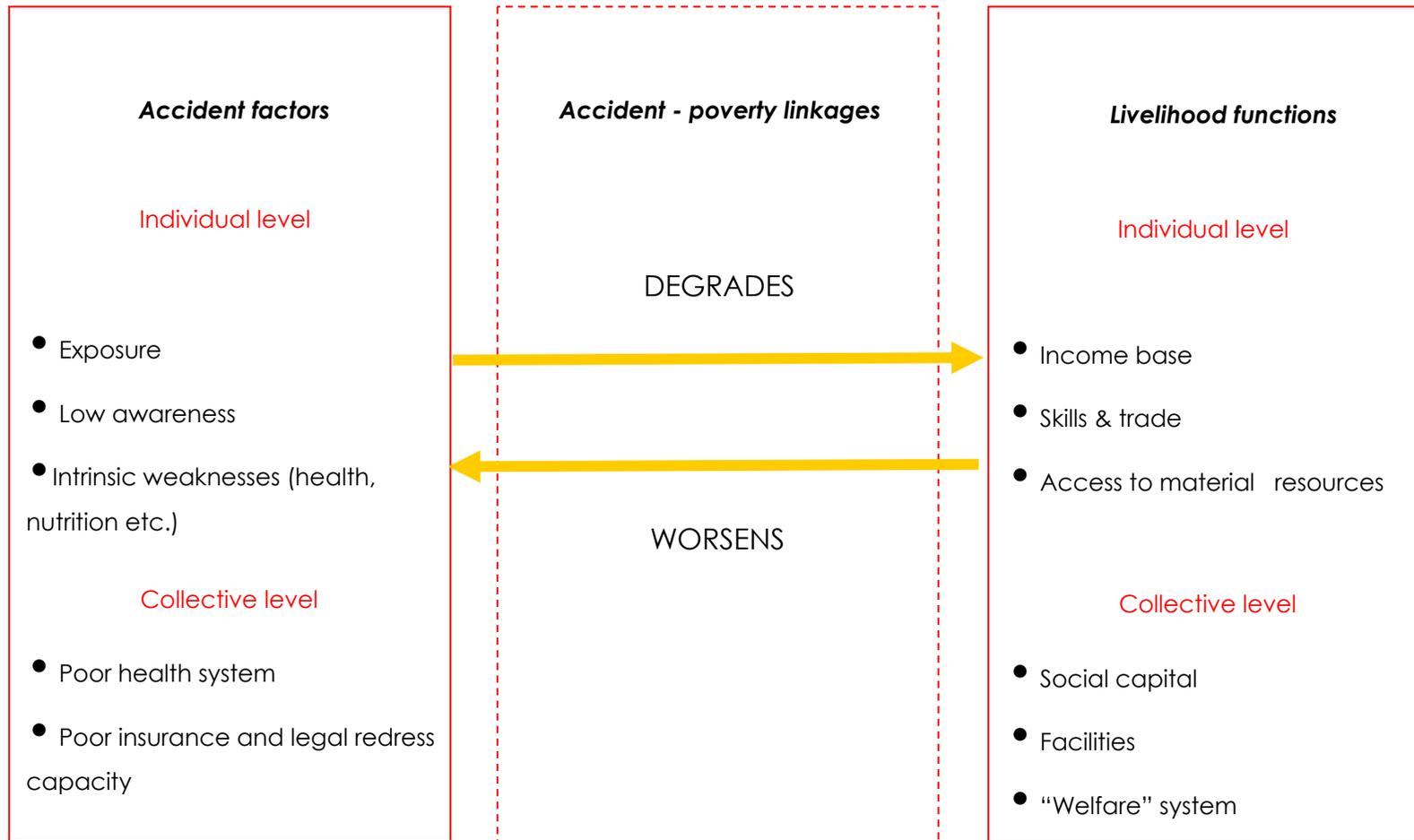
- If taking into account the secondary effects of accidents one of the situations that have important impacts is that of becoming/being a widow which in some cultures creates substantial negative effects, both social and economical
- The impact of accidents is often related to the role of the affected individual (wage earner, child carer etc.)
- Very little information on the situation of the elderly. However, lessons learned from research on natural disasters shows a higher susceptibility of the elderly to accidents,

The two following figures offer a synthesis of the concepts presented above:

- Based on the example of productivity features in rural areas, the first figure shows how an accident can impact the income base of a household;
- The second figure shows the linkages between accident factors and livelihood functions (source: authors).



Source: ad. from Barnett & Blaikie, 1992



7. Identifying Research Challenges for Tomorrow

Based on the review provided earlier in this report, this section identifies research needs of accidents and poverty in the developing world. These challenges also connect to ongoing efforts to link the prevention and management of accidents with sustainable development objectives.

Improving the epidemiological study of accidents

Epidemiology is an essential tool to understand accident patterns and to consequently identify accident-prone individuals, groups, factors and processes. In addition, a better understanding of death and injury patterns of accidents can help improve services for the management of emergencies involving poor communities. Targeted applied research on accident epidemiology in poverty context would probably be needed to fill this information gap.

Additional research and investment are also needed in solutions for data collection and analysis (e.g.: standardised coding of injuries and accidents³; enhanced accuracy of collected and processed data; methodological protocols for surveys and questionnaires); data storage (e.g.: data bases; information systems); information visualisation (e.g.: Geographical Information Systems, GIS); and information dissemination (e.g.: awareness-raising material; training packages; easily accessible information targeting poor communities etc.).

A necessary side-measure of the above should be the training of civil servants and staff involved in the management of accidents and emergencies. The contents of this training should include: detection of poverty-related features; collection of socio-economic statistics; monitoring of accident-prone communities; protocols for information management and reporting to policy levels.

Features and patterns of accidents: understanding social processes

Accidents are social processes embedded in the intricacies of the social fabric. Anticipating accidents and improving the management of emergency and post-emergency situations therefore requires an improved understanding of the social

³ See for instance the International Classification of Disease – 10th Revision (ICD-10), World Health Organization, 1992.

factors and processes leading to accidents. The multi-factorial aetiology⁴ of injuries is indeed complicated by the uniqueness of each developing nation's cultural and social environment. (Hyder, 2002) Only such analysis of cultural and social processes can allow a clear understanding of injury and accident mechanisms in different social and geographical settings.

Gender issues are easily discerned in existing statistical data and a gender perspective is often applied in the research efforts tracked. More information on how sex and age influence risk and outcome of accidents and injuries is needed to be able to efficiently address prevention and mitigation.

Investment in applied research on these issues is therefore needed; it should involve social sciences such as: anthropology, sociology, psychology and geography. This multi-disciplinary approach will enable authorities and accident practitioners to a) design a policy for accident prevention and to b) assess the role played by poverty features in the dynamics of accidents.

Assessing economic impacts of accidents

Applied research in economics is needed to better assess the impact of everyday accidents on key features of poverty. These include: level of income; livelihoods; support systems etc.

Additional investment is needed in investigating linkages between social and economic development, on the one hand, and accidents, on the other. One of the most important issues to consider is whether a consequence of development can be an increase in the number of accidents? It is well clear that social and economic development is not a process that equally benefits all social groups. In other words, is it possible that development induces an increased rate of accidents for poor segments of society?

Road and traffic accidents could be a case in point. In China for instance, motorisation is increasing rapidly. Roads and traffic safety strategies, such as those implemented in developed countries (e.g.: speed limits and other regulations, driver education and information) have though not been implemented in relation to the quick increase of traffic and car ownership. (Yang et al., 1996:140) Consequently, traffic-

⁴ Aetiology; the causation of diseases and disorders as a subject of investigation.

related mortality rates are still increasing in China, although the country is economically developing.

Occupational accidents: paying more attention

As mentioned above, the poor might be more exposed, or vulnerable to occupational accidents. Authors of the report therefore suggest that investment in made in applied research on this kind of everyday accidents.

In terms of methodology, such research effort should first focus on economic sectors that generate the largest share of accidents (and/or the more damaging ones). Second, an analysis of accident patterns is needed – for instance, a behavioural analysis of “safety attitudes” on workplaces can be performed. Third, workers should be involved in the development of awareness-raising campaigns for improved safety-at-work – together with financial investment in safety devices (helmets, gloves, glasses, earplugs, etc.).

Last but not least, managers of workplaces and factories need to be involved in these research initiatives, as well as international agencies, e.g. the International Labour Organisation (ILO). Information recently published by the ILO underlines the gravity of the issue. According to new research some 2.2 million people die of work-related accidents and diseases each year. This number may be vastly underestimated due to poor reporting and inadequate coverage of health systems in many countries. Managers also have an important role to play for contingency planning and management of emergencies caused by accidents. Only a genuine commitment on the behalf of companies/employers and managers can ensure sustainability of strategies aiming at accident prevention.

The next section discusses research priorities for the production of information with the explicit purpose of ameliorating decisions on policy. Such policy should in the best case identify the actions needed on the institutional levels to address accidents in relation to the poorest parts of the population.

8. Involving SRSA in applied research?

In addition to the research needs identified above, this section suggests directions for SRSA to get involved in applied research pertaining to poverty-accident linkages.

Improved collection and processing of accident-related data is key to a better understanding of the epidemiology of injuries and can serve as a catalyst for furthering a national health agenda. For instance, in the Peru case discussed above the research was conducted with the explicit goal to chart the characteristics of burns in children and to identify risk factors (such as crowding, poverty and poor maternal education). This study served as a basis for devising future prevention programmes. Designing appropriate public policies for the prevention of accidents in poor communities requires sound knowledge bases, indicators and improved methodologies.

Knowledge bases and indicators

Additional research is needed in the development of a knowledge base related to accidents-poverty interactions and linkages. The function of this knowledge base is to provide decision-makers with accurate and up-to-date information on accidents and poverty in their own city/country/region. The development of accident-related knowledge bases should capitalise upon already existing databases (e.g.: Ministry of Health; State services for occupational health; State services for road safety; etc.).

Additional research is also needed in the development of accident-related and poverty-related indicators. The purpose of these indicators is to provide decision-makers with a ready, easily understandable picture of the status of the relationship between poverty and accidents. Indicators are needed to design, implement and evaluate policies and strategies related to the mitigation of everyday accidents in poverty contexts.

Such analysis of statistical sources can have far-reaching implications for the design, implementation and assessment of public health policies. This is for instance the case of drowning accidents in the Philippines. In this country, the analysis of injury-related data demonstrated a combination of high case fatality rates, under-

reporting (in health services and administration), and possible inadequacies of pre-hospital care available for victims. (Consunji, Hyder, 2004)

Methodologies for prevention

As discussed above the simple transfer of injury prevention from developed countries to the developing world is not desirable without making the appropriate modifications and adaptations to the developing country's particular circumstances. (Mohan, 1997) Such adaptations require an analytical process featuring the following steps⁵:

1. Definition of the magnitude, scope and characteristics of the injury and accident burden in a country;
2. Identification of risk factors and definition of those amenable to intervention;
3. Analysis of potential interventions with regards to costs, effectiveness and acceptability, prior to implementation.

Investment is needed in applied research on the selection and transfer of developed world methodologies for the prevention or mitigation of everyday accidents in developing countries. A first step could be for the SRSA to investigate the efforts made in this direction by development actors and other civil protection agencies.

Informing development assistance

Efforts aiming at sustainable development and accident prevention also need improved information to be best efficient in developing countries. A way to design aid strategies that are relevant to actual, local needs is to develop "national injury and accident profiles". Such profiles aim at the following purposes:

- Provide a detailed profile of injuries and accidents in a given city/country/region;
- Identify high-risk groups and risk factors;
- Highlight information gaps and available data (with estimation of accuracy, quality and confidence level of these data);

⁵ Adapted from: Consunji and Hyder, 2004:1111; Krug et al., 2000.

- Devise methodologies for bottom-up (e.g.: community-based) prevention of everyday accidents.
- Recommend improvements in injury surveillance and accident prevention.

Such efforts to consolidate methodologies for accident-related assistance should rely on extensive benchmarking with input from the development aid community: United Nations agencies (e.g.: UN-Office for the Coordination of Humanitarian Assistance, OCHA); Non-Governmental Organisations (NGOs) involved in accident prevention and relief; health and crisis NGOs (e.g.: Médecins Sans Frontières, MSF); other regional aid initiatives (e.g.: European Union's Humanitarian Office, ECHO); etc. Fostering South-South cooperation has also been identified as a key feature of the effective prevention of accidents and sharing of best practices and lessons learned. This is for instance the case in the field of road safety, engineering and enforcement. (Consunji, Hyder, 2004:1116)

Cost and benefits analysis of research and prevention efforts

Presupposing that new data on the link between poverty and accidents will be available in the near future, the next step is to discuss what direction such efforts should take. Most certainly such efforts will be articulated on several levels such as support to regulation and national authorities focussing on accidents and injury; public education and awareness building on risks and preventive measures etc.

What is most pressing in the case of shantytowns in Peru? To provide access to piped water in every kitchen, to make electricity affordable and feasible for heating water and cooking, to implement a housing programme where a separate room can be used as kitchen etc.

Experience tells us that resources generally are scarce when it comes to accident prevention, probably even more so when it comes to protecting the poorest groups in already poor societies.

Efforts aiming at the alleviation of the effects of accidents and injury should consider the cost effectiveness and if possible always relate to the larger framework of development work carried on in a particular context or society. To make interventions cost-effective and to determine the level and situation where agencies should step in

and offer assistance is a challenge that only can be met if more knowledge is available on the many facets of the relationship between accidents and poverty.

Disasters, emergencies and poverty

Despite an often perceived focus on disasters in the third world, by for instance media and aid agencies, little work has been done to date to measure the direct and indirect, short- and mid-term impacts of natural catastrophes to developing countries – and to poor communities in particular. (Freeman, 2000:4)

- *Understanding disasters/poverty interactions.* It is becoming clear that the vulnerability of the poor is complex and varied. (Yodmani, 2001:8) The poverty debate however fails to account for the role of natural catastrophes as a development issue. The experience of agencies specialised in the management of accidents and emergencies should be capitalised upon to demonstrate how poverty worsens the impacts of accidents, and disrupt social and economic development.
- *Improving loss assessment.* The current state of the art tends to measure the direct economic loss caused by disasters considered as single events. In doing so, analysts fail to recognise repeating patterns in catastrophes, and to assess the role that is played by poverty features. Improving loss assessment should address a wide range of stakeholders: individuals and households; business owners; livelihood functions for communities; etc. For instance, existing results in microfinance⁶ should be capitalised upon.

These two directions for further research should be considered as a way to improve dialogue and sharing of lessons learned between professional communities dealing with development aid, poverty reduction and accident/emergency management.

⁶ For instance: micro-credit activities at community level.

9. Conclusions

There is a clear need for SRSA to get involved in applied research efforts on the linkages between poverty and accidents. Both poverty reduction, and the mitigation of everyday accidents, can benefit from such an effort.

Considering increased support to research into the relationship between poverty and accidents therefore is a welcome move from SRSA. Investing in the mitigation of accidents is complementary to existing knowledge and know-how already available at SRSA in the field of emergency management.

It is however suggested that the following four questions and issues be considered by SRSA prior to engaging in such research effort. Below each of these, the authors have inserted elements of answer:

1) Why do research: what for, and for whom?

- Identifying objectives in terms of poverty reduction and prevention of accidents
- Identifying the end-users: communities and families, aid/relief agencies, state institutions etc.
- Identifying and exploring coping mechanisms to avoid the victimisation of affected groups

2) Methodology of research:

- Collecting appropriate data: identifying sources and methods for data harvest and analysis
- Understanding the poverty-accident linkages and how accidents influence the social fabric

3) Fostering multidisciplinary approaches

- Public administration: data collection in health systems
- Public health: epidemiology of accidents & injury
- Sociology: studying the social fabric of accidents
- Ergonomics & Engineering: technical aspects
- Geography: land use and habitat; transport; GIS etc.

4) *Taking stock of existing research in related areas*

- Disaster mitigation
- Risk management
- Disabilities
- Occupational health etc.

Finally, the following factors may be considered important when and if promoting further involvement of SRSA in the field of poverty related research and accident mitigation and prevention in development contexts:

- *Taking stock of existing expertise.* Emergency experts working at SRSA have been involved in numerous operational activities, many of them involving poor communities. This experience must be recognised and relied upon to design any SRSA research program on poverty.
- *Adapting professional culture.* Because it has been involved for many years in emergency activities, SRSA as an institution and its staff have developed a specific organisational culture. Getting involved into poverty related activities will require a progressive review of this culture and possibly changes in operations management.
- *Investing in sustainable research.* In the developing world, aid and development assistance and projects often fail once donors have withdrawn. In many cases, lack of funding and ownership make long-term maintenance and follow-up activities impossible. SRSA commitment should therefore seek sustainable contacts for project development.

10. References & Bibliography

All URLs cited in the paper were active as of 26 September 2005.

For further information

Research centres and Programmes

- *Research Center on Chronic Poverty*, Manchester University, United Kingdom. Info: www.chronicpoverty.org
- *Institute for Environment and Human Security*, United Nations University (UNU-EHS), Bonn, Germany⁷. Info: www.unu.edu/ehs
- *INERIS* (France): on industrial hazards and related accidental risks. Info: www.ineris.fr

Scientific and professional journals

- *Accident Analysis and Prevention*
- *International Journal of Epidemiology*
- *Injury Prevention*
- *American Journal of Public Health*
- *The Lancet* (for mortality, disability and diseases studies)

Information can also generally be found in public health journals (a plethora of titles) where injury is studied in an public health perspective. Many topics such as burn injury, transport accidents etc. are represented by specialised publications investigating specific areas. However, when investigating publications on development there is little information to be found on accidents and injury. Any research on accidents supported by SRSA should be requested to largely communicate on its findings.

⁷ UNU-EHS does research on patterns of social vulnerability to natural disasters, with a focus on water-related hazards.

Bibliography

Abbas, Khaled A. (2004) “Traffic safety assessment and development of predictive models for accidents on rural roads in Egypt.” *Accident Analysis and Prevention* 36 (2004) 149–163

Barnett, A., Blaikie, P. (1992) *Aids in Africa: Its Present and Future Impact*. London: Belhaven

Borrell, et al. (2005) “Education level inequalities and transportation injury mortality in the middle aged and elderly in European settings”, *Injury Prevention* 2005; **11**: 138-142

Consunji, R. J., Hyder, A. A. (2004) “The burden of injuries in the Philippines: implications for national research policy”, *Accident Analysis and Prevention* 36 (2004) 1111-1117

Dayton-Johnson, J., (2004) Natural disasters and adaptive capacity, Working Paper No. 237, *Research Programme on Market access, Capacity Building and Competitiveness*, OECD Development Centre, August 2004
<http://www.oecd.org/dataoecd/30/63/33845215.pdf>

Delgado, J., M E Ramírez-Cardich, R H Gilman, R Lavarello, N Dahodwala, A Bazán, V Rodríguez, R I Cama, M Tovar and A Lescano. (2002) “Risk factors for burns in children: crowding, poverty, and poor maternal education” *Injury Prevention*. 2002, 8, pp. 38-41

Freeman, P.K., (2000) (?), Infrastructure, natural disasters and poverty, Unpublished paper, International Institute for Applied Systems Analysis (IIASA), Laxenburg, Austria, 9 p. <http://www.iiasa.ac.at/Research/RMS/june99/papers/freemansolo.pdf>

Hasselberg, Marie and Lucie Laflamme (2005) ”The social patterning of injury repetitions among young car drivers in Sweden” *Accident Analysis and Prevention* 37 (2005) 163–168

Hyder, A. A. (2002) “Letters to the Editor – Structural adjustment in health in Pakistan: defining the questions”. *International Journal of Epidemiology* 31, 509

- Krug, E.G., Sharma, G.K., Lozano, R. (2000) "The global burden of injuries", *American Journal of Public Health* 90 (4), 523-526
- Lama L.T et al. (2005) "Different quantitative measures of the impact of injury deaths on the community in the Guangxi Province, China." *Accident Analysis and Prevention* 37, 2005, 761–766
- Maghsoudi, Hemmat and Naser Samnia (2005) "Etiology and outcome of pediatric burns in Tabriz, Iran" *Burns* 31, 2005, 721–725
- Mathangi Ramakrishnan, K., Janani Sankar and Jayaraman Venkatraman (2005) "Profile of pediatric burns. Indian experience in a tertiary care burn unit" *Burns* 31 (2005) 351–353
- Mohan, D. (1997) "Injuries in the less industrialised countries: what do we need to know?" *Injury Prevention* 3 (4), 241-242
- Morel, C. (2002) *Les décisions absurdes*, Paris: Folio Essais, 379 p.
- Murray, C.C.J.L., Lopez, A.D. (1996) *The Global Burden of Disease (Volume 1), Global Burden of Disease and Injury Series*. Harvard School of Public Health, Boston, USA.
- Murray, Christopher J L and Alan D Lopez (1997) "Mortality by cause for eight regions of the world: Global Burden of Disease Study." *Lancet* 1997; 349: 1269–76
- Tercero, Francisco and Ragnar Andersson (2004) "Measuring transport injuries in a developing country: an application of the capture-recapture method" *Accident Analysis and Prevention* 2004, 36, 13–20
- Vaez, M and L. Laflammea (2005) "Impaired driving and motor vehicle crashes among Swedish youth: An investigation into drivers' sociodemographic characteristics" *Accident Analysis and Prevention* 37, 2005, 605–611
- Van Rijn OJ, Bouter LM, Kester AD, et al. (1991) "Aetiology of burn injuries among children aged 0–4 years: results of a case-control study". *Burns* 1991, 17, 213–9
- WHO (1992) *International Statistical Classification of Diseases and Related Health Problems, 10th Revision*. WHO, Geneva.

WHO (2000) *Injury: a leading cause of the global burden of disease*. World Health Organization: Dept. of Injuries and Violence Prevention. Noncommunicable Diseases and Mental Health Cluster. Geneva.

[http://www.who.int/violence_injury_prevention/publications/other_injury/injury/en/
http://whqlibdoc.who.int/publications/2002/9241562323.pdf](http://www.who.int/violence_injury_prevention/publications/other_injury/injury/en/http://whqlibdoc.who.int/publications/2002/9241562323.pdf)

WHO (2004) *The World Health Report: 2004: Changing History*.
<http://www.who.int/whr/previous/en/index.html>

Yang, L., et al. (2005) “Epidemiological profile of mortality due to injuries in three cities in the Guangxi province, China”, *Accident Analysis and Prevention* 2005, 37, 137-141.

Yodmani, S. (2001) *Disaster risk management and vulnerability reduction: protecting the poor*, *Social Protection Workshop 6: Protecting Communities – Social Funds and Disaster Management*, *Asia and Pacific Forum on Poverty: Reforming Policies and Institutions for Poverty Reduction*, 5-9 February 2001, Asian Development Bank, Manila, The Philippines <http://www.adb.org/Poverty/Forum/pdf/Yodmani.pdf>