

Inequalities in child mortality in sub-Saharan Africa: A social epidemiologic framework

Gloria Macassa¹, Johan Hallqvist¹, John William Lynch²,

1) Division of Social Medicine, Department of Public Health Sciences, Karolinska Institutet, SE 171 76 Stockholm, Sweden.

Phone: 46-08-7373611, Fax: 46-08-307351, Email: Gloria.Macassa@ki.se

2) Department of Epidemiology, Biostatistics and Occupational Health, McGill University,

Purvis Hall, 1020 Pine Avenue West, Montreal QC H3A 1A2

SUMMARY

In the past twenty years or so, the study of the determinants of child survival in low-income countries has been based on demographic conceptual frameworks. The most widely known has been the Mosley and Chen framework (1). In that framework, the key concept was a set of proximate determinants, or intermediate variables, that directly influence the risk of morbidity and mortality. It assumes that all the more distal social and economic determinants must operate through these variables to affect child survival. However the Mosley and Chen framework has failed to directly incorporate the complex social dimension of health.

The objective of this paper is to link more distal causes for child health by describing a framework that conceptualises the relation between distal and proximal factors and how they operate to cause inequalities in child mortality within sub-Saharan Africa. Additionally the framework defines policy entry points needing support of empirical evidence. Furthermore the paper acknowledges that the social context plays an important role for inequalities in children's chances of survival. However, the relative importance of the mechanisms presented in the proposed framework may vary among the different countries of sub-Saharan Africa, thus researchers should empirically adapt the framework to their specific context.

Key words: Child mortality, sub-Saharan Africa, inequalities

[Afr J Health Sci. 2011; 18:14-26]

Introduction

In the past twenty years or so, the study of the determinants of child survival in low-income countries has been based on demographic conceptual frameworks. The most widely known has been the Mosley and Chen framework [1]. In that framework, the key concept was a set of proximate determinants, or intermediate variables, that directly influence the risk of morbidity and mortality. It assumes that all the more distal social and economic determinants must operate through these variables to affect child survival. The proximate determinants were grouped into five categories largely centred around household/family level influences: [1] maternal factors (age, parity, and birth interval); 2) environmental contamination

(air, food/water/fingers; skin/soil/inanimate objects; insects; insect vectors); 3) nutrient deficiency (calories, protein, micronutrients (vitamins and minerals)); 4) injury (accidental, intentional) and 5) personal illness control - personal preventive measures such as hand-washing and medical treatment. This framework has been at the heart of the conception of the Demographic and Health Surveys [2] which has increased knowledge of the various determinants of child survival in many countries. However, the framework gives emphasis to more proximate determinants and has lead research to focus on more individual-level decision making. Infant and child mortality has declined in many developing countries especially in Latin America, Caribbean, North Africa and Asia [3]. These achievements have to some extent been a result of

identification of important risk factors incorporated in the Mosley and Chen framework [2]. In addition new low cost technologies made it possible to prevent major infectious diseases of childhood through mass immunisation campaigns and to treat diarrhoea dehydration and malaria. International agencies have also pushed an agenda of a limited number of inexpensive, highly effective interventions to reduce child mortality in low-income countries such as the Integrated Management of Childhood Illness (IMCI) [4] which counteracted the effects of the factors identified by the Mosley and Chen framework.

However sub-Saharan Africa has been the only region of the developing world where infant and child mortality has stagnated or even increased [4]. For instance, the 2005 World Health Report suggested that under-five mortality was now seven times higher in the African region than in the European region and that the rate was only 4.3 times higher in 1980 and 5.4 times higher in 1990 [5]. Furthermore the report suggested that child deaths were increasingly concentrated in the African region (43% of the global total in 2003, up from 30% in 1990) [5]. The lack of progress registered in the region has been due to, on one hand to HIV/AIDS, but also to its very complex socio-political and cultural environment.

The objective of this paper is to link more distal causes for child health by describing a framework that conceptualises the relation between distal and proximal factors and how they operate to cause inequalities in child mortality within sub-Saharan Africa. Additionally the framework defines policy entry points needing support of empirical evidence.

Theoretical framework for studying the social basis of inequalities in child mortality within sub-Saharan Africa

The Mosley-Chen framework has for many years facilitated interdisciplinary communication between demographic and epidemiological perspectives on child survival in sub-Saharan Africa, but it has failed to directly incorporate the complex social dimension of health into the framework [2]. For instance, in a study of social disruption as a factor influencing infant and child survival in Uganda, William *et al.*, needed to expand the Mosley and Chen model to accommodate some of the socio-political problems affecting infant and child survival [6]. In that study, the authors included political unrest, civil war, famine and AIDS; situations that regrettably, still occur in many countries of the region

In recent years, many studies have shown that

inequalities in health are no longer an issue only for developed countries [7] and that social position and social context are an important part of the structure that generates those inequalities in health as well as in child health. However, the understanding of the broader social determinants of health has been much more frequently applied in low mortality developed than in high mortality low-income countries. Similar to the arguments posed by William Farr in the case of Europe in the 19th century [8,9], health inequities in sub-Saharan Africa today are not the result of chance, but a direct result of national and international physical, economic, social and political conditions.

The framework, which is introduced in this paper (See Figure 1), takes into the consideration that the physiological end-pathways leading to child mortality in sub-Saharan Africa are inextricably, linked to the social setting, that offers opportunities to combine the more proximal focus with the broader societal processes that implicate a complex web of factors (10). The framework is based on a model developed by Diderichsen and Hallqvist [11] and identifies three socially based components: the social context, social position and specific risk factors which must be considered in understanding and redressing inequities in child health in within sub-Saharan Africa.

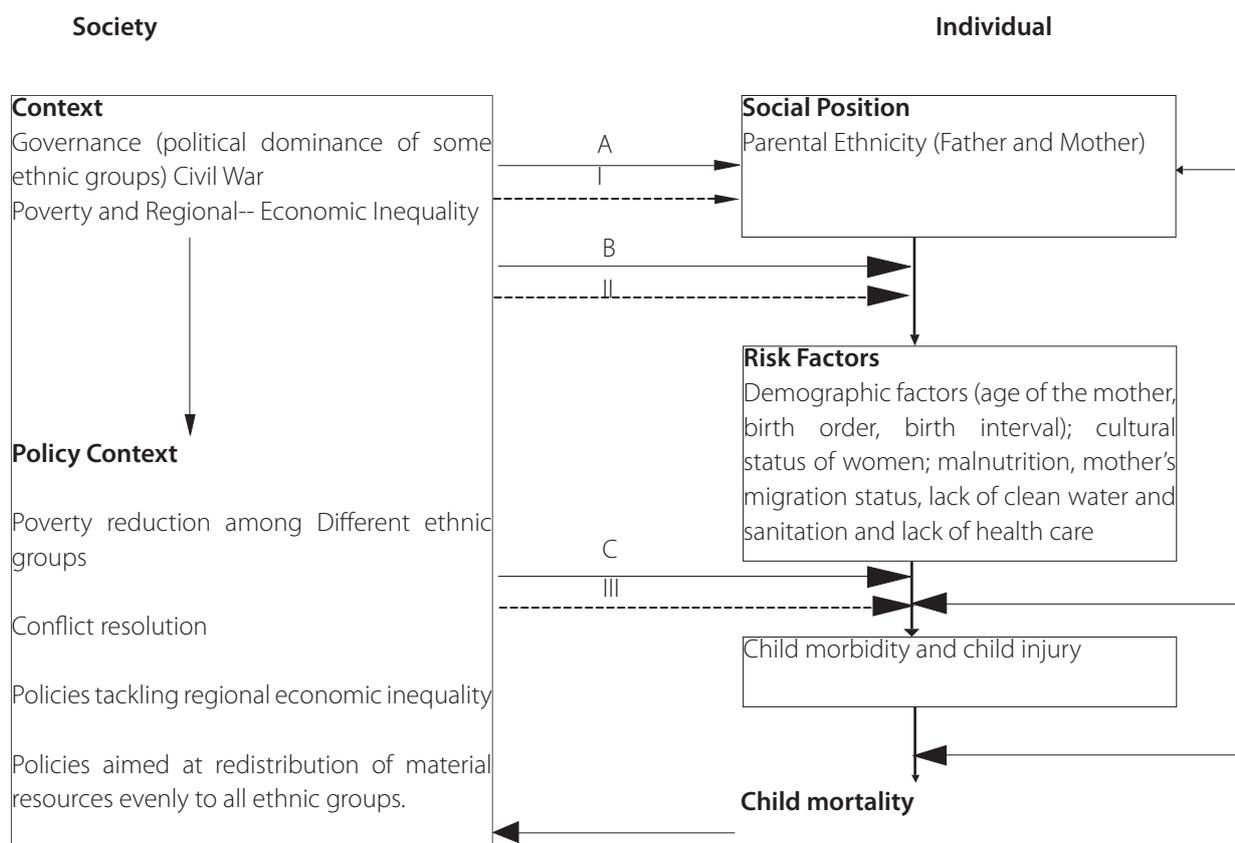
The components identified by the framework are reviewed arguing that the more distal causes are important because they point at important policy changes in relation to current interventions to reduce inequities in child mortality:

The social context

The social context encompasses the structure, culture, and function of a social system. Therefore populations cannot be seen merely as a collection of independent individuals. They should rather be seen as social systems in which the distribution and clustering of both exposures and health outcomes may be important and in which the contacts between “susceptible” and “contagious” individuals are crucial for the transmission of both biological/infectious agents and social behaviour [12]. Koopman and Lynch suggested that the theoretical base for “population system epidemiology” should model joint effects of multiple exposures in individuals as time related processes while incorporating the determinants and effects of interactions among individuals [13].

The structure and culture of social context might be a contributing cause of disease and injury. For instance, there are neighbourhoods where norms allow

Figurel. The social basis of ethnic inequities in child mortality in sub-Saharan Africa



Source: Adapted from Diderichsen and Hallqvist (1998) A- C Mechanisms I-II Policy entry points

health. In those countries, the governments are the main providers of mother and child health services, AIDS prevention work, leprosy control programs and anti-smoking campaigns, these and other primary health care initiatives are particularly badly affected [23,24]. On the other hand, in government services which remain after the cuts, user charges are often introduced. This method of introducing the market mechanism into the provision of health care obviously makes services less available to the poor. Furthermore, the privatisation of health and hospital services also makes the poor suffer, as services become more oriented towards those who can pay [24]. In addition, essential drug policies which aim to make necessary pharmaceuticals available to all at an affordable price are threatened by increasingly liberal policies towards pharmaceutical companies. In addition there has been the brain drain of medical professionals which is threatening the very existence of health services in many countries of the region [25]. The flight of professionals is not limited to doctors since it affects nurses, pharmacists and social services as well [25].

High rate of migration and urbanization

Migration, internal or international (the movement of persons within a country or outside their frontiers respectively) is another contextual factor, which affects child survival in sub-Saharan Africa. All through the ages people have participated in various types of voluntary and involuntary migration movements. Under voluntary migration people are motivated by their own aspirations to move across national or international boundaries. On the other hand, refugees represent involuntary migration commonly provoked by war, systematic prosecution, or ecological disasters such as large-scale famine or draught. Worldwide as well as in sub-Saharan Africa, migration within national boundaries is more common than international migration, as the later is regulated by legal restrictions imposed by governments [26-29].

Internal migration (especially rural-urban migration) is strictly related to urbanisation in sub-Saharan Africa [30]. However, to date, Africa is considerably less urbanised when compared with the rest of the world [31]. For example, in the year 2001, urban dwellers

in East Africa accounted for only 25% of the population compared with 70% in Latin America [31]. Current estimates by the UN predict that half of the African population will live in urban settings by the year 2025, and that the percentage will further increase to 53% or 787 million in 2030 [31,32].

Two reasons are put forward for the increased urbanisation. First, there are strong rural-urban economically driven migrations with people seeking education and job opportunities outside subsistence farming. Second, rural settlements have evolved into small and medium size cities [33]. While comparable levels of urbanisation were observed in Western Europe at the turn of the last century, the uniqueness of the African situation is its rapid increase that it has been accompanied by severe economic deceleration [33]. As a result of rapid urbanisation under such economic decline, the majority of residents in Africa's large cities live in overcrowded slums and shantytowns, where health conditions and livelihoods are poor. Evidence is now emerging from the region that the advantage that urban areas previously had over rural areas on various health, social and economic indicators has been wiped out or even reversed [34]. The unprecedented shift in rural-urban population distribution in the face of declining economies raises new challenges in the campaign to improve basic health care for rapidly growing numbers of urban poor in African countries especially for children [34].

The existence of rural-urban differentials in favour of urban areas suggests that rural-urban migration can improve children's survival chances [26]. However, studies that have investigated the relationship in multivariate frameworks, have sometimes found that migration status is not a significant mortality determinant [27]. It is argued that once variables controlling for differences in socio-economic status and use of health services between rural-urban migrant and non-migrant groups are omitted from the models, migration is an important factor explaining mortality [27]. Other studies have found that children of female migrants from the countryside generally have much poorer survival chances than other urban children [28]. Furthermore, it also appears that in the largest cities, children's urban survival advantage over rural areas has narrowed over time [28]. The relationship between migration and health is a complex one: it operates in both directions and is mediated by socio-political factors, environment and disease exposure [29]. Female migration, while it can increase household income through remittances, results in the need for alternative child and health care arrangements. Where

social networks through the extended family are strong enough to assume these child care responsibilities, the net effect of female migration on children can be positive [29]. On the other hand in situations of forced migration whether internal or cross-border, populations are often vulnerable and at added risk violence to prevail, and there are industries and work places where organisational behaviours induce stress with its consequent patho- social effects [12]. Marmot has argued that inequalities in health represent a major challenge and that effective action must also focus on social environment [14]. The social context encompasses the central engines in society that generate and distribute power, wealth and risks [11,15, 16]. Examples include the educational system, labour policies, gender norms, and systems of political representation. These mechanisms exist on local, regional, national, and global levels.

In sub-Saharan countries, contextual factors such as poverty, civil war, Globalisation and structural adjustment programs, migration, urbanisation, gender discrimination and water and sanitation have influenced the health of the population. In addition it is important to note that the context of sub-Saharan Africa is subject to social changes which may also influence how groups will move upwards or downwards.

Poverty

Over a third of all children in developing countries are living in absolute poverty. Rates of absolute poverty are high in sub-Saharan Africa and South Asia compared to Latin America and the Caribbean. Rural children face significantly higher levels of poverty than urban children, with rates of absolute poverty raising 70% or above in rural sub-Saharan Africa [17]. Severe shelter and severe sanitation deprivation are the problems affecting the highest proportion of children in developing world.

Children, as one of our most important vulnerable populations, face unusually high health risks as they grow. With still –developing immune systems they are completely reliant on others for their survival. The obstacles to optimal health are greatest for children born into poverty; those are also the most likely to be exposed to infectious disease and malnutrition. Poverty is associated with high levels of mortality. Women bear a disproportionate burden of poverty and children growing up in poverty are often permanently disadvantaged.

Civil war

Since the end of the Cold War, civil war has become the predominant form of violence [18]. In recent years, Africa has witnessed an increased number of armed conflicts [18]. These domestic conflicts pose a serious threat to economic development, especially for poorer countries in sub-Saharan Africa.

Nowhere has conflict had more devastating impact on children than in sub-Saharan Africa. In general, children not only are targets of violence but also because of the war many children die from malnutrition and disease [18]. For instance, in Mozambique alone, between 1981 and 1988, armed conflict caused underlying 454,000 deaths [19].

Many of today's armed conflicts take place in countries with extreme poverty where children are already vulnerable. In Somalia, more than half of deaths of children in some places were caused by measles. [19]. Furthermore, in most wars, health facilities come under attack, and those facilities that remain open during the conflict are often looted or forced to close down [19].

In addition, restrictions on travel may hamper the distribution of drugs and other medical supplies causing health systems referral services and logistic support to break down.

On the other hand, during conflicts mothers may experience hunger, exhaustion and distress that can make them less able to care for their children [19].

Globalization

Globalization is another contextual factor that influences children's health in sub-Saharan Africa. It is a process by which nations, business and people are becoming more connected and interdependent across the globe through increased economic integration and communication exchange and travel. Contemporary globalization is characterised by increasing liberalisation in the cross-border flow of finance capital and trade of goods and services [20-23]. In nearly all developing countries globalization is leading to significant changes in occupational and social structure. A defining feature seems to be an acceleration of the gap between the rich and poor [23]. There are both potential health gains and problems associated with globalization. The potential health gains include, for instance, the diffusion of the knowledge and technology that can aid in disease surveillance, treatment and prevention.

More fundamentally, increased trade and foreign investment through liberalisation can improve economic

growth, particularly in poor countries, may reduce poverty, which in turn, leads to better health [24].

In many sub-Saharan countries, policies associated with globalization have affected the health sector, firstly by reduced government overall spending on of disease. Forced migration can be consequent on conflict and war political or religious persecution, economic hardship, famine and other natural disasters.

Gender Discrimination

In sub-Saharan Africa men have control over critical productive resources, such as land for farming, and women gain access to assets through their relationship with a man, especially in marriage [35]. Financial or material dependence on men means that women have less control over when, with whom and in what circumstances they have sex [35]. In many low-income countries and especially in sub-Saharan Africa, women endure high rates of malnutrition, illiteracy, early marriage and inadequate access to reproductive health services [36]. This creates a vicious cycle of deprivation that is passed on from mother to child and generation after generation. In addition, women not only supply much of the labour for agricultural production but are also responsible for most of the household economy. This means that they fetch water, gather firewood, look after the family, market surplus produce and are the key to the health and nutrition of infants and children [36]. In recent years it is acknowledged that gender discrimination is a critical factor in the high HIV/AIDS prevalence in sub-Saharan Africa [37]. Moreover, most of the harmful sexual practices have their origin in patriarchal societies that promote male superiority [37].

Social position

Social position of individuals or groups is a defining characteristic of their levels of health and disease [38, 39]. The measures of socioeconomic position indicate particular structural locations within the society. These structural positions are powerful determinants of the likelihood of health damaging exposures and of possessing particular enhancing resources. This is perhaps the most basic principle in understanding how and why social position is linked to health [16]. In the framework (see Figure1) parental social position is defined as education, occupation, income, urban/rural place of residence, ethnic affiliation and religion.

Education

In sub-Saharan Africa parental education and mainly maternal education has been found to be an

important determinant of child survival [40]. In the region, female literacy has been found to have an important bearing upon survival chances even after controlling for factors such as social class and economic conditions. Although the influence of literacy on child survival is well documented, it is by no means very obvious exactly in what way increased literacy rates affect levels of infant and child mortality. A common suggestion is that maternal education diminishes the importance of a fatalistic view of the child's death, increasing the mother's potential use of health services as well as increasing women's autonomy. However, some studies have reported a weak correlation between maternal education and child survival in sub-Saharan Africa compared to other third world regions [41-43].

In a historical review of the mortality decline in Japan it was demonstrated that primary education for women provided profound and long-lasting health dividends. The cohort of women born around 1890, the first to benefit from universal primary education, had a direct impact on the decline of infant mortality rate (IMR) in the 1920s. The education gains were linked to the increases in life expectancy in the 1960s and 1970s as evidenced by the strong association between women's education and their children's adult life expectancy [44].

Other studies have showed that father's education is more influential than mother's education under conditions of civil war or food crises [43]. Parental education (especially maternal education) is related to health behaviours such as improved household hygiene and hand washing. Preston and Haines [47] argued in their analysis of child mortality in the U.S. in the late 19th century, that the identified health "know how"-acceptance of the germ theory of disease causality and associated hygienic practices was an important determinant of the mortality decline in United States. According to Hemmond, education and health are connected by a pattern of correlations that varies depending upon various other aspects including the national, social and economic context [48].

Occupation

Previous research has found an association between parental occupation and child health outcomes in developed countries, in favour of the higher social strata [49]. In many low-income countries children whose parents (especially the father) are in lower socioeconomic group's exhibit high mortality risks compared to children whose parents are in professional occupations [49]. Parental occupation has not been an

ideal measure of social position in sub-Saharan Africa, since many people are classified unemployed in the surveys, especially the DHS surveys. This is further complicated by the fact that the majority of those considered unemployed are women who work in informal markets [45, 50].

Income

Parental income has been associated with inequalities in child mortality in many western countries [51, 52] and in some low-income countries [53]. However in many sub-Saharan African countries it would be ideal to define a household wealth that includes material possession, land possession and cow ownership. A study in rural Karachi found that land possession had a very strong relationship with child death [53]. Until now, very little research has focused on the relationship between income and child health outcomes in sub-Saharan Africa. This may be related to the difficulties faced by surveys to collect data on income. Instead, in recent years there has been a shift to develop wealth indexes, which can be used as an alternative to income [54].

Urban/rural place of Residence

Another aspect of social position that is important in sub-Saharan Africa is parental place of residence. Urban/rural place of residence has been found to influence survival chances of children in low-income countries [49]. However, in historical societies cities had much higher mortality compared to rural areas [55, 56]. At that time, the urban environment produced conditions that were generally unhealthy for the majority of the population. Cities were overcrowded thus facilitating the spread of diseases mainly before water and sewage systems were introduced. Contrary to the development in pre-transitional Europe, mortality is higher in rural areas compared to urban areas of today's middle and low-income countries [49, 56, and 57].

This fact is related to higher access to water and sanitation, and to the concentration of better medical technology in urban areas, as well as health care service infrastructure. Furthermore, urban residents in those contexts are generally more educated and have a better socio-economic position compared to rural residents [49]. In sub-Saharan Africa, the majority of the population lives in rural areas and in their majority experience extreme poverty [49].

Ethnicity

In recent years, ethnicity has become an important

indicator of social position. In Western countries, some studies have found an association between ethnicity and child health outcomes [57, 58]. On the other hand research on ethnic disparities among children in low-income countries and especially in sub-Saharan African countries is still scarce. In 2000, Brinkerhoff and Hewett published the most extensive study to date exploring inequality in child mortality among ethnic groups in Sub-Saharan Africa in the 1990's [59, 60]. The study used data collected in Demographic and Health Surveys in the Central African Republic, Cote d'Ivoire, Ghana, Kenya, Mali, Namibia, Niger, Rwanda, Senegal, Uganda, Senegal and Zambia. The study found large disparities in child health including child mortality that were explained to some degree by socioeconomic factors. However, no systematic theoretical mechanisms have been advanced to account for the observed ethnic variations in child mortality in many African countries [59, 60]. It is hypothesised that it may be a link between ethnic dominance in the political economy and child mortality in sub-Saharan Africa. Thus, child survival chances are enhanced for members or groups that have dominated national politics as a result of favourable economic conditions at the household and community level [59]

Religion

In relation to religion very little is known about its association with child health outcomes in sub-Saharan Africa. However in many studies in the region, religion has been found to be associated with fertility [61, 62]. Differences in theological doctrines have been associated with different fertility behaviours in developed and developing countries [61, 62]. Indeed, research from developed countries has emphasised that the Roman Catholic Church is essentially pronatalist because it supports large families, rejects the most effective birth control methods including abortion, sterilisation, and discourages divorce [62]. For instance, in Mozambique a study found that Muslims had the lowest fertility compared with those from other religions, mostly Zions, a local religion [63]. Religion might be related to abstinence taboos or even create resistance to contraceptive use. In recent years, religion has also been at the centre of civil unrest in many countries of the region [49]. For instance, we have witnessed religious riots in Nigeria, which has led to deaths and injuries among the population including children. On the other hand, the recent peace agreement, which was signed in Sudan, ended a long civil war between the predominantly Muslim north

and the catholic south. An understanding of the role of social context and social position as described above will give a holistic approach to the study of causes of inequality within sub-Saharan Africa and can expose the underlying structural factors that lead to a more radical approach towards addressing the needs of the poor in the sub-Saharan African region

Risk Factors

In sub-Saharan Africa there are well known risk factors, which influence child mortality. These factors were already proposed in the Mosley and Chen framework and have been extensively researched in many low-income countries, especially in sub-Saharan Africa. These factors include maternal age at the child's birth [49, 64-68], sex of the child [69], birth order and birth interval [49,67,68], family size [71-74], household environment [49] and health care services [49]. However, as already mentioned above, these risk factors have been only studied within the family characteristics and not in a broader perspective of the social position which parents hold as well as the context where they live. For instance in a study of child immunization levels carried out in Angola, [75] it was hypothesized that malnutrition levels were higher in segments of the population either regionally or ethnically defined, that had suffered most from civil war. Results from the study showed that children who lived in parts of the country where fighting had been ferocious and generalized and the devastation most profound, exhibited lower levels of age, inadequate immunization and higher levels of malnutrition, especially stunting than children living in the less affected areas.

In another study carried out in the Tigray region in Ethiopia (a region devastated by war and famine), Kiros *et al*, found that fathers and mothers education were negatively associated with child mortality. However they suggested that the parental education effect diminished over time if the crises was severe and prolonged [76]. On the other hand in the Congo, the 1994 devaluation prescribed by its adjustment programme, resulted in increasing food prices and subsequent negative impact on the nutritional status of the poorest children[77].

As it's true for developed countries, also in sub-Saharan Africa, there is an accumulation of health hazards and risk factors for those in less disadvantaged groups so that for example children who live in the poorest houses usually have less access to health care due to their parents unsafe working conditions as well as their great risk of unemployment [78]. For instance

in South Africa, black children growing up in rural areas are eight times less likely to have access to either a flush toilet or latrines and four times less likely to have access to tap water than their urban counterparts and twice as likely to be malnourished [78].

Mechanisms

The framework which has been proposed above will specifically introduce the role of social context and social position in generating inequalities in child mortality within sub-Saharan Africa and how the wider context influence risk factors in creating inequalities in child mortality in the region. In addition the framework identifies four mechanisms (A-D) and four Policy Entry Points (I-IV).

The first mechanism (A, Figure 1) is related to how social context influence parental social position or social standing within the society in which they live. The stratification process determines the availability of social positions and influences parental mobility; hence, to which positions parents may end up. In sub-Saharan Africa the best available markers of social position are education, place of residence, ethnicity and religion and to a lesser extent occupation and income (although in recent years a wealth index is used as a substitute). As recent research has shown, in sub-Saharan Africa, stratification takes other forms than those which are often seen in West Europe and United States [50]. In those contexts social position is often measured by means of occupation, education and income [51, 52].

The second mechanism (B, Figure 1) conveys how the prevalence of exposures may vary between social groups by type, amount, and duration. Hence, it is a mechanisms that explains differential accumulation or social clustering of exposures. Other things being equal, these exposure differentials may explain excess risk of ill health associated with lower social positions across a wider range of specific diseases. For instance in sub-Saharan Africa it is the children which parents are in the lowest economic quintiles who experience high rate of water and air-borne diseases such as diphtheria, tuberculosis, cholera, typhoid, infectious hepatitis, yellow fever, malaria as well as malnutrition [79-86].

The third mechanism (C, Figure 1) depicts how the accumulation or clustering of health-damaging exposures along social gradients is also closely linked to differential vulnerability. The implication is that the health impact of a specific exposure depends on whether other contributory causes or risk factors are also present. In sub-Saharan Africa, children whose

parents are in the lowest social positions are often exposed to many risk factors. If they are parts of the same causal mechanism they may interact and the consequence are increased effects of the interacting specific causes in less advantaged social groups, the definition of increased vulnerability [11]. In sub-Saharan Africa poorer children often are sick with a combination of diseases such as malnutrition, malaria as well as concomitant respiratory infections.

The fourth mechanism (D, Figure 1) is related to differential social and economic consequences of ill health. It is known that the underlying social context and social stratification elsewhere and within sub-Saharan African countries in particular may lead to an inequitable distribution of the social consequences of ill health. For instance, in many countries of sub-Saharan Africa due to Structural Adjustment Programs (SAP) carried out in the 1980's and 1990's the majority of the population is without the safety net of universal health care and secure employment. Thus, poorer parents are unable to pay the high fees required by private health care if their children are sick. In addition as many of them have insecure employment or none at all they are forced to the black market by selling whatever goods they keep their hand to take care of their families [82, 83].

Identifying Policy Entry Points

The framework identifies Policy Entry Points (See Policy Entry Points I-IV, Figure 1) which could improve child survival within sub-Saharan Africa and help to reduce inequalities and inequities in child mortality across the region. The first potential policy entry point (I, Figure 1) is to influence social stratification. African countries should promote policies aimed to diminish social inequalities in labour market, farming subsidies, family welfare policies, and education especially for girls which may for example improve people's lives and can influence how wide the gap is between people in different social positions. There is also a need to reduce poverty among the poorest groups, which in sub-Saharan Africa tend to live in the poorest regions of each country. However, above all, poverty reduction programmes underway in many sub-Saharan countries should be accompanied by a greater Government transparency, which could allow them to reach those in most need. It is known that many sub-Saharan countries are struggling with corruption at all levels, which are in most cases the hindrance to efforts towards reducing poverty.

Policy Entry Point II and III (see Figure 1) aims at decreasing exposures and vulnerability Policy makers

within sub-Saharan Africa should focus more specifically on reducing the excess exposures to health hazards of those in the lower social position (Entry Point II, Figure 1). In general, most health policies do not differentiate exposure or risk reduction strategy according to social position. A study that investigated whether public health could help to reduce child mortality in low-income countries including SSA found that child survival interventions were not reaching those who needed them the most [84]. The study further suggested an integration of child survival and reproductive health services as possible means to improve the effectiveness of further child health interventions. Usually, the size of the benefit of any potential child health intervention is contingent on the constellations of other exposures and perhaps more importantly on the macro social and economic forces (mechanism A Figure 1). An alternative policy entry point, therefore, concerns the modification of the effect of exposures through the concept of differential vulnerability (Entry Point III, Figure 1). Reduced vulnerability may be achieved when interacting exposures are diminished or relative social conditions improve significantly. For instance many point -out female education as one of the most effective means of mediating women's differential vulnerability. Thus, diminishing one key exposure such as lack of education it might reduce the vulnerability of women to the effects of other risks. In SSA where female illiteracy is high, education often improve women's autonomy and social position within the society in a degree that they can better care for their children thus improving their survival (mechanism B, Figure 1).

The last Policy Entry point (IV) (see Figure 1) is aimed at preventing unequal consequences of ill child health and further inequalities and inequities. In this area of policy is the intervention point where the great bulk of health care resources should be concentrated. For instance, some argue that care should be viewed according to need. However, a critical issue is what the definition of need is. If need is defined with no sensitivity to the special needs of disadvantaged populations for example all post-malnutrition children should have a standard of care, then it is likely that inequities will be accentuated. This is due to the fact that despite having the same diagnosis, the most disadvantaged (the poorest of the poor) may have more difficulties in recovering thus requiring more time of visitation to the Health Care Centre than the others in order to achieve the same as the better of the poor malnourished children (mechanism D, Figure 1). Therefore, policy options should demand evidence of

the range of interventions, disease specific and related to the broader social environment that will reduce the likelihood of unequal consequences of ill child health. In addition, the social context plays a large role in the stratification of social opportunity for children who are sick, and countries of SSA which have a system with accessible and functioning safety nets can in practice do much to prevent the social differentiation induced by ill health. As many countries in the region are trying to reach the millennium development goals by 2015 (MDG's) some authors point out that the improvements in health outcomes (including child mortality) will not be possible without major improvements in health care delivery systems, which in turn depend on changes in public sector management, new form of engagement with the private sector (leading for example, to wider availability of affordable drugs, vaccines, and diagnostics), more research directed at improving health systems, as well as policies and interventions well beyond the health sector [85,86].

Conclusion

Globally and historically, social position is among the most important health determinants throughout the life course [87]. Young children are particularly vulnerable to the effects of adverse poverty and parental social position. Poverty and low socioeconomic position are associated with higher risk of death in infancy and childhood, chronic childhood illness, and many acute illnesses [87]. Those concerned with child health in sub-Saharan Africa need to develop awareness and understanding of the social determinants of health if they are to contribute fully to improved child health outcomes. These determinants have been forgotten in most of the medical education around sub-Saharan Africa and understated in the contemporary climate of biomedical and technological responses to child illnesses. According to Spencer this does not mean that technology and biomedical advances should be abandoned, but is to emphasise that there is an urgent need to see health within its social factors on children. It is acknowledged that child poverty is not an "unmodifiable" fact. The situation of families and their children can be improved, but this will require political and economic policies that are, in essence, redistributive. Therefore this paper proposes a conceptual framework which identifies some social components that must be considered in understanding and redressing inequalities and inequities in child mortality

within sub-Saharan Africa. The physiological-end pathways leading to child morbidity and mortality in sub-Saharan Africa are intrinsically linked to the social setting where parents live. Furthermore, the paper acknowledges that the social context plays an important role in the stratification opportunities for children's chances of survival. However, the relative importance of the mechanisms presented in the framework may vary among the different countries of SSA, thus child health researchers should empirically adapt the framework to their own context. In addition further research in those different components of the proposed framework will provide important insights and guidance to policy makers. Given that a "society" understanding of the determinants of child health has an important influence on the improvement of child survival, heightened awareness of the social production of child ill health is a critical component of the health equity agenda in all sub-Saharan African countries. However, the larger challenge ahead will be to assess the possible range of policy entry points along the continuum of the social basis of child health inequities in order to identify effective synergy's and comparative advantages of policies within each particular context within sub-Saharan Africa.

References

1. Mosley WH and Chen LC. Analytical framework for the study of child survival in developing countries. In Mosley WH and Chen LC (eds). *Child survival: strategies for research. Population and Development Review*. 1984; **10** :25-45.
2. Boerma JT. Child survival in developing countries: can Demographic and health surveys help to understand the determinants? *The Netherlands: Royal Tropical Institute* pp 237-248.
3. Ahmad OB, Lopez AD, Inoue M. The decline in child mortality: a reappraisal. *Bulletin of the World Health Organization*. 2000; **78**:1175-1191.
4. WHO. Child and adolescent health development, 2004. <http://www.who.int/child-adolescent-health/integr.htm>. Assessed 8 September 2005.
5. WHO. The World Health Report 2005. www.who.int/whr/en. (Assessed 3 August 2006).
6. William KA, Agyei_John B, Sskamatte, S. Social disruption as a factor influencing infant and child survival in Uganda. *Genus*. 2000;**1-2**:221-224
7. Braveman P, Tarimo E. Social inequalities in health within countries: not only an issue for affluent nations. *Social Science and Medicine*. 2002; **54**:1621-1635.
8. Farr W. 1885 report. In Humphreys NA (ed). *Vital statistics: a memorial volume of selections from the reports and writings of Willard Farr*. London: The Sanitary Institute of Great Britain, 1885; pp 1-12.
9. Whitehead M. William Farr's legacy to the study of inequalities in health. *Bulletin of the World Health Organization* 2000; **78**:86-87.
10. Diderichsen F, Evans T, Whitehead M. The social basis for disparities in health. In Evans T, Whitehead M, Diderichsen F, Bhuyia A, Wirth M (eds). *Challenging inequities in health: From ethics to action*. Oxford: Oxford University Press, 2001; pp12-23.
11. Diderichsen F, Hallqvist J. Social inequalities in health: some methodological considerations for the study of social position and social context. In Arve-Pares B (ed). *Inequality in health. A Swedish perspective*. Stockholm: Swedish Council for Social Research, 1998.
12. Diez-Roux AV. Bringing context back to epidemiology: variables and fallacies in multilevel analysis. *American Journal of Public Health*. 1998; **88**: 216-222.
13. Koopman JS, Lynch JW. Individual causal models and population system models in Epidemiology. *American Journal of Public Health*. 1999; **89**:1170-1174.
14. Marmot MG. Improvements of social environment to improve health. *Lancet*. 1998; **351**: 51-60.
15. Blaxter M, Social Class and health inequalities. In Carter O and Peel J (eds) *Equalites and inequalities in Health*. London: Academic Press 1976;pp111-126.
16. Marmot MG. Understanding social inequalities in health. *Perspectives in Biology and Medicine*. 2003; **46**:S9-23.
17. Smith D. What does globalisation mean for health. NY: Third World Network,
18. United Nations. *Africa Recovery* 2002;**16**:1-6. www.un.org/ecosocode .
19. Machel G. Impact of armed conflict on children. Unicef Report 1995;1-2. www.un.org/righths/introduc.html (Assessed 3 July 2006).
20. Amrith S. Democracy, globalization and health. *The African Dilema*. United Kingdom: Centre for History and Economics, 2001.
21. Deaton A. Health in age of globalisation. Princeton University: Center for Health and Well Being, *Research Program in Developmental Studies*, 2004.

22. Giovanni AC. Globalisation and health: results and options. *Bulletin of the World Health Organization*. 2001; **79**:834-841.
23. Dollar D. Is globalization good for your health? *Bulletin of the World Health Organization*. 2001; **79**:827-833.
24. Drager Labot Drager N, Labonte R, Torgerson R. Frameworks for analysing the links between Globalization and health. WHO, 2004.
25. Trovato F. Migration and urbanization. *Essential readings*. Oxford: Oxford University press 2002;pp100-338.
26. Brockerhoff M. The impact of rural-urban migration on child survival. *Health Transition Review*. 1994; **4**:127-149.
27. Stephenson R, Matthews Z, McDonald JW. The impact of rural-urban migration on under-two mortality in India. *Journal of Biosocial Science*. 2003; **35**:15-31.
28. Brockerhoff M. Child survival in big cities: the disadvantages of migrants. *Social Science and Medicine*. 1995; **40**:1371-1383.
29. Khan K, Collison S, Tollman S, Wolf B, Garene M, Clark S, Agincort WU. Health Consequences of migration from South Africa, rural northeast. SA: Conference on African migration in comparative perspective, Johannesburg, 4-7 June 2003.
30. Adepoju A. Migration in Africa. In Baker J, Aina TA (eds). *The Migration experience in Africa*. Upsalla: Nordiska Afrikaninstitutet, 1995; pp 88-108.
31. Dufour DL, Piperata BA. Rural to urban migration in Latin America: An update and thoughts on the model. *American Journal of Human Biology*. 2004; **16**:395-404.
32. Keiser J, Utzinger J, Caldas de Castro M, Smith TA, Tanner M, Singer BH. Urbanization in Sub-Saharan Africa and implication for Malaria Control. *American Journal of Tropical Medicine and Hygiene*. 2004; **7**: 118-127.
33. United Nations. World Urbanization Prospects: the 2001 Revisions. New York: Population Division of Economics and Social Affairs of the United Nations, 2002.
34. APHRC. Urban Poverty and Health. Nairobi: *African Population and Health Research Center*, 2005; pp 1-22.
35. ILOAIDS. Women, girls HIV/AIDS and World Work. NY: ILO, 2004; pp 1-4 www.ilo.org/aids. Assessed 14 September 2006
36. United Nations. Gender recommendations of the UN Millenium Project Hunger Task Force, 2004; pp 1-40. www.globalpolicy.org/socelon/inequal/gender. Assessed 14 September 20056.
37. Dealing J. Discrimination fuels AIDS. Johannesburg: Sunday Times of South Africa, 2004.
38. Lynch JW, Kaplan G. Socioeconomic position. In Berkman LF, Kawachi I (eds). *Social Epidemiology*. Oxford: Oxford University Press, 2000; pp 13-35.
39. Graham H, Kell MP. Concepts, frameworks and policy. London: Health Development Agency, 2004; pp 1-17. www.had.nhs.uk. Assessed 8 September 2007
40. Kuate-Defo B, Diallo K. Geography of child mortality clustering within African families. *Health & Place*. 2002; **8**:93-117.
41. Hobcraft J. Women's education, child welfare and child survival: a review of evidence. *Health Transition Review*. 1993; **3**:159-175.
42. Uchudi JM. Covariates of child mortality in Mali: Does the health-seeking behaviour of the mothers matter? *Journal of Biosocial Science*. 2001; **33**:33-54.
43. Kiros GE, Hogan DP. War, famine and excess child mortality in Africa: the role of parental education. *International Journal of Epidemiology*. 2001; **30**:447-455.
44. Hasegawa T. Japan: Historical Dimensions of health equity. In Evans T, Whitehead M, Diderichsen F, Bhuyia A, Wirth M (eds). *Challenging inequities in health: From ethics to action*. Oxford: Oxford University Press, 2001; pp90-103.
45. Macassa G, Ghilagaber G, Bernhardt E, Diderichsen F, Burström B. Inequalities in child mortality in Mozambique: differentials by parental socio-economic position. *Social Science and Medicine*. 2003; **57**:2255-2264.
46. Garfield R. Child health in Africa. War, famine and excess child mortality in Africa: Commentary. *International Journal of Epidemiology*. 2001; **30**:456.
47. Preston S, Haines MR. The fatal years: child mortality in late 19th century America. Princeton: Princeton University Press, 1991:pp170-210.
48. Hammond C. What is about education that makes us healthy? Exploring the education-health connection. *International Journal of Lifelong Education*. 2002; **21**:551-571.
49. Macassa G. Poverty and health in different contexts: Social inequalities in child mortality in Mozambique and 19th century Stockholm. Stockholm. Almqvist and Wiksel International 2004; pp 4-117. (PhD dissertation)
50. Franz J, Fitz RF. Child mortality, poverty and environment in developing countries. UK: University of St Andrews, 2006;1-31.

51. Lynch J, Smith GD, Harper S, Hillemeier M, Ross N, Kaplan GA, Wolfson M. Is income inequality a determinant of population health?. Part 1. A systematic review. *Millbank Quarterly*. 2004; **82**:5-9
52. Shmueli A. Population health and income inequality: new evidence from Israeli time-series analysis. *International Journal of Epidemiology*. 2004; **33**:311-317.
53. Durkin MS, Islam S, Hassan ZM, Zaman SS. Measures of socioeconomic status for child health research: comparative results from Bangladesh and Pakistan. *Social Science and Medicine*. 1994; **38**:1289-1297.
54. Schellenberg JA, Victora CG, Mushi A, de Savigny D, Schellenberg D, Mshinda H, Bryce J, Tanzania Integrated Management of Childhood Illness MCE Baseline Household Survey Study Group. Inequities among the very poor: health care for children in rural southern Tanzania. *The Lancet*. 2003; **361**:561-566.
55. Woods RI, Watterson PA, Woodward JH. The causes of rapid infant mortality decline in England and Wales 1861-1921. Part I. *Population Studies*. 1988; **42**:343-366
56. Woods RI, Watterson PA, Woodward JH. The causes of rapid infant mortality decline in England and Wales 1861-1921. Part II. *Population Studies*. 1989; **43**:113-132.
57. Krieger N. Discrimination and Health. Socioeconomic Position. In Berkman LF, Kawachi I (eds). *Social Epidemiology*. Oxford: Oxford University Press 2000; pp 36-75
58. Schulpen TW, van Steenberg JE, van Driel HF. Influences of ethnicity on perinatal and child mortality in the Netherlands. *Archives of Disease in Childhood*. 2001; **84**:222-226.
59. Brockerhoff M, Hewett P. Inequality and child mortality among ethnic groups in sub-Saharan Africa. New York. Population Council Report, 1999; pp 1-36.
60. Brockerhoff M, Hewett P. Inequality of child mortality among ethnic groups in sub-Saharan Africa. *Bulletin of the World Health Organisation*. 2000; **78**:30-41.
61. Avong HN. Religion and fertility among the Atyap in Nigeria. *Journal of Biosocial Science*. 2001; **33**:1-12
62. Mosher WD, Williams LB, Johnson DP. Religion and fertility in United States: new patterns. *Demography*. 1992; **29**:199-214.
63. Ceccato VA. Assessing the impact of modernization on fertility: the case of Mozambique. Austria: International Institute for Applied Systems Analysis, 2000; pp 1-15.
64. Zenger E. Infant mortality, birth order and sibship size: the role of heterogenous risk and the previous-death effect. Princeton University: *Population Research Working paper*. 1992; **92**:1-20.
65. Rustein SO. Factors associated with trends in infant and child mortality in developing countries during the 1990s. *Bulletin of the World Health Organization*. 2000; **78**:1256-1270
66. Winikoff B. The effect of birth spacing on child and maternal health. *Studies in Family Planning*. 1983; **14**:231-245.
67. Nascimento MBR, Hugo I. Breastfeeding: making the difference in the development, health and nutrition of term and preterm new borns. *Revista de Hospitais e Clinica*. 2003; **58**:49-60.
68. Shapiro-Mendoza C, Selwyn BJ, Smith DP, Sanderson M. Parental pregnancy intention and early childhood stunting: findings from Bolivia. *International Journal of Epidemiology*. 2005; **34**:387-396.
69. Katahoire A, Scheutz F, Sabroe S, Whyte SR. The importance of maternal schooling for child morbidity and maternal health behaviour in Southeast Uganda. *Journal of Health and Population in Developing Countries*. 2004;1-13. <http://www.jphdc.unc.edu/>.
70. Trapp EM, Williams J, Menken J, Fisher S. Disappearing sex-bias in child mortality in Bangladesh. Boulder: University of Colorado, Institute of Behavioural Sciences, 2004.
71. Palloni A, Tienda M. The effects of breastfeeding and pace of childbearing on mortality at early ages. *Demography*. 1986; **23**:31-51.
72. Blane D, Smith GD, Hart C. Some social and physical correlates of intergenerational social mobility: evidence from West of Scotland Collaborative Study. *Sociology*. 1999; **33**:169-183.
73. Hart CL, Smith GD. Relation between number of siblings and adult mortality and stroke risk: 25 year follow up of men in The Collaborative study. *Journal of Epidemiology and Community Health*. 2003; **57**:385-391.
74. Lam D, Marteleto L. Stages of the Demographic Transition from a child's perspective: family size, cohort Size and schooling. Paper Presented at the Annual meetings of the Population Association of America, 2004: pp 1-20.

-
75. Agadjanian V, Prata N. Civil war and child health. Regional and ethnic dimensions of child immunization and malnutrition in Angola. *Social Science and Medicine*. 2003; **56**: 2515-2527.
76. Kiros GE, Hogan DP. War, famine and excess child mortality in Africa: the role of parental education. *International Journal of Epidemiology*. 2001; **30**: 447-455.
77. Chopra M. Inequalities in health in developing countries: challenges for public health research. *Critical Public Health*. 2005; **15**:19-26.
78. Spencer NJ. Poverty and child health 2nd ed. Abingdon: Radcliffe Medical, 2000.
79. Myer L, Ehrlich RI, Susser ES. Social epidemiology in South Africa. *Epidemiology Reviews*. 2004; **26**:112-123.
80. Köhler I, Soldo BJ. Early life events and health outcomes in late life in developing countries-evidence from the Mexican Health and Aging Study (MHAS). University of Pennsylvania: Population Studies Center 2003; pp1-8.
81. Leon D, Walt G. Poverty, inequality and health in an international perspective: a divided world? In Leon D, Walt G (eds). *Inequality and Health*. Oxford: Oxford University Press 2000; pp 1-17.
82. Haacker M. The economic consequences of HIV/AIDS in Southern Africa. IMF working paper No 2/38, 2002; 1-39 (<http://ssm.com> Assessed 6 march 2007).
83. Shahmanesh M, Shahmanesh M, Miller R. AIDS and Globalization. *Sexually Transmitted Infections*. 2000; **76**:154-155.
84. Bryce J, Black RE, Walker N, Bhutta ZA, Lawn JE, Steketee RW. Can the world afford to save the lives of 6 million children each year? *Lancet*. 2005; **365**:2193-2200.
85. Spencer NJ. Social, economic and political determinants of child health. *Paediatrics*. 2003; **112**:704-706.
86. Haines A, Cassels A. Can the millennium development goals be attained?. *British Medical Journal*. 2004; **329**:394-397.
87. Lawrence O, Gostin JD. Meeting the survival needs of the World's least healthy people: a proposed model for global health governance. *Journal of the Medical association of America*. 2007; **298**:225-227.