Global burden of disease – a race against time

– secondary publication

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ABSTRACT

Low-income communities will within the next decades undergo rapid changes. The burden of non-communicable diseases (NCDs), such as diabetes, cardio-vascular disease and cancer, will comprise an increasing proportion of the total disease burden. The results of projections indicate that the already constrained health systems will face a double burden of disease, in which HIV/AIDS and other common infectious diseases will co-exist with the new NCDs. In order for preventive measures directed towards NCD to be cost-effective, these have to be implemented within the next 10-20 years.

As previously emphasized by the authors of the present paper [1], there is increasing evidence that many communities in low- and middle income countries are exposed to risk factors which over time will result in an increase in the prevalence and incidence of non-communicable diseases (NCDs), e.g. diabetes, cardio-vascular disease, chronic respiratory diseases and cancer. This development is a consequence of epidemiological transition, arising as a result of an increase in life expectancies combined with urbanisation, modernization and economical development. The main objective of the present paper is to give an insight into the various aspects of this transition with specific focus on low-income communities and possibilities for intervention.

In order to measure and compare disease burdens, the traditional methods have mainly been based on various measures of mortality. However, since many infectious diseases (CDs) and NCDs result in shorter or longer periods of disability which do not necessarily result in death, there are a number of pronounced limitations related to the use of these measures as indicators for burden of disease. In order to develop a more valid alternative, several summary health measures of disease burden have been developed. These measures indicate the sum of life years lost due to premature death and periods of disease. In the present paper, we have primarily chosen to use the summary health measure *disability adjusted life years* (DALY), which is a measure based on algorithms adjusting for disease-specific differences in the burden of disease and age of the individuals. One DALY is defined as one year lost of an otherwise healthy life. [2].

Of the estimated 1.5 billion DALY's that comprise the overall global burden of disease, CDs, NCDs and accidents contribute to 41%, 47% and 12%, respectively [3]. Globally 79% of all deaths which are caused by NCDs take place in low-income communities. In this context it is relevant to notice that out of a global population of six billion individuals, 80% live in low-income countries. There is a pronounced variation in the proportional distribution of CDs and NCDs when comparing geographical regions (Figure 1) [2]. It appears the obvious trend is an increasing proportion of disease burden which can be related to NCD with increasing level of economic development and modernization. As a result of the epidemiological transition, these pronounced differences between geographical regions will tend to diminish in the coming decades.

A projection of disease burden for low-income countries in 2030, predicts that NCDs will contribute to half of the total burden (Figure 2) [4]. This projection is made when considering the combined effect of demographical transition (population growth and increasing life expectancies) and expected impact of modernisation and economical development. The same model indicates that in 2030, HIV/AIDS will appear as the most important cause of disease and death (12%), followed by perinatal disease (6%), depression (4%) and ischemic heart disease (4%). According to this projection, it is remarkable that depression now and in the future appears as one of the most important contributors to the global burden of the disease. If the measure was based on mortality rather than DALYs, depression would most likely result in an insignificant proportion of the total disease burden.

It is furthermore projected that on a global level lung-, stomach- and liver cancer will appear as one of the ten most common causes of death in 2020 [2]. On the condition that no interventions will be implemented, the number of deaths caused globally by cardio-vascular disease will increase from three million in 1998 to almost five million in 2020 [5]. In 2020, the number of deaths caused by NCDs in developing countries will equal the deaths caused by CDs [5]. Hence, within the coming 2-3 decades the combined burden of cardio-vascular disease, HIV/AIDS and perinatal disease will comprise the major causes of disease and death in low-income countries.

There are good reasons to assume that NCDs will not follow the same trends as observed in the industrialized countries, when the burden of cardio-vascular disease peaked. Cardio-vascular disease in low-income countries is predicted to hit the populations earlier, result in higher age-specific morbidity and mortality rates, and higher incidences in low-income groups than previously observed in the industrialized countries. Hence, the estimated loss of life years related to cardio-vascular disease in the economically productive proportion of the population in India and China (PRC) will increase by 57% and 95% respectively during the period 2002-2030 [5].

A major part of the previously mentioned analyses and projections are based on estimates, extrapolations and projections with questionable relevance and validity. The lack of access to relevant data appears as a major barrier for obtaining a more valid impres-

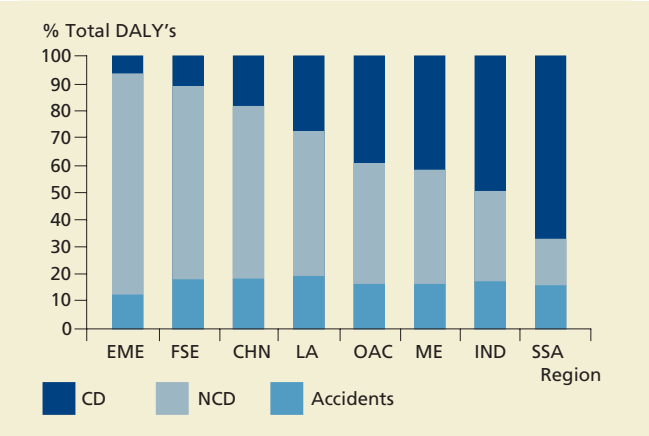

Figure 1. The proportional distribution of *disability adjusted life years* (DALY)-burden, contributable to infectious diseases (CD), non-communicable diseases (NCD) and accidents for established market-economies (EME), former socialistic economies (FSE), Peoples Republic of China (CHN), Latin America (LA), Middle East Crescent (ME), India (IND) and Sub-Saharan Africa (SSA) [2].

sion of the present and future importance of NCDs in developing countries. The results of a Medline literature search revealed that of all 48 Sub-Saharan African countries, population based prevalences of diabetes type 2 and ischemic heart disease during the period 1990-2004 were published for 11 and 3 countries, respectively. For chronic obstructive lung disease, there were no relevant data. With regards to incidence of these three diseases, data were only available for ischemic heart disease (one country) [6]. In many of these countries, a national health information system has been established. However, the generalisability of the health facility based data is very poor and cannot be used as valid indicators of disease burdens in the population.

In the absence of reliable national health information systems in most developing countries, there is an urgent need for basic cross-sectional surveys and cohort studies, which can produce useful data for assessment of prevalence and incidence of the most common NCDs and the respective risk factors. Without this basic information it will not be possible to prioritize and plan primary and secondary preventive measures, and allocate resources regarding diagnostics and treatment.

Although the burden of NCDs in near future will comprise a large proportion of the overall disease burden in developing countries, the major infectious diseases will remain a major challenge to the health systems. During the next 20-30 years, diseases such as HIV/AIDS, TB, diarrhoea, meningitis, hepatitis, malaria, dengue and yellow fever will still burden major parts of the population. In addition, new emerging diseases, e.g. *severe acute respiratory syndrome* (SARS), ebola and avian flu as well as antibiotic resistant strains of already known bacteria will play a major role in the coming transition. In contrast to the historical scenarios in the industrialized countries undergoing modernization, where CDs were gradually replaced by NCDs, the health system in many developing countries should be prepared to operate under a "double burden" of both CDs and NCDs [7], with HIV/AIDS appearing as the largest disease-specific burden [4]. For several decades the resource constrained health systems have been seriously challenged by CDs such as malaria and diarrhoea, although simple and affordable methods for prevention, diagnosis and treatment of these diseases already exist. The same health systems now have to manage NCDs, where diagnosis and treatment often are more complicated, resource demanding and costly, and often result in a lifelong progression of disease. The poorly understood interactions between CDs and NCDs will add more complications to this scenario. Low birth weight, which is common in low-income countries and often caused by maternal infections and malnutrition and is a known risk factor for child mortality, may result in a new cascade of negative health impacts in transitional communities. Hence, increasing evidence indicates that low birth weight programmes the unborn child to "save" energy, which increases the risk for the common NCDs, such as diabetes type 2, hypertension, cardio-vascular disease and the metabolic syndrome [8].

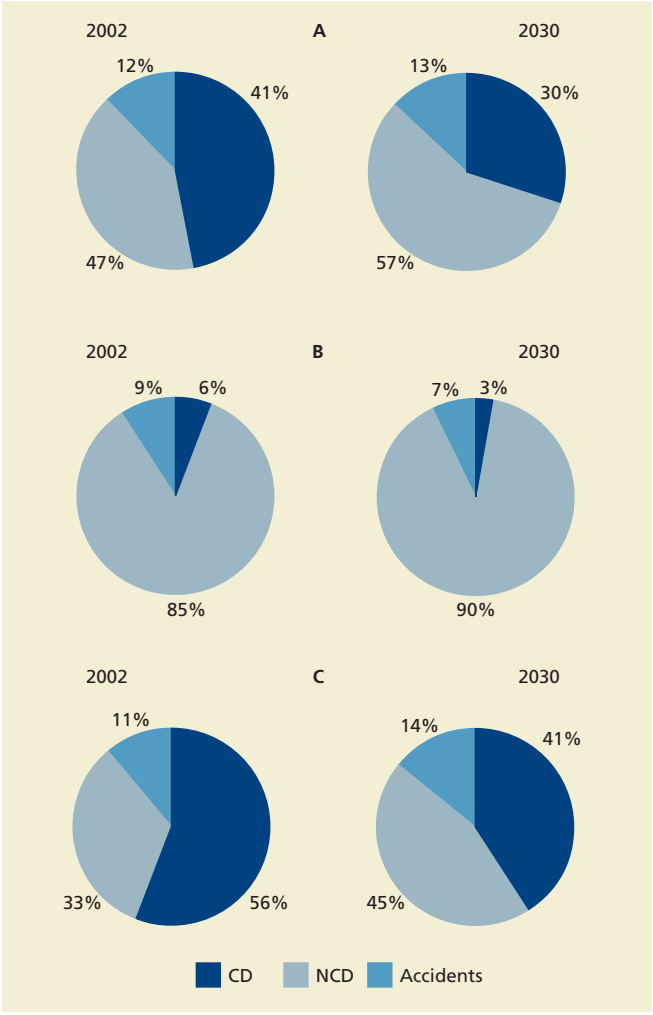

Figure 2. The proportional distribution of *disability adjusted life years* (DALY), contributable to infectious diseases (CD) and non-communicable diseases (NCD) for world (A), high-income countries (B) and low-income countries (C). for 2002 and 2030 [5].

In most developing countries, economic development and modernization will result in increased levels of socio-economic inequity which again will result in large discrepancies in exposure to risk factors and the respective disease outcome. At the present time, this is most obvious in a comparison of urban and rural communities, where the most developed urban communities also present with the highest incidences of NCD [9]. However, even within the same household, NCD-relevant risk factors may vary dramatically, resulting in children suffering from undernutrition living with overweight parents [10]. These complications will add more barriers to the planning and implementation of effective preventive measures.

Since the 1960s, the preventive programmes targeting NCDs in industrialized countries have been based on promotion of smoking cessation, physical activity and a healthy diet. However, due to educational, cultural, economical and climatic factors, it may not be possible to make a direct transfer of these interventions for health promotion in developing countries e.g. in areas with a hot and humid climate it may be difficult to implement programmes which promote outdoor activities targeting diabetes and cardio-vascular disease. Culture-specific perceptions of tobacco, diet and body ideals may also become barriers for replication of already known strategies for intervention. In this context, there is an acute need for reconsideration of the existing experience with disease prevention in order to adjust the measures to match local target groups and environments which differ from the well known scenarios in industrialized countries.

As an essential base for development and implementation of effective preventive programmes targeting NCDs, there is an urgent need for a rapid and result-oriented focus on epidemiological and socio-anthropological aspects of NCD. Without appropriate interventions, the epidemiological transition in low- and middle income countries will result in a cascade of (community) problems with pronounced economical drawbacks. However, the main paradox remains that this development initially is a consequence of economic growth and increased standards of living. The common consensus emphasizes that a major proportion of future cases of NCD are preventable, but in order to ensure good cost-effectiveness these programmes should be implemented within the next two decades [5]. An approach directed against the classic diseases of poverty, i.e. malnutrition, infectious child diseases, maternal death and HIV could be combined with preventive measures directly targeting NCDs. The question is not whether donors and local governments will increase their focus on NCD, but rather when this change in health policies

takes place. As it appears in the title of [5], it will be a race against time.

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