Global transition in health

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ABSTRACT

"Tempora mutantur et nos in illis" king Lothar I remarked by year 900 AD. What exactly changed in us over time, i.e. how patterns of the epidemiological transition in populations locally and globally might appear, was described by Omran in 1971 [1]. The effect of transition on health and diseases in populations was demonstrated by Frenkl et al in 1991 [2]. And which major public health problems following each other, and why, was underscored by LaPorte in 1995 [3].

In 2000, leaders of the world society decided to identify a range of common goals, the Millennium Development Goals (MDG), to be reached by year 2015. Many of the MDG are directly or indirectly related with the major health problems, particularly those hitting the poorest: lack of clean drinking water, unhealthy environment, high maternal mortality due to lack of care for the pregnant, and lack of control of major communicable, often fatal diseases like child diseases, malaria, HIV/AIDS and tuberculosis.

It is remarkable that the specific chronic diseases of major public health relevance are in fact not mentioned in the MDG, even if these diseases increasingly are hitting populations in low- and middle-income societies, i.e. developing countries. The world community seems to prioritize the diseases that are most visible, and most often linked with poverty, namely the infectious diseases mentioned above, which together kill about 17 million people annually, often in combination with malnutrition, and the 0.6 million deaths related to birth and pregnancy. With the exception of HIV/AIDS, which also hit richer societies, these diseases of poverty have been underprioritized regarding research as well. However, at the turn of the Millennium, the burden of "Western" non-communicable diseases was increasing fast in developing countries. And by 2025, the burden of non-communicable diseases is expected to have doubled globally, with half of the burden on developing countries. Therefore it may be rewarding to look backwards upon the three stages of Omran's original thesis on epidemiological transition, to understand life and death forwards, in a world in fast transition, cf. the Danish philosopher Soeren Kirkegaard: "it is true what philosophy tells us, that life must be understood backwards, while not forgetting the second sentence, that it must be lived forwards".

DEMOGRAPHIC AND EPIDEMIOLOGICAL TRANSITION

The theory of demographic transition was first formulated by the demographer Warren Thomsen, in 1929, who described how societies originally with a high mortality and high birth rate, over time transform into decreasing mortality, followed by decreasing birth rate.

This development is seen as a result of growing economy and industrialization.The notion of epidemiological transition was introduced by Omran [1], in 1971, to describe the changes in health, occurring during the demographic transition, where the largest burden of disease gradually shifts from infectious diseases to chronic, non-communicable diseases. Omran formulated five factors of major importance for transition in his Theory of the Epidemiology of Population Change: 1) Mortality and middle life time are fundamental for the dynamics of population growth (Figure 1). 2) During the transition, a shift occurs in mortality and disease patterns whereby infections, specifically among children and younger individuals, gradually are replaced by degenerative and man-made diseases in adults, towards dominance of the latter in the elderly. As Kierkegaard might have formulated it: there are three stages on the way of our world: a) the plagues and hunger period, b) the period with decreasing importance of pandemics, and c) the period with increasing importance of degenerative and man-made diseases. 3) During the epidemiological transition, the most pronounced changes in health and disease patterns take place among children's and mothers, which result in a decrease in mortality followed by declining birth rate. 4) Epidemiological transition in health and diseases is therefore closely associated with demographic and socio-economic transition, and with changes in life-style and modernization. 5) Variations in the speed by which these changes occur, can be demonstrated in three basic models: a) the classical Western model, b) the delayed model, and c) an accelerated model from e.g. Japan after World War II up to 1970.

TRANSITION IN HEALTH

In 1991, Frenkel et al [2] proposed a modified model of transition in health, including the ways societies respond to a given health situation, and vice versa. About the same time, King [4], who till then was one of the most outspoken advocates for reducing the high mortality among vulnerable population groups such as children in developing countries, through essential primary health interventions, such as vaccination and oral rehydration therapy for diarrhea, promoted a most provocative statement, now doubting the sustainability of his recommendations in relation to child mortality as well as those from the World Health Organization's (WHO's) and UNICEF's and developing aid agencies, and recipient countries'. King argued that many populations in the developing world were entrapped and could not escape the enormous population growth, which was the long-term results of effective health interventions, hereby rather worsening than improving the life conditions of the poor, i.e. inducing another era of plagues and hunger.

In contrast, the World Bank (WB) issued the remarkable report in 1993 Investing in Health [5], where the accounts of (ill-)health included a summary measure for years of life lost to disease-specific premature death and disability (DALYs). The report pointed at the grotesque unbalance in burden of diseases between various populations or "models" of real life, i.e. a) the Western, b) the delayed, and c) the accelerated – and added d) the (post)communist model. The notion equity in health was adopted by the WB, and major plans were designed in order to facilitate investment to relieve the burden of disease for the weakest. Unfortunately, harsh structural adjustment models enforced by the WB with the support from Western country donors had – at least initially – a negative effect on some populations' health [2].

Omran's epidemiological transition model has been criticized and modified by many, including himself. Two events, in particular, apparently do not fit the three stages: the HIV/AIDS epidemic, e.g. another plague or pandemic, hitting rich (USA) as well as poor (African) societies, and the unexpected fall in deaths form man-made, in particular cardio-vascular diseases in some Western countries. Furthermore, the unexpected falling birth-rate in spite of increasing mortality, in many of the former Soviet republics, where public health systems collapsed, and even infectious diseases like diphtheria and tuberculosis, re-emerged, helped by increasing inequity, poverty, and tobacco- and alcohol-consumption.

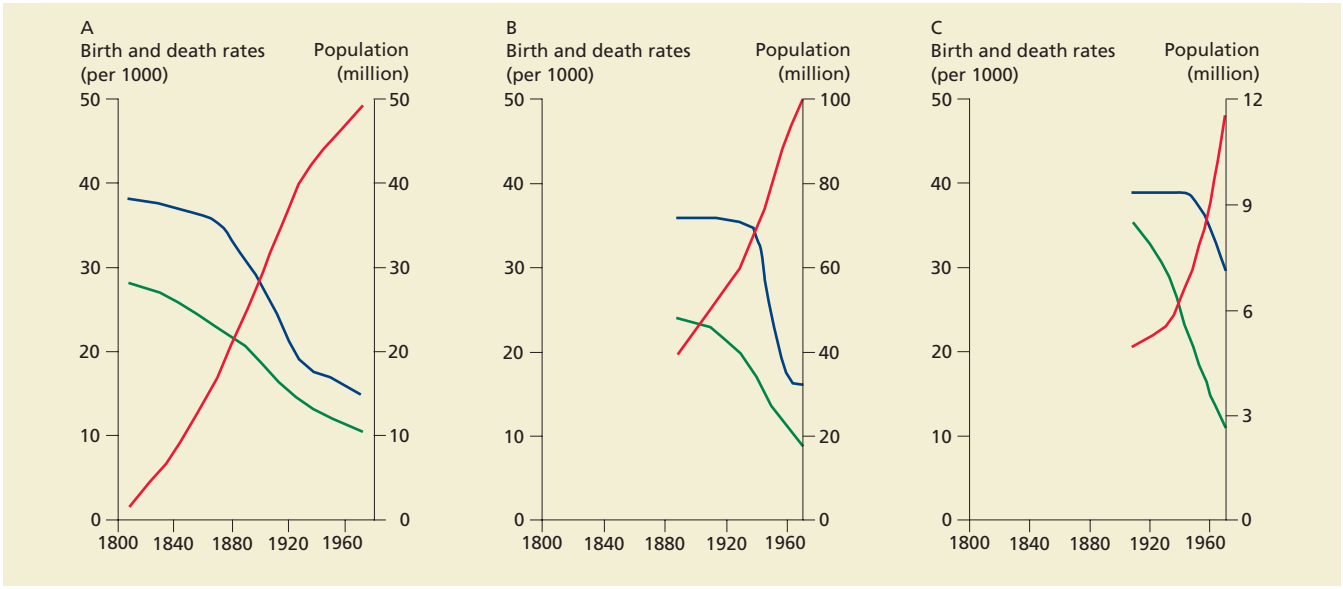

Figure 1. The "Classic Western Model", the "Accelerated Model" and the "Delayed Model". These models describe three speeds of demographic transition for a long-time industrialised community (A), a typical low-income community (B) and a recent industrialised community (C), respectively. Mortality (green), birth rate (blue) and population (red). Adapted from Omran 1971 (1) and Jean-Pierre Gervasoni (pers. comm.).

In 2004, Vallin & Meslé [6] went through these convergences and divergences in death and disease, and arrived at a new approach to transition in health, acknowledging Omran's model, and extending it. Some developing countries, India e.g. may go into a new stage of life, before the previous has been completed (stage 1 and 2 simultaneously).

WHO [7] described in 2000 this double burden of communicable and non-communicable diseases. Some Western countries, including Denmark, only recently entered the 3d stage, before "completely addressing the issue of man-made diseases, which typify the 2nd stage". This diplomatic statement may be translated into: "the Danes, including our role models, still do smoke and drink and eat too much, and exercise too little."

TRANSITION IN HEALTH RESEARCH

There is a major and uncovered need for research into the diseases, which still kill millions of children, mothers and young adults each year. We still need effective vaccines against malaria, HIV, tuberculosis, many other infectious diseases including respiratory infections, diarrhoeal diseases, and sexually transmitted diseases. There may also be a need for the traditional Western oriented research in diseases hitting in stage three – cardio-vascular diseases, diabetes and cancer – be combined with research into diseases of stages one and two. What are the long-term consequences of e.g. infection and malnutrition in pregnancy and infancy? It is striking that while 80-90% of type-2 diabetics in the Western world are related to the obesity epidemic, 60-70% of type-2 diabetics in India are not fat according to Western and universally adopted standards [8]; similarly, many hypertonic Africans are not obese, but have decreased insulin sensitivity. Low birth weight is now known to predispose for development of the metabolic syndrome, which includes type-2 diabetes, hypertension and its complications, as first suggested by Hales & Barker [9] in 1991. Could this contribute to the faster development of and earlier advent of diabetes type-2 and hypertension in developing countries? As mentioned above, type-2 diabetes and cardiovascular diseases already kill as many or more in developing as in developed countries. There is increasing evidence that low birth weight or premature birth, irrespective of cause, may induce insulin resistance and earlier début of the metabolic syndrome [10]. Research in e.g. the Danish twin cohorts and in other children with low birth weight and their consequences might be combined with research in developing countries, where low birth weight is much more prevalent. Another interesting interaction between communicable and non-communicable diseases is being recognized: diabetes patients in countries in fast transition now have as high risk of reactivating tuberculosis as HIV/AIDS patients.

So transition in health globally should also reflect global entrance to health research. The stages of life and societies may not be as closely separated, as Omran indicated – but his model focuses sharply on the relations between transition in demography, epidemiology, and health.

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