Commentary: Poverty and cardiovascular disease in India: Do we need more evidence for action?

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It appears that some Western academics are still caught in a time warp, like Rip van Winkle. An argument was advanced by a World Bank team in 1999, that any action to control non-communicable diseases (NCDs) would only help the rich and hurt the global poor by increasing health inequity.1 This has subsequently been refuted by many.2,3 Even the World Bank changed its stance in 2007, declaring that in ‘all countries and by any metric, NCDs account for a large enough share of the disease burden of the poor to merit serious policy response’.4 The United Nations political resolution on NCDs, in September 2011, also acknowledged that NCDs are imposing health and developmental burdens on the poor in low- and low-middle income countries.5 Despite this, Subramanian et al. have chosen to rehash the same argument with regard to cardiovascular disease (CVD) in India.6 In brief, they reviewed the available published literature from India on the association between socio-economic status (SES) and cardiovascular (CV) risk factors or acute events or mortality outcome. They demonstrated a positive gradient in socio-economic status (SES) in the prevalence of one of the CV risk factors, obesity or overweight in Indians, and postulated that CVD is a concern for only the rich in India. In effect their stated position was similar to the Gwatkin thesis and it is disheartening that we have not moved
beyond in the past 14 years. We recognize and respect the commitment of Gwatkin and Subramanian et al. to maintaining prioritized global attention to communicable diseases and malnutrition. While sharing these commitments, we believe and argue that action is also needed on chronic NCDs and that these are not mutually competitive.

**What are the arguments against the conclusions of Subramanian et al?**

First, the latest estimates published in the *Lancet* 2012, based on the Global Burden of Disease (GBD) study, points out that low- and lower middle-income countries contribute nearly two-thirds of the burden of NCDs. Indisputably, cardiovascular diseases (CVDs) are the major contributor to the global burden of disease, and especially NCDs and, of the top five causes of deaths, four are related to NCDs. There is no justification to assume that a vast majority of the poor (more than two-thirds) within the low- and lower middle-income countries do not contribute to the high burden of CVDs.

Second, in their article Subramanian and colleagues have reviewed published papers over a 30-year (1980–2011) period. This is a long period in a country’s history; we have indeed witnessed major economic, demographic and other epidemiological transitions in India post liberalization, which started in the year 1991. If we disaggregate the studies quoted by the authors into pre- and post-1991, we observe a striking difference. Whereas studies conducted in the pre-liberalization era do suggest the existence of a positive social gradient in CV risk factors, research reports from the post-liberalization era indicate a reversal of social gradient in CV risk factors such as hypertension and less distinct but apparent changes in the prevalence of metabolic syndrome or cluster of CV risk factors. In a 10-year follow-up study in an urban South Indian population, the SES gradient for diabetes and CV risk factors changed dramatically, with a convergence of prevalence rates among people in the middle-income and lower-income groups. In another serial epidemiological survey from Jaipur, prevalence of smoking, diabetes and dyslipidaemia increased more in low educational status groups as compared with higher educational groups. Tobacco use has been consistently high among the low SES group, especially the smokeless forms of tobacco. Overall the total cardiovascular risk, based on the well-accepted global cardiovascular risk assessment approach, was elevated in individuals in the low SES group. Furthermore, the proportion of individuals with optimal CV risk factors was lowest in individuals in the low education group. The authors to support their argument have given preferences to unadjusted and self-reported estimates from underpowered studies conducted mostly in one site or region in India. A systematic evaluation of the published literature, however, reveals that risk factors of CVD are prevalent in low SES groups at least to the same level as high SES groups, if not more.

From an epidemiological point of view there are several other debatable, less convincing and selective interpretations of findings or points of view in the report by Subramanian et al. The authors selectively ignore the methodological limitation in the studies with positive social gradient, whereas they highlight such limitations in studies with negative social gradient. They rejected the findings from the Sentinel Surveillance in Industrial population (SSIP) study group by simply questioning the generalizability of the findings. This study, carried out in industrial settings, involves both industrial employees and their family members, covers 10 different sites and probably the largest such studies in India, with a sample population of nearly 20,000 adults. This finding of reversal of social gradient has been confirmed in community-based studies conducted in 11 different regions in India.

The paucity of reliable hard outcome data and their distribution across social groups should not be the reason for delaying or arguing to curtail the public health efforts to limit the impact of CVDs in the Indian population. Available evidence indicates that both acute myocardial infarction (AMI) and stroke are more often seen in individuals from relatively poor SES. Interestingly, Subramanian himself has co-authored a paper on SES and AMI, which clearly shows an inverse gradient in education and AMI risk across the 52 countries participating in the INTERHEART study. Though the magnitude of this relationship is stronger in high-income countries, it is still significant in low- and low-middle-income countries. This study had nearly 2000 South Asian cases and 2000 controls, a large majority coming from India and Pakistan, making this one of the largest such studies. In a separate analysis of the INTERHEART South Asian population published by Joshi et al. in *JAMA* in 2007, low educational level was strongly associated with increased risk of AMI in native South Asians. If, in Pendekar et al.’s study, we combine the groups of those with lower than secondary school education (who would represent the less than $2 per day wage-earning population) and compare with those of higher levels of education, the inverse relationship of SES with CVD death becomes apparent. In fact the stroke mortality trend does show a negative gradient in this population. Subramanian et al. in their article agree that tobacco use and diet low in fruits and vegetables are relatively frequent in the low SES individuals. From the INTERHEART study we know that tobacco use, diet low in fruits and vegetables and history of hypertension together contribute to nearly two-thirds of the population attributable risk for AMI. This is also consistent with the GBD study which shows that the above-mentioned risk factors are among the top
five risk factors for mortality as they lead to adult chronic diseases and contribute significantly to ischaemic heart diseases (IHDs). Therefore, it is biologically plausible that individuals from low SES are vulnerable to IHDs and stroke despite having normal body mass index (BMI) (Subramanian et al., base a major part of their argument on the low prevalence of obesity in the Indian population and the lack of reversal of social gradient). Further, Subramanian et al. suggest that CVD and its risk factors are over-represented in the Indian narrative of NCDs. In a detailed report on causes of death in India, which is based on accurate estimation of the cause of death through verbal autopsy with medical evaluation methods, CVD was the leading cause of death in all parts of India including the poorer empowered action group states and even in rural areas. Again, in this report 50% of deaths due to NCD for all ages were from CVD and diabetes, and if we consider the age groups above 25 years this proportion is strikingly high. Among CVD, IHD is the major contributor. The national commission on macroeconomics and health estimated that in 2005 the prevalence of CHD was 359/100,000, of stroke was 12/100,000 and of rheumatic heart disease (RHD) was 7/100,000. Other NCDs also show inverse association with SES. For example, in the million deaths study published in the Lancet, Dikshit et al. demonstrate a clear and inverse SES gradient for cancer deaths with twice the number of deaths among participants who were illiterate as compared with those with the highest level of education. This applied to both men and women.

What are the reasons for a mixed pattern in the relationship of poverty and cardiovascular risk factors?

In India the epidemiological transition (transition from the ‘age of pestilence and famine’ to the ‘age of degenerative and man-made diseases’) has occurred rapidly, so much so that both pre- and post-transitional conditions can co-exist in several communities. The relationship between SES and CV risk factors is complex, and different CV risk factors show apparently disparate relationship with SES at each stage of epidemiological transition. Tobacco use is probably the first of CV risk factors to show a reversal of social gradient. As the transition progresses, hypertension prevalence also increases rapidly in the poor SES group. Apart from lifestyle changes there are other reasons that could operate in increasing the risk of hypertension among the poor. First, the poor consume food high in salt (a staple diet of those earning below S2 a day is either cooked rice or rotis (Indian bread) with pickles which have high salt content). Second, the consumption of fruits and vegetable is low and consumption of country liquor is very high, all of which can increase blood pressure (BP). Despite a consistent growth in the overall gross domestic product (GDP) in the past decade, the average inflation rate, especially the food basket inflation, remains consistently high in India. The high inflation rate makes the healthier options more inaccessible to the poor. Therefore, it is likely that reversal of SES gradient for BP has been observed in India. In fact, the Assam tea garden workers who are among most poor have been shown to have a high prevalence of hypertension due to high salt consumption. Similarly, high prevalence rates of hypertension and metabolic syndrome are reported from remote rural areas in India.

Even in the tribal (Aboriginal) population in India, one in every two adults in the age group 25–64 years were reported or diagnosed to have hypertension. This clearly indicates that CV risk factors affect individuals from the lowest socio-economic strata. Obesity or overweight is the last of the CV risk factors showing inverse social gradient even in countries experiencing advanced epidemiological transition, and we believe that in the years to come we will have an epidemic of overweight and obesity. Small increase in weight appears detrimental to Indians, potentially due to early life undernutrition and other known biological reasons. Despite very low obesity prevalence in the Indian population compared with the US population, the prevalence of diabetes is at least 2-fold higher in the Indian population. Further, Indians are also known to have a high body fat percentage at any given BMI. Therefore, the higher prevalence of obesity observed in high SES should not be a reason for curtailing public health efforts to contain CVD in India.

Subramanian et al. in their article raise concerns over the use of the language of ‘double burden’ of diseases to suggest the co-existence of the ‘diseases of the poverty’ and ‘diseases of the affluent’. As per available conservative estimates, we have over 100 million individuals with hypertension, approximately 60 million with diabetes and a million deaths due to tobacco use in India. In a study of causes of mortality in rural Andhra Pradesh, South India, chronic diseases were the leading cause of death with the diseases of the circulatory system contributing to nearly one-third of all deaths. Therefore, we believe that it would not be inappropriate to emphasize the ‘double burden of diseases’ in India. It is however, not appropriate to call CVDs ‘diseases of the affluent’.

Subramanian et al. also raise concerns over the efforts to make health care in India universal and free. Given the high out-of-pocket health care expenditure and the catastrophic health spending to meet the health care needs arising from both CVDs and other NCDs, the demand for universal health coverage (UH) is appropriate and rational. Whereas a UH coverage helps to mitigate the financial burden due to the potential catastrophic health spending, it also helps to bridge the gap between the rich and poor in terms of...
access to health care and promotes equitable nation development. We argue that the alternative explanations provided by Subramanian et al. suggesting that these measures only help the rich in India are erroneous and misplaced. They also discuss ‘diversion of resources’, as they perceive that spending on NCDs will increase the inequality by unwittingly shifting the limited resources from the health concerns of the poor to those of rich in India. In fact the most cost-effective interventions for control of NCDs are: policy intervention such as higher taxation on tobacco and alcohol; policy initiatives for prevention of transport-related losses of fruits and vegetables which can be as high 50%; and trans fat reduction particularly in biscuits which are inexpensive and ubiquitous. The taxation on tobacco and alcohol, for example, has the potential to increase revenue and could be used for NCD prevention programmes. Such examples are available from several low-income and middle-income countries which can help to mitigate the burden of NCDs significantly.40,41 We believe that addressing the unfinished agenda of pre-transitional diseases through poverty alleviation and other measures, and countering the rising burden of chronic diseases are not mutually exclusive.

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References

Commentary: Jumping the gun or asleep at the switch: is there a middle ground?

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Non-communicable diseases (NCD) are now widely recognized as constituting a majority share of global mortality, accounting for 65% of all deaths. An estimated 43% of all deaths in low-income countries and 75% of deaths in lower-middle-income countries can be attributed to non-communicable conditions. In this context, it has been hypothesized that NCD may no longer be confined to only the most affluent populations in low- and middle-income countries (LMIC). Instead, even populations with lower socio-economic status (SES) within LMIC may be experiencing increasing risk for NCD or NCD risk factors. Support for this hypothesis has been documented in a number of LMIC,3-7

In this issue of IJE, Subramanian and colleagues challenge the idea that NCD are disproportionately...)