Re: Jumping the gun: the problematic discourse on socioeconomic status and cardiovascular health in India
From PRAKASH C GUPTA¹ and MANGESH S PEDNEKAR¹*

¹Healis-Sekhsaria Institute for Public Health, Navi Mumbai, India
*Corresponding author. Healis-Sekhsaria Institute for Public Health, 601/B Great Eastern Chambers, Plot No. 28, Sector 11, CBD-Belapur, Navi Mumbai, Maharashtra, India. Email: pednekarmangesh@rediffmail.com

We read the paper on socioeconomic status and cardiovascular health in India by Subramanian et al. in this journal with interest.¹ We were rather perplexed by the tone of the statements and certainty of the conclusion in the paper. To quote ‘…the proportion of CVD related cause was found to be greatest among higher SES groups’ (Abstract), ‘…IHD deaths occur disproportionately among more economically advantaged groups’ (p. 12) and ‘…[inference that] the poor (who constitute the overwhelming majority in India) are disproportionately burdened, might be premature’ (p. 13). In the Abstract, the authors advise that ‘Resource allocation in the context of efforts to make health care in India free and universal should reflect the proportional burden of disease on different population groups’.

The burden of a disease in a subgroup would depend upon the number of cases of disease in that subgroup and the healthcare resources which would be required for that number. Different subgroups, however, differ in their respective sizes and presumably, since the allocation of healthcare resources already takes into account the size, we need to look at the proportionate burden.

We decided to look at our Mumbai Cohort Study data once again to look at the burden of the cardiovascular disease (CVD) mortality by educational status² (that was referred to by Subramanian et al.). To recapitulate briefly, it was a cohort of 148,173 individuals (age >= 35 years) recruited and followed through house-to-house visits after about 5 years. Cause of death information was abstracted from death records at the Mumbai municipal corporation. To look at the burden of CVD in the most simplistic manner in this communication, we focused only on the number of deaths in the cohort. We used education level as proxy for socioeconomic status and divided the cohort members into two broad groups: those having lower than high school education and those having high school education or above. We looked at all CVD deaths (100 to 199 in ICD-10), IHD deaths (120–25) and stroke deaths (160–69).

Since the most important parameter that influences death is age, we looked at the age distribution of the burden of all-cause mortality and of CVD in the two groups. Figure 1 shows the age distribution in two groups for deaths due to all causes, CVD, IHD and stroke. As one would expect, the burden of all-cause mortality in the lower education group was greater than in the higher education group at all ages. It is remarkable that the similar differences between the two groups persisted for CVD. For IHD there was a criss-cross at different age points. For stroke, the differences were higher although some points, especially in the higher education group, were based on small numbers.

Table 1 shows the distribution of person-years of observation, proportionate burden of all deaths, CVD deaths, ischaemic heart disease (IHD) deaths, stroke deaths and also age-adjusted burden. It is clear that the CVD and stroke deaths were disproportionately higher (one and half times and over two and half times higher, respectively) in the lower education group compared with the higher education group. For IHD, the confidence intervals were overlapping but the difference was much smaller. The interesting point is a reversal after age-adjustment—the IHD burden seemed greater in the higher education group although confidence intervals were still overlapping. For CVD and for stroke also, after the age adjustment, the numbers increased for the higher education group substantially but decreased for the lower education group, although only marginally. This was perhaps due to the fact that the burden in the higher education group was disproportionately greater in the younger age groups, an important point from a public health point of view.

These data do not comment on ‘reversal’ hypothesis since they are one-time data. Also, they may suffer from the usual shortcomings of a cohort study, e.g. the cause of death was abstracted from death information written by the attending physician and may not be very accurate. Nevertheless, the data do clearly point out that in absolute number terms, CVD burden was proportionately higher in the disadvantaged group (poor). Healthcare policies for non-communicable diseases...
(NCDs) in general and for CVD in particular need to take this fact into account. The policies also need to consider the fact that the burden, especially of IHD, in the economically advantaged group may be greater in the lower age groups than it ought to be.

These are different from conclusions that Subramanian et al. reached in their paper. We feel that they mixed up two distinct public health issues—distribution of risk factors for the CVD and the ‘proportionate burden’ of CVD among the poor.

Whether risk factors for CVD are higher in one group or not is a different question, but the burden of CVD does seem to disproportionately higher among poor people in India and the allocation of healthcare resources needs to take that into account.

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Authors’ response to Gupta and Pednekar: Importance of examining cause-specific proportions of deaths as well as mortality rates
From DANIEL J CORSI1, MALAVIKA A SUBRAMANIAN2, GEORGE DAVEY SMITH3 and SV SUBRAMANIAN4*

1Harvard Center for Population and Development Studies, Cambridge, MA, USA, 2Department of Social Science, Indian Institute of Technology, Gandhinagar, Ahmedabad, Gujarat, India, 3MRC Integrative Epidemiology Unit (IEU), School of Social and Community Medicine, University of Bristol, UK and 4Department of Social and Behavioral Sciences, Harvard School of Public Health, Boston, MA, USA

*Corresponding author. Department of Social and Behavioral Sciences, Harvard School of Public Health, 677 Huntington Ave, Boston, MA 02115, USA. E-mail: svsubram@hsph.harvard.edu

It is not clear what Gupta and Pednekar mean when they state, ‘We decided to look at our Mumbai Cohort Study data once again to look at the burden of the CVD mortality by educational status’.1 We not only had cited but also used their data from their previously published study2 to illustrate the importance of examining both mortality rates between different educational categories (which they do), as well as the proportion of deaths attributable to different causes in different educational categories3 (see Figure 2 of our original paper3). In their letter,1 Gupta and Pednekar present a re-analysis of age-adjusted mortality rates that they have published before,2 although in the letter they coarsened the five educational categories (which they had used in their original publication2) to two categories of ‘lower education groups’ and ‘higher education groups’ and combined across men and women. It seems erroneous, for instance, to group illiterate individuals with those with primary- and middle-school education, especially when their own data demonstrated age-adjusted cardiovascular disease (CVD) and ischaemic heart disease (IHD) mortality rates for men were higher for those with primary- or middle-school education and lower for those who were illiterate or have a secondary-school or college education2 (also see the line graph in Figure 2 of our original paper3). It is also not clear if additional exclusions have been made in this new analysis, as the number of deaths analysed was fewer than originally reported (11 905 vs 11 947) in the ‘lower education groups’ and 1048 vs 1054 in the ‘higher education groups’. In short, Gupta and Pednekar do not raise any concerns whatsoever with the specific interpretations we made in our original paper3 based on their published data,2 which makes us wonder what new information is gained through their re-analysis.

In our original paper,3 using the study by Pednekar and colleagues2 as an illustration, we emphasized the need to not only compare mortality rates across educational categories but also to examine the fraction or proportion of deaths that are attributable to CVD and its subtypes (IHD or stroke) in different educational categories (see the bar graph in Figure 2 of our original paper3). Gupta and Pednekar in their letter completely ignore the importance of this measure. As we argued in our original paper,3 a greater proportion of deaths attributable to CVD, and in particular IHD, among the better educated suggests that if public resources towards treatment and care are concentrated on such conditions they will, proportionally, have greater benefit for the health of the better-off groups, leading to the entrenchment of the inverse care law.5

Another limitation of solely focusing on mortality rates across different groups is that it is not possible to ascertain whether some of the proportional excess in CVD/IHD mortality among the higher educated may be related to a reduction in mortality from infectious or other causes among these groups (for