

**Response to a comment on 'Unravelling the Socioeconomic Gradient in the Incidence of Catastrophic Health Care Expenditure'**

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## Response on commentary

The commentators propose an alternative approach to measuring catastrophic health expenditure (CHE), different to that used by Khan et al. (2017) and others (for instance, van Doorslaer et al. 2007). The modified measure is expected to more accurately reflect socioeconomic gradient.

The underlying concept of 'catastrophic payment' is important to consider when estimating incidence of CHE. Van Doorslaer et al. (2007) when analysing catastrophic healthcare in Asia state that "Our focus is on expenditures that are catastrophic, in the sense that they severely disrupt household living standards" (page 1160). Following the approach of Van Doorslaer et al. (2007), we estimate out-of-pocket (OOP) payments as a 'share of total household consumption expenditure' and as a 'share of non-food household consumption expenditure', to derive our thresholds for CHE.

Our major concern is that the commentators did not explain why their proposed threshold (i.e. OOP payment corresponds to the consumption of 1 or 2 household members) is better than the measurement used in our study and elsewhere in relation to the underlying concept of 'catastrophic payments'. Using OOP payments as a share of per capita health consumption expenditure, the commentators are inferring different CHE thresholds for households of different socioeconomic status. For instance, for threshold  $CHE=1$  if  $OOP/PHCE > \alpha_j$ ;  $CHE = 1$  if  $OOP/PHCE \leq \alpha_j$ ; where  $j=1,2\dots$  then if OOP payment incurs, the yearly consumption of one member or more of this specific household faces CHE.

This measurement may be subject to estimation bias since poorer households tend to be larger than rich ones in Bangladesh (Bangladesh Bureau of Statistics, 2011). In this case, total household consumption expenditure (THCE) of poorer households will be divided by a higher number of people and consequently the threshold level of CHE will be set at a lower level for poorer people as a share of THCE. For example, if household A (poorer) with 6 members has 1,000 USD THCE and household B with 4 members has 1,200 USD THCE, the CHE threshold will be 1/6 or 16.7% (or 167 USD) and 1/4 or 25% (or 300 USD) respectively. In that case, poorer household will reach CHE thresholds at a lower level of health care spending (in absolute value) compared to CHE thresholds used by ourselves (Khan et al. 2017) and others (Van Doorslaer et al 2007). Such a situation will result in an obvious socioeconomic gradient in CHE, more possibly due to systematic differences in demographic structure across socioeconomic groups. If the opposite situation is considered that the richer households have a higher number of household members (6 members in a rich and 4 members in a poor household), the CHE threshold will be 16.7% for rich and 25% for poor households. It implies that the socioeconomic gradient of household size can have a direct effect on socioeconomic gradient in the incidence of CHE and this new approach, proposed by the commentators, may be biased.

Further, this new approach proposes weighting all household members equally (children, elderly, and working adults) even though consumption expenditure and health expenditure may be different depending on age. Use of an equivalence scale might be a better alternative for calculating per capita consumption expenditure though this does not address our major concern i.e. using it as an alternative CHE threshold. The commentators pointed out differences in findings between our study (Khan et al. 2017) and others (like, van Doorslaer et al. 2007). It should be noted that in our study, we used

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3 an asset-index for ranking the households while van Doorslaer et al. (2007) used  
4 consumption expenditure, which may explain the difference in findings. Our ranking  
5 variable was motivated by Joglekar (2008), who suggested the use of asset-index for  
6 ranking the households to avoid problems of endogeneity due to use of consumption  
7 expenditure in constructing both dependent and explanatory variables while estimating  
8 the incidence of catastrophic Health Expenditure.  
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11 To summarise, a clear justification should always be presented for the choice of  
12 thresholds when estimating CHE, highlighting different pros and cons. We contend that  
13 the commentators proposed threshold may suffer from estimation bias due to the  
14 socioeconomic gradient of household size. We welcome the opportunity to discuss this  
15 topic and to further improve and develop methods in this field of research.  
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