



## Lessons from the PURE study

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The Prospective Urban Rural Epidemiology (PURE) study is an investigator initiated programme to assess the health of more than 600 communities selected from 17 countries. Three high-income countries, seven middle-income and seven low-income countries are taking part.<sup>1</sup> As the name suggests, PURE also looks at differences between rural and urban communities. It's a massive undertaking which is starting to yield useful information that can be used to improve health status in these countries. Credit for creating the PURE study should go to Prof Salim Yusuf who doggedly pursued this dream and has persuaded many organisations to fund this work. It is not another Global Burden of Disease (GBD) programme though it shares many of the objectives – and weaknesses.

So what can we learn from the PURE study paper that was published in NEJM?<sup>2</sup> This particular paper focuses on cardiovascular disease, which has been identified by the GBD as the leading cause of death and years of life lost around the world.<sup>3</sup> The GBD tells us about the relative importance of cardiovascular disease in different countries and regions, but PURE looks at countries grouped by socioeconomic status. In most respects the results of PURE are unsurprising. The results confirm that major cardiovascular disease, fatal cardiovascular disease and death from any cause are higher in low-income countries than in high-income countries. However, what appears to be surprising, at first glance, is that the burden of total cardiovascular disease, as measured in PURE, is similar in high-income, middle-income and low-income countries. This appears to at variance with what would be predicted from the INTERHEART Risk Scores in the three groups of countries which was higher in high-income countries than in low-income countries. The apparent discrepancy is partially accounted for by the finding that non-major cardiovascular events show a reverse association, with rates being much lower in low-income countries than in high-income countries. This is because in this paper non-major cardiovascular events were defined as events that led to hospitalisation. The lower number, and accessibility, of hospitals in low-income countries provides at least one reason for the lower number of non-major cardiovascular events recorded. Less rigorous record-keeping in might also play a part.

The PURE results assessing rural compared with urban areas also provides interesting insights into the burden of cardiovascular disease in middle- and low-income countries. Overall the rates of cardiovascular disease in these groups of countries were lower in urban areas than in rural communities – despite INTERHEART Risk Scores being higher in urban communities. Cardiovascular deaths were also lower in urban communities, but the rate of non-major cardiovascular events (hospitalisation) was higher in urban areas. Again, this is probably partly explained by the greater availability of hospitals in urban areas. Greater access to health care in urban areas might, in general, explain the lower overall death rates compared with rural areas.

If the difference between urban and rural communities in low- and middle-income countries in cardiovascular deaths is because of differences in access to health centres and hospitals, funding the building of more hospitals might seem a simple solution. As is clear, however, from experiences in developed countries such as the UK, rural hospitals are not cost-effective. Local rural hospitals equipped for interventions such as angioplasty are a luxury that even richer countries cannot afford. Rather than treating coronary artery atherosclerosis with angioplasty, stents or coronary artery bypass surgery there is an increasing focus on prevention of coronary stenosis by education and with drugs. The polypill concept is gaining traction and could become a viable option.<sup>4</sup> Although some people regard this as an unacceptable approach it does reduce risk. In essence it seems similar to vaccination

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as a way to prevent disease and death, but of course a polypill is a daily expense while vaccination provides long term protection. The question is whether a polypill is affordable in low-income countries.

Income – especially disposal income – is of course different between high-, middle-, and low-income countries and could also be a partial explanation for the differences recorded in the PURE paper.<sup>2</sup> Previous reports from PURE suggest the availability and affordability of medical interventions is a reason for better control of hypertension in high income countries compared with low income countries.<sup>5</sup> Similarly, differences between rural and urban communities in terms of income might partly explain the differences in outcomes between the communities. Income in rural communities is generally less than in urban communities. Especially in low-income countries this might result in catastrophic healthcare expenditure. Even in middle-income countries it is not uncommon for medical costs to greatly exceed total income.<sup>6</sup> Previous reports from PURE have indicated that even a drug as cheap and available as aspirin is 7-times less likely to be used in low-income countries than in high-income countries.<sup>7</sup> Data on incomes and costs of drugs have been collected in the PURE study and these data might identify the communities most lacking in affordable medicines.

What might be done if, as anticipated from casual observation, drugs are too expensive to be affordable to a large and needy population? The pharmaceutical industry has provided antiretroviral drugs at low price and this has been a valuable component in the fight against HIV. It would be unreasonable, however, to ask pharmaceutical companies to provide all their proprietary drugs at (near) cost price. This would stifle investment and ultimately adversely influence health-care for all – especially in poorer countries. Governments in low-income countries might be able (with targeted financial aid) to afford to subsidise provision of drugs at affordable prices – especially if bought in bulk through a coordinating international organisation. Or perhaps international aid might be used to help governments to establish production facilities within countries for generic (or licensed) drugs, or a polypill. Some might argue that the focus should be on education and promotion of better lifestyles for prevention of cardiovascular disease. There might ultimately be a place for some such interventions, but in the short- and medium-term it seems that provision of affordable drugs is a key to preventing or ameliorating cardiovascular disease and saving lives. However, when even aspirin is not universally affordable, new ways of providing access to drugs is needed.

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