The cost of harmful alcohol use in South Africa: A commentary

To the Editor: A figure that is often used when quantifying the total harmful cost of alcohol to South African (SA) society is sourced from a research article that appeared in the *SAMJ* in 2014. The article, by Matzopoulos *et al.*,[1] calculates the estimate of this total cost to be in the region of ZAR250bn per year using 2009 prices. Unfortunately, through repetitive quoted use, this figure has become accepted by many as being both reliable and constant in real terms over time. However, there has been very little interrogation of its actual derivation, or the assumptions required to justify its use in the context of the harm caused by alcohol. In particular, a major component of this total cost comprises an amount of ZAR183.5bn per year that is assumed to measure the intangible cost associated with premature mortality and/or morbidity resulting from abuse of alcohol. These costs are, somewhat controversially, estimated by Matzopoulos *et al.*[1] using an estimate of the so-called value of a statistical life (VSL), which attempts to measure the value of a death averted in an SA setting.

In this letter, we first question whether the way the VSL was utilised by Matzopoulos *et al.*[1] to attach a rand value to human life is an appropriate use of the VSL concept. We then examine the methodology that they invoke to obtain a proxy estimate for VSL. We believe that this estimate is inappropriately large and that it led them to posit a very high cost associated with the premature mortality and/or morbidity that is assumed to be alcohol-related. We then propose an alternative approach for calculating VSL which, in contrast to that of Matzopoulos *et al.*,[1] utilises a willingness-to-pay approach by the SA government to undertake additional health expenditure that results in measurable changes in mortality. In contrast to the VSL estimate of Matzopoulos *et al.*,[1] this alternative estimate of VSL is obtained within the standard willingness-to-pay methodological framework generally used to calculate VSL (see, for example, Hultkrantz and Svensson[2]). This revised estimate for VSL is much lower than that obtained by Matzopoulos *et al.*,[1] and, in turn, leads to a much lower cost estimate for alcohol-related harm to SA society.

Ideally, the VSL is calculated for a community by surveying that community's perception of how some beneficial intervention might impact on the probability of mortality in that community, and how much the community would pay for such an intervention. As mentioned, this approach is obtained within the standard willingness-to-pay methodological framework. However, because no such VSL study has ever been conducted in SA, the approach used by Matzopoulos *et al.*[1] to measure VSL for SA sidesteps this suggested willingness-to-pay approach and replaces it with a crude linear proxy estimate for VSL (see Miller[3]) of the form:

$$VSL = GDP/cap * VSL_{factor}$$

To compute VSL using the equation above, Matzopoulos *et al.*[1] use a value for the VSL_{factor} from Lindhjem *et al.*[4] of 73.8. They state that the value of the VSL_{factor} they use for SA is derived on the basis of countries '… with similar purchasing power parity-adjusted per capita GDP to that of SA' (p. 130). However, it is clearly questionable whether the basket of countries used to infer a value of 73.8 for the VSL_{factor} is appropriate as a proxy for calculating an SA-based value for the VSL_{factor}; for example, the basket considered does not include any country from sub-Saharan Africa. Matzopoulos *et al.*[1] then multiply the SA GDP per capita by this unjustified value for the VSL_{factor} and calculate a proxy estimate for VSL of ZAR3.5m (2009 prices). They then further multiply this rand figure for VSL of ZAR3.5m by the estimated number of alcohol-attributable deaths for the year 2009 of 36 840, obtained from a study conducted by Schneider *et al.*,[5] and calculate a mortality-based cost of ZAR128.9bn in that year. To this, they then add a morbidity cost of ZAR54.6bn and arrive at an overall cost of premature mortality and morbidity of ZAR183.5bn, which they attribute to abuse of alcohol for SA in 2009.

We believe that the rand figure for VSL of ZAR3.5m that Matzopoulos *et al.*[1] obtain is completely inappropriate for SA and stems from this unjustified value for the VSL_{factor} of 73.8. This leads to a very high estimate for the intangible cost of alcohol-associated harm to SA society, which is questionable. We accept that estimating VSL directly from the SA population is fraught with difficulty. In line with the standard willingness-to-pay methodological framework, we propose, alternatively, that a credible estimate currently available for estimating the value of life in SA is the value that the SA government implicitly puts on life through its budgetary expenditure, particularly its expenditure on health. In a recent article, Edoka and Stacey[6] calculate a health spending elasticity that can be associated with the age-standardised per capita death rate in SA. They use their elasticity estimate of –0.223 to obtain values for the disability-adjusted life-year (DALY) and the value of a death averted (a VSL proxy). At 2015 prices, these figures are ZAR38.5k and ZAR1.472m, respectively; ZAR49.4k and ZAR1.89m at 2020 prices. Their approach, we believe, is the most credible methodology available for SA, as it reveals the SA government's willingness to pay for averting mortality.

While we support the methodology, Edoka and Stacey's[6] estimate of elasticity is flawed, because the data used encompass a period (2002 - 2015) when the antiretroviral treatment (ART) programme to address the SA HIV pandemic was rolled out. We therefore estimated the elasticity over the period 2005 - 2018 (the period after the implementation of ART) using data from Blecher *et al.*[7] and the World Bank, obtaining an ordinary-least-squares estimate for the elasticity of –0.916 ($p<0.01$). This elasticity estimate implies, in turn, an estimate for the rand value of a DALY at ZAR12.37k and the value of a death averted of ZAR0.460m (2020 prices).

The figure obtained above of ZAR0.460m represents an SA government *willingness-to-pay* estimate for averting an SA death. As such, we believe that this figure is the most credible and robust estimate of the value that could currently be assigned to an SA life. If one uses this value for VSL of ZAR0.460m at 2020 prices (ZAR0.255m at 2009 prices), rather than the figure calculated by Matzopoulos *et al.*[1] for VSL of ZAR3.50m (2009 prices), which equates to ZAR6.31m at 2020 prices, one gets a significantly reduced value for the intangible cost of alcohol-related harm estimated by Matzopoulos *et al.*[1] In particular, one would then obtain an estimate of ZAR13.3bn for the VSL-based intangible cost of alcohol-related harm, rather than the figure calculated by Matzopoulos *et al.*[1] of ZAR183.5bn, all estimated at 2009 prices. This represents a revised and credible estimate for the intangible cost of alcohol-related harm that is ~7% of that estimated by Matzopoulos *et al.*[1]

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1. Matzopoulos RG, Truen S, Bowman B, Corrigall J. The cost of harmful alcohol use in South Africa. S Afr Med J 2014;104(2):127-132. https://doi.org/10.7196/SAMJ.7644
2. Hultkrantz L, Svensson M. The value of a statistical life in Sweden: A review of the empirical literature. Health Policy 2012;108(2-3):302-310. https://doi.org/10.1016/j.healthpol.2012.09.007
3. Miller TR. Variations between countries in values of statistical life. J Transp Econ Policy 2000;34(2):169-188. http://www.jstor.org/stable/20053838 (accessed 5 July 2021).
4. Lindhjem H, Navrud S, Braathen NA, Biausque V. Valuing mortality risk reduction from environmental, transport and health policies: A global meta-analysis of stated preference studies. Risk Anal 2011;31(9):1381-1407. https://doi.org/10.1111/j.1539-6924.2011.01694.x
5. Schneider M, Norman R, Parry C, Bradshaw D, Plüddemann A. Estimating the burden of disease attributable to alcohol use in South Africa in 2000. S Afr Med J 2007;97(8):664-672.
6. Edoka IP, Stacey NK. Estimating a cost-effectiveness threshold for health care decision-making in South Africa, Health Policy Plan 2020;35(5):546-555. https://doi.org/10.1093/heapol/czz152
7. Blecher M, Daven J, Kollipara, A Maharaj Y, Mansvelder A, Gaarekwe, O. Health spending at a time of low economic growth and fiscal constraint. In: Padarath A, Barron P, eds. South African Health Review 2017. Durban: Health Systems Trust, 2017: chapter 3. https://www.researchgate.net/publication/319302266_Health_spending_at_a_time_of_low_economic_growth_and_fiscal_constraint (accessed 25 July 2021).

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