Mind the gap: rethinking global alcohol metrics in high-abstention low-income and middle-income countries

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Alcohol per capita consumption (APC; total pure alcohol consumed per person 15 years or older per year) is the primary indicator used to track global progress in reducing harms associated with alcohol use. However, in many low-income and middle-income countries (LMICs), where most of the population abstain from alcohol and risk of alcohol-associated harm is concentrated in a heavy-drinking minority, APC can misrepresent both exposure and risk. This Viewpoint argues for the routine inclusion of drinker-adjusted metrics, specifically litres of alcohol consumed per drinker (alcohol per drinker), alongside the standard APC indicator. By use of data from WHO's Global Information System on Alcohol and Health, we show how alcohol per drinker reveals patterns hidden by population averages, particularly in high-abstention LMICs. For example, South Africa and the UK have similar APC but starkly different alcohol-attributable harm profiles, which are better explained by differences in alcohol per drinker. Although APC remains valuable, relying on this metric alone risks misinterpreting progress and misdirecting policy in contexts where drinking is concentrated among a minority of the population who drink heavily. As global monitoring evolves, we call for the inclusion of additional metrics that better reflect risk in diverse contexts.

Introduction

Reducing the harmful use of alcohol is a global health priority, reflected in the UN's Sustainable Development Goal (SDG) Target 3.5 and WHO's global action plan for the prevention and control of noncommunicable diseases (2013–2020).[1,2] Progress towards SDG 3.5 is tracked with alcohol per capita consumption (APC; total litres of pure alcohol consumed [recorded plus unrecorded] divided by population aged ≥15 years; data for unrecorded alcohol are modelled estimates produced by WHO).[1,3] APC remains the gold-standard indicator because it is consistently available, internationally comparable, and strongly associated with alcohol-attributable harm.[4–7]

In many low-income and middle-income countries (LMICs) most adults (people aged ≥15 years) abstain from alcohol consumption while a minority drink heavily.[3,8] Tanzania illustrates this point: 61% of adults abstain, but the national APC is 10·4 L, roughly twice the global average (5·5 L in 2019).[3] Use of the total population as the denominator flattens this unequal distribution into a misleading average, hiding the intensity and risk of alcohol-attributable harm carried by people who drink alcohol.

A simple adaptation of how alcohol use is reported can sharpen the focus: alcohol per drinker, calculated as total litres of pure alcohol consumed (recorded plus unrecorded) divided by the number of people who drank alcohol in the previous 12 months, adjusts for abstention. This indicator is available in WHO's Global Information System on Alcohol and Health (GISAH),[9] and has been briefly cited in global status reports since 2018;[3,10] however, it has received little attention and is underused. Alcohol per drinker is rarely discussed or analysed in ways that explore its value or limitations, particularly for countries with high abstention rates. This underuse could reflect the fact that APC was developed when high-income countries (HICs), where most adults drink, were the main focus of alcohol monitoring.

In this Viewpoint, we use 2019 GISAH data[9] to offer empirical examples to show how alcohol per drinker can reveal very different drinking patterns in high-abstention countries, a pattern otherwise hidden by the population average underpinning APC. Our aim is not to discard or replace the gold-standard APC indicator, but to emphasise the need for the use of an additional context-appropriate indicator in high-abstention countries, especially when comparing health and research focus areas or needs of LMICs and HICs. As LMIC disease burdens shift from communicable towards non-communicable conditions,[11] and the alcohol industry expands aggressively into emerging markets,[12,13] we promote alcohol per drinker as a tool for global comparisons and identifying populations at high risk of alcohol-attributable harm. An overview of our data sources and approach is given in the appendix (pp 2–3).

Population averages: hiding differences in drinking and alcohol-attributable risk

APC increases with increasing national income,[3] but that gradient largely disappears when alcohol per drinker is used instead of APC (appendix p 4). Countries that have high abstention rates have APC values similar to or lower than those of HICs; however, alcohol per drinker in several lower-income countries matches, or exceeds, levels seen in HICs because a small minority accounts for most of the alcohol consumed. When countries are ranked by APC instead of alcohol per drinker, the order changes markedly (appendix p 5). In the APC ranking, 11 of the 15 countries with the highest APC ranking are HICs. By contrast, when ranked by alcohol per drinker, only two of the top 15 countries are HICs; the remainder are LMICs where a smaller drinking population consumes at very high levels.

Figure 1 plots the APC gap (alcohol per drinker minus APC) across abstention quartiles. In countries where most adults drink (quartile 1), the two metrics closely

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See Online for appendix

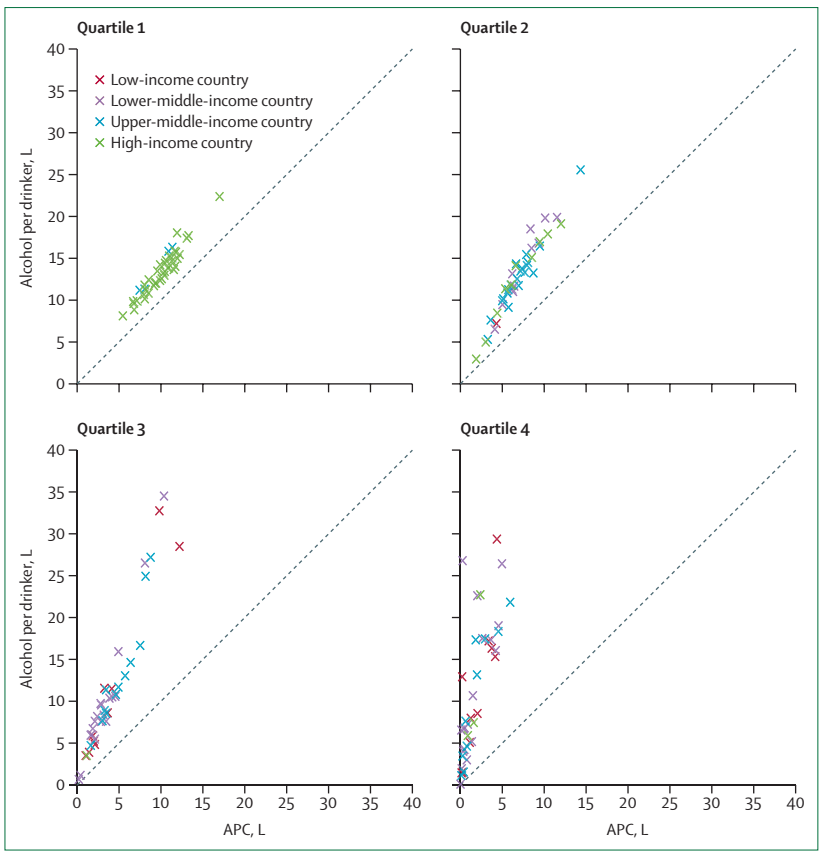

Figure 1: **APC versus alcohol per drinker for 2019, stratified by national abstention quartile**
Abstention quartiles are ordered from low abstention (quartile 1) to high abstention (quartile 4). The dashed line represents parity. Data are from 169 countries with complete data from the WHO Global Information System on Alcohol and Health,[9] excluding countries reporting total alcohol bans. Some countries in the highest abstention quartiles, particularly low-income, majority Muslim countries, exhibit low overall APC with high alcohol per drinker. A sensitivity analysis excluding majority Muslim countries (based on data from the Pew Research Center)[14] yielded similar patterns, with slightly lower slopes in quartiles 3 and 4, but no qualitative difference in interpretation. APC=alcohol per capita consumption.

align. As population abstention levels rise (through quartiles 2, 3, and 4), the gap widens because alcohol consumption is concentrated across a smaller proportion of the population. The gap does not prove high national consumption, but signals increasing polarisation between non-drinking and heavy drinking, and is valuable intelligence for identifying where heavy drinking is hidden behind a low population average. This pattern is pronounced in some low-income, majority Muslim countries where religious abstention from alcohol is common. However, a sensitivity analysis excluding these countries showed similar results, suggesting that the APC gap reflects broader structural dynamics, not only religious or cultural effects.

Low numbers of people who drink masking high levels of risk

Risk of alcohol-attributable harm does not rise at a uniform rate. For some conditions, such as cancer, the dose–response curve is roughly linear, and each drink adds a fixed increment of risk.[15,16] In these instances, moderate drinkers, although individually at lower risk than heavy drinkers, generate most of the cancer burden simply because they are the majority. By contrast, for conditions such as liver disease or injuries, risk increases exponentially with alcohol consumption,[15,16] accelerating more rapidly at high volumes of consumption; a minority of very heavy drinkers can generate a disproportionate share of harm. Where abstention is common and consumption is highly concentrated in a small population fraction, the average risk of alcohol-attributable harm of the whole population might be driven less by how many people drink and more by how much the heaviest drinkers consume. APC cannot detect that nuance, but alcohol per drinker can.

Real-world data reveal this pattern. The APC reported in the WHO African region (4·5 L) is roughly half the APC of the European region (9·2 L), but these regions report similar age-standardised, alcohol-attributable health burdens (52·2 deaths per 100 000 population for the African region *vs* 52·9 for the European region).[9] Among people who drink, mean intake per person per year is similar in these regions (15·5 L in the African region *vs* 14·7 L in the European region),[3] confirming that a small, heavy-drinking minority can drive regional harm despite a low population average. Alcohol per drinker is only one piece of the puzzle: co-occurring risks, health-care provision, unsafe transport, infectious-disease comorbidity, the multiplicity of policy responses, and other social determinants, such as malnourishment, unsafe water, sanitation, hygiene, and indoor smoke inhalation, might also amplify alcohol-attributable harm in many LMICs.[17–19] Differences in baseline disease distribution, such as high prevalence of injuries and infectious diseases, and low rates of alcohol-related cancers, might also influence regional patterns of alcohol-attributable burden.[3,11]

Same APC, unequal on-the-ground harm: South Africa versus the UK

In 2019, South Africa (an upper-middle-income country) and the UK (an HIC) had similar APCs (figure 2), yet South Africa recorded more than three times the alcohol-attributable mortality (68·0 deaths per 100 000 population in South Africa *vs* 21·9 in the UK), double the rate of alcohol-attributable, liver cirrhosis-related deaths (11·4 in South Africa *vs* 5·6 in the UK), and more than five times the rate of alcohol-attributable, road injury-related deaths (6·8 in South Africa *vs* 1·2 in the UK) of the UK.[9] This disparity aligns with more than a two-fold difference in alcohol per drinker (27·2 L in South Africa *vs* 13·8 L in the UK),[9] rather than national total APC, suggesting that in high-abstention settings (ie, South Africa), individual-level drinking intensity tracks alcohol-attributable harm more closely than population-level averages. Although only 32·5% of South African adults report drinking,[9] this proportion still equates to nearly 14 million people,

showing that the drinking population can both be numerically large and at high risk of alcohol-attributable harm. This pattern underscores the need to incorporate alcohol per drinker more routinely into monitoring frameworks to better track progress and guide policy in diverse drinking contexts.

Real-world application: what alcohol per drinker reveals

Trends in APC and alcohol per drinker often move together, but not always, and not everywhere. In HICs, where most adults drink, the two measures track closely. Our analysis of GISAH data[9] shows that from 2000 to 2019, mean APC across the Group of Seven (G7) countries (Canada, France, Germany, Italy, Japan, the UK, and the USA) fell by 1·1 L, and mean alcohol per drinker declined by a nearly identical amount (1·3 L). These results imply that in high-income settings, APC remains a reasonable proxy for drinking intensity and risk of alcohol-attributable harm. However, this picture changes in LMICs, where many of the population abstain from alcohol consumption. In the seven most populous LMICs where greater than 50% of adults abstain (Bangladesh, Ethiopia, India, Indonesia, Mexico, Pakistan, and Nigeria), mean national APC remained stable from 2000 to 2019 (decreased by 0·3 L), yet alcohol per drinker increased by more than 1 L.

Real-world examples from specific countries, comparing data from 2000 with data from 2019, highlight how trends in APC and alcohol per drinker can diverge in high-abstention LMICs.[9] In Mali, where 85·2% of the population report abstinence in the past year, APC increased by 3·5 L from 2000 to 2019, but alcohol per drinker increased by more than 21 L. In Ethiopia, where 80·1% of the population also report abstinence, APC increased by 2·2 L, whereas alcohol per drinker increased by 9·9 L. In both countries, APC clearly signals meaningful increases, but misses the sharp escalation in risk of alcohol-attributable harm among those who drink, and the need for targeted interventions. In Comoros, an extreme example where less than 1% of the population reports drinking, national APC scarcely changed (increased by 0·1 L), but alcohol per drinker increased by 8·8 L. A stable APC here could lead to policy inaction, despite clear signs of growing intensity. And in Türkiye, where 89·7% of adults report abstinence, APC decreased slightly (by 0·6 L), but this small decrease masked a much sharper decline in alcohol per drinker (decreased by 9·7 L), and a real reduction in risk of alcohol-attributable harm that APC alone would obscure.

These examples show how alcohol per drinker is a more accurate measure of exposure to alcohol-attributable harm and a meaningful basis for policy and funding decisions. However, its reliability depends on having reasonably accurate estimates of the drinking population. In some settings, particularly where drinking is rare or heavily stigmatised, individuals might

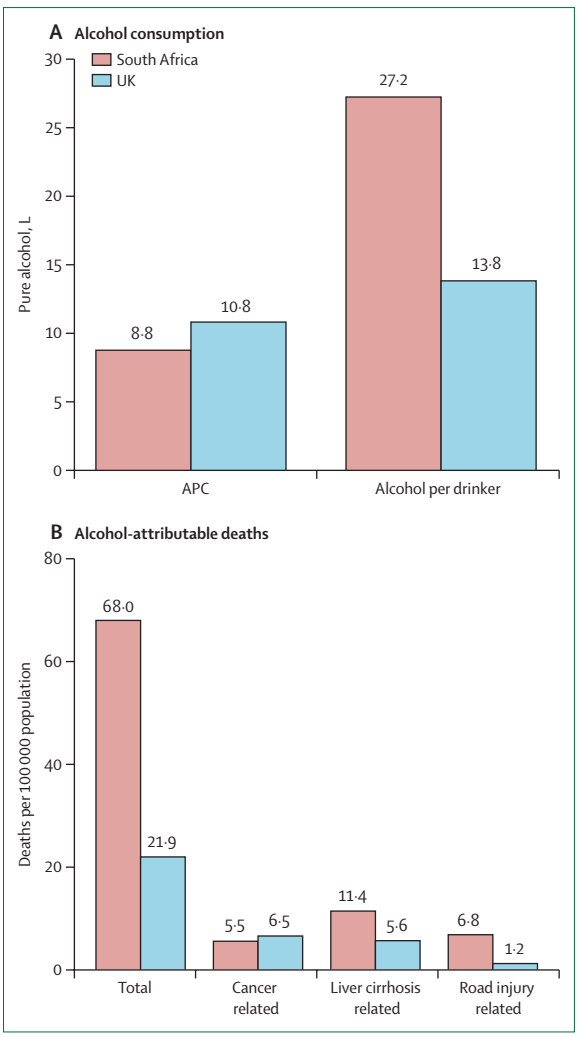

Figure 2: **APC, alcohol per drinker, and alcohol-attributable deaths in South Africa and the UK in 2019**
Data are from the WHO Global Information System on Alcohol and Health 2019.[9] APC=alcohol per capita consumption.

under-report alcohol use, further complicating efforts to accurately estimate the number of drinkers and potentially inflating the alcohol per drinker value. Small errors in the estimated prevalence of drinking can substantially shift the value of alcohol per drinker, as in Comoros, where a modest change in the assumed number of drinkers would alter the metric substantially. In some LMICs, where survey data might be infrequent or outdated and abstention rates might decline due to changes in economic or social development,[20,21] alcohol per drinker might overstate or understate changes in alcohol consumption over time. Therefore, there is need for cautious interpretation when the denominator is uncertain. In such cases, alcohol per drinker might be more suitable for cross-sectional comparisons between countries than for monitoring change within a single country. However, these limitations also reflect broader

structural inequities in global surveillance. If alcohol per drinker provides a clearer picture of exposure and alcohol-attributable harm in some high-abstention LMICs, the aim should be to strengthen the data systems needed to support its use.

Towards more context-appropriate global alcohol metrics

Alcohol per drinker addresses the bias created by high abstention rates, but population structure also shapes average consumption levels. In Africa, around 70% of people are younger than 30 years,[22] whereas HICs generally have a larger proportion of older adults. Younger adults are more likely to drink and tend to drink more heavily than older adults. Therefore, a young population could drive higher alcohol per drinker averages, whereas an older population can lower them. This demographic contrast can influence national APC in both directions, potentially underestimating drinking intensity among younger populations in HICs and overstating it in regions with high abstention but a smaller, younger drinking population.

Alcohol per drinker clarifies how alcohol consumption is distributed among those who drink, rather than across the whole population. By dividing the national APC only among those who drink, alcohol per drinker offers insight into whether those who consume the most alcohol (ie, those at highest risk of alcohol-attributable harm) are reducing their consumption. Put simply, alcohol per drinker can serve as a useful indicator of change. For example, if APC decreases while alcohol per drinker remains stable or increases, it might indicate that fewer people are drinking, but heavy drinking persists among those who do. Conversely, a decrease in alcohol per drinker without a corresponding decrease in APC might suggest an increase in the number of people who drink. A decline in both measures is likely to reflect a genuine reduction in population-level risk of alcohol-attributable harm.

There are similarities between alcohol per drinker and other public health exposure metrics. After the WHO Framework Convention on Tobacco Control,[23] population exposure to second-hand tobacco smoke in many HICs shifted from being commonplace to being much more scarce. Some annual health survey reports now include data on second-hand smoke exposure (eg, cotinine in saliva) that includes not just an overall population average figure, but also the proportion of the population with measurable values, on whom the health burden of second-hand smoke now lies.[24]

Regarding assessing country-level alcohol consumption, which is required for determining alcohol per drinker, the data constraints are real but surmountable. Although APC can be compiled annually from industry data, even when survey capacity is scarce, alcohol per drinker requires at least periodic population surveys to measure the proportion of adults who drink. Many LMICs do not have resources for annual monitoring, which might explain reliance on the simpler APC indicator. The answer is not to abandon the more informative indicator of alcohol per drinker, but to build the data infrastructure to support it. In practical terms, alcohol per drinker could be calculated and reported at the same frequency as APC, annually or every few years, depending on the availability of population-level survey data. That said, alcohol per drinker is still an average; it cannot reveal, for example, whether consumption is spread evenly across drinkers or concentrated in a small proportion of the population. Alcohol per drinker also does not indicate the drinking patterns or contexts of drinking. Understanding this distribution will require sub-national surveys and pattern-of-drinking data—an important research agenda.

Despite these constraints, initiatives have been specifically developed to support LMICs in building more robust surveillance systems. The WHO STEPwise approach to surveillance (STEPS) survey, for example, was designed to provide LMICs with a standardised yet flexible tool for collecting data on key risk factors for non-communicable diseases, including alcohol use.[25] 75·0% of LMICs have undertaken at least one STEPS survey since 2000, but only 40·2% have completed one since 2015, reflecting inadequate frequency and sustainability of regularly undertaking surveys.[26] Nonetheless, these surveys provide a valuable foundation from which to generate periodic estimates of drinker prevalence. Some countries also conduct national surveys outside of the STEPS framework. Even if collected only every few years (eg, once every 1–5 years), these data, combined with annual APC estimates from industry sources, are sufficient to track alcohol per drinker over time. Regional and global organisations, including WHO, already play a coordinating role in implementing the STEPS survey by providing standardised tools, technical support, and shared analytical resources. This approach prioritises actional progress over precision, ensuring that populations with the highest levels of alcohol consumption, and therefore at the greatest risk of alcohol-attributable harm, are not obscured by population averages. This agenda is also reflected in the WHO Global Alcohol Action Plan 2022–2030, which calls for stronger national data systems and improved alcohol data collection to support policy and programme development.[27]

Conclusion

In conclusion, we recommend use of alcohol per drinker in addition to, rather than as a substitute for, APC when reporting or evaluating alcohol consumption on a global scale, especially when comparing countries with substantial abstention rates with those that do not. As the geography of alcohol consumption and alcohol-attributable harm changes (as alcohol consumption rapidly expands geographically in LMICs), so should the

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exposure metrics and the indicators of progress to monitor it. For global monitoring to remain both meaningful and equitable, it should reflect not only how much alcohol is consumed, but who is consuming it.

Alcohol per drinker is especially important in LMICs, where drinking is often concentrated in a small minority at high risk of alcohol-attributable harm. Relying on population averages in these settings risks missing rising alcohol-attributable harm, underestimating the need for intervention, overstating progress, or missing the target population for intervention. By contrast, alcohol per drinker offers a simple, feasible tool to sharpen interpretation, improve targeting, and expose dynamics that APC might miss. Yet, alcohol per drinker remains underused, and little attention has been given to when and why it could offer clearer insight than APC. Our aim is to highlight how these two metrics can lead to different conclusions, and to show where alcohol per drinker might be especially valuable from a public health and monitoring perspective.

Incorporating alcohol per drinker into standard reporting frameworks would not require reinventing global monitoring systems, only making better use of what already exists, alongside a renewed commitment by LMICs and funders to undertake periodic population surveys. The building blocks are there: APC estimates, surveys, and recognition that one-size-fits-all indicators might not always be fit for purpose. What we measure shapes what we see, and what we see shapes how we respond.

Contributors

Conceptualisation: RB and MT. Formal analysis: RB. Writing (original draft): RB. Writing, reviewing, and editing: RB, MT, CDHP, SS, and KS.

Declaration of interests

RB is Co-Director of the WHO Collaborating Centre for Alcohol Policy and Public Health Research. MT is Chairperson (voluntary) of the Nutrition Society of South Africa. All other authors declare no competing interests.

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