The World Drug Index: Towards the Holistic Assessment of Global Substance Use and Related Problems

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Introduction

There is currently an absence of frameworks to holistically assess global substance use and related problems. To address this critical gap, this paper presents the first step towards a World Drug Index to measure national substance use and problems with implications for policy analysis.

Methods

Aggregated indices were created for all individuals, males, females, and distinct substances, encompassing 109 indicators that track substance use and related problems for 125 countries. The upper and lower bounds for each indicator were set as the 95th and 5th percentiles, respectively. Nations were classified into tiers depending on data availability. Exploratory analyses were conducted to investigate the relationship between index performance and national development, data availability, and drug policy.

Results

General trends emerged where the Global North performed worse than the Global South. Most nations performed better in the Female versus the Male Index, and this gender-gap pattern was particularly pronounced in traditionally gender-conservative nations. Performance varied significantly across substance class indices. Composite Index performance was negatively associated with development context (p=0.022) but not, for a subset of countries, with substance use policy (p=0.235). Composite Index performance did not differ across data availability tiers (p=0.25).

Discussion

The results highlight the necessity of a nuanced approach to substance use policy that targets specific national problem areas. As the first iteration, this index presents a potentially granular diagnostic toolkit of national substance use and related problems and may act as a

catalyst to advance national drug policy by leveraging existing evidence-based international policy successes.

Keywords

Substance use; drugs; evaluation; index; substance use policy; drug policy; global drug use.

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Introduction

Substance use is highly prevalent, with recent reports estimating that approximately 316 million individuals have used an illicit drug in 2023 (UNODC, 2025). Annual rates of prevalence are significantly higher for licit substances, such as alcohol and tobacco, with a reported 2.3 billion and 1.14 billion users in 2019, respectively (Reitsma et al., 2021). Regular substance use can be detrimental to health, with an increased risk of developing physical ailments, such as cardiovascular disease (Gan et al., 2021) and pulmonary issues (Shahi et al., 2025), as well as mental health conditions, such as anxiety and depression (Handley et al., 2016; Lai et al., 2015; Lipari et al., 2016). Further, while rates differ depending on the substance, a subset of individuals who regularly use substances will develop a Substance Use Disorder (SUD; American Psychiatric Association, 2013). SUDs can be highly debilitating, having accounted for 94.7 years of life lost per 100,000 people in 2023 (Naghavi et al., 2025).

A slew of policy measures has been developed to tackle current rates of substance use and associated issues (Colson & Bergeron, 2017; Manthey et al., 2024). Substance use and, by extension, related policies are multifaceted and involve multiple domains, ranging from harm reduction and prevention to law enforcement and treatment (Ritter, 2009). Individual indicators have been developed to track current rates of substance use, associated problems, and the effectiveness of substance use policies (EUDA, 2024). However, individual indicators are unable to account for the multifaceted nature of substance use and, as such, are inadequate to track the effectiveness of related policies. One potential solution is the development of an integrated framework, such as a composite index, that aggregates performance across various indicators, providing a unidimensional value to compare across

nations and over time (Becker et al., 2017). Composite indices have been used to measure other multidimensional phenomena, such as the Sustainable Development Goals (Murphy et al., 2025), environmental impact (Wolf et al., 2022), and substance use harms within nations, such as Australia and the United Kingdom (UK; Attewell & McFadden, 2008; Goodwin, 2007). However, to our knowledge, except for an early United Nations Office on Drugs and Crime (UNODC) working paper that was preliminarily developed to compare regional substance use (UNODC, 2005), no index has been developed to compare substance use between nations at the global scale. Further, there is currently no tool capable of holistically assessing national substance use by gender, which is a critical gap given the UN General Assembly's explicit directive to integrate a gender perspective into efforts to curb substance use and related harms (Schleifer & Pol, 2017). This study aims to address these research gaps and presents the first step towards a World Drug Index, providing a much-needed metric for evaluating national substance use, related problems, and the efficacy of drug policies as a whole and by gender.

The methodology presented has been used to track SDG performance across Europe and North America (Murphy et al., 2025; Murphy et al., 2023), and recently, substance use and related problems across 27 countries in the European Union (EU; Murphy et al., *under review*). However, several methodological adjustments have been made for the application at the global scale, including the introduction of percentile-based normalisation, conditional indicator weighting, and a tier-based data availability classification system. Further, this study significantly expands the assessment coverage of previous methodologies. A Composite World Drug Index was created to track the performance of 125 countries relative to the highest and lowest performers across 39 indicators. Further, two separate Male and Female World Drug Indices were created to assess substance use and related problems across

35 indicators in males and females. Finally, aggregate World Drug Indices were created for all individuals, males, and females for five distinct substance classes: cannabis, hallucinogens, amphetamines, cocaine, and opioids.

Methods

Data collection and indicator selection

Following an initial screening search, data were sourced from the UNODC World Drug Report 2025 (UNODC, 2025). In line with UNODC reporting requirements, member states primarily submit data to the UNODC through the Annual Reports Questionnaire (ARQ). Where ARQ data is inadequate or insufficient, ARQ data is supplemented with data from other sources, such as national government reports and scientific literature. The UNODC takes several steps to increase the reliability and validity of the data, including standardisation, outlier identification, imputation where national data is unavailable, and adjustment of national data to improve comparability (UNODC, 2025). A total of 109 indicators were identified and classified based on gender and/or substance class. Indicators classified as 'composite' (n=39), concerned all individuals aged between 15 and 64 years; 'male'(n=35), individuals identifying as male; 'female' (n=35), individuals identifying as female. Indicators were also classified into five distinct substance classes: cannabis (includes synthetic cannabis; n=21); hallucinogens (includes ketamine; n=18); amphetamines (includes ecstasy and methamphetamine; n=18); cocaine (n=12); opioids (includes opiates; n=18). Indicators cover various aspects of substance use and related problems, including prevalence of use, primary substance of people entering treatment, prevalence of offences related to use, possession, and trafficking, prevalence of people who inject drugs (PWID), and blood-borne disease among PWID. National data availability was categorised into three tiers to contextualise the robustness of the index scores: Bronze, Silver, and Gold, depending on the

number of indicators for which data is available. The Bronze tier reflects that a country is less than or equal to the 25th percentile in terms of the number of indicators available; the Silver captures between the 25th and the 75th percentile; and the Gold that a country is reporting at or above the 75th percentile. While all nations have been included in index calculation (see Normalisation below), in the results and discussion, nations will be qualitatively compared within their respective data availability tiers. The restriction of the qualitative analysis to within-tier groups prevents interpretations being drawn that might conflate data reporting with national substance use policy. Where available, annual data for each indicator were collected and are correct as of 10/09/2025. Missing data were treated as null values in the index (i.e., no imputation was used). Please refer to Supplementary Table 1 for a complete list of indicators used, weights applied, lowest and highest performers, and the number of nations with data per indicator.

Weighting, normalisation, aggregation, and visualisation

Aggregate indices were constructed using mostly equally weighted indicators. However, there were some indicators for which an equal weight would have disproportionally rewarded or punished a country for the use of, or problems associated with, certain substances. For instance, for each substance, there were three indicators related to offences (i.e., trafficking, possession, and other) and three indicators related to prevalence of self-report use (i.e., lifetime, annual, and monthly). Conditional weighting was used for these indicators, where the weight applied was 1/(number of indicators available). For example, if a country had all three indicators, a weight of 1/3 (0.3) was applied; if only two indicators were available, a weight of 1/2 (0.5) was applied; and if only one indicator was present, a weight of 1/1 (1) was applied.

A relative-performance-based system was used for indicator normalisation, where the upper and lower bounds of each indicator were set to the values of the highest (95th percentile) and lowest performing (5th percentile) nations, respectively. The result is an index that places each country on a scale relative to the highest and lowest performers. Equation 1 was used to normalise a nation's performance where the target outcome is undesirable (e.g., 'HIV among PWID'). In theory, Equation 2 could have been used to normalise performance in desirable indicators. However, no indicators were included in this iteration of the index where the outcome could be considered desirable (e.g., 'syringe distribution per capita').

$$I_i = 1 - \frac{(X_i - Min_i)}{(Max_i - Min_i)} If\ the\ indicator\ target\ is\ undesirable \quad [1],$$

$$I_i = \frac{(X_i - Min_i)}{(Max_i - Min_i)} If\ the\ indicator\ target\ is\ desirable \quad [2]$$

where i = indicator assessed, I_i = normalised indicator score, X = the nation's indicator performance, Min_i = the 5th percentile and Max_i = the 95th percentile. Aggregated index values were constructed using an arithmetic mean, which has been justified in previous work (Murphy et al., 2023). As shown in Equation 3, the arithmetic mean represents the sum of the values of each observation divided by the total number of observations:

$$A = \frac{1}{n}\sum_{i=1}^{n} I_i = \frac{I_1 + I_2 + \cdots I_n}{n} \quad [3]$$

where, A = arithmetic mean, n = number of indicators, I = normalised indicator score. This index uses a traffic light system for data visualisation, as has been used in indices that assess national SDG performance (Murphy et al., 2025). A normalised score of 0.33 or below was classified as a 'red' performance, a score between 0.33 and 0.66 as 'orange', and a score greater than 0.66 as 'green'.

Exploratory analyses

Four hypothesis-driven exploratory analyses were conducted to investigate the relationship between index performance and development, substance use policy, data availability, and regional differences in data reporting. First, previous evidence has found that European substance use and related problems are negatively associated with proxies of development (Murphy et al., *under review*). Therefore, a univariate regression analysis was run between Composite Index scores and the Sustainable Development Solutions Network (SDSN) 2025 SDG Index (Sachs et al., 2025). The SDSN SDG Index includes over 100 indicators that track performance towards various dimensions of the SDGs, and, as such, represents a holistic assessment of development, beyond univariate proxies such as Gross Domestic Product. To investigate the relationship between drug policy and Composite Index performance, a second univariate regression analysis was conducted on a subset of 22 countries for which data is currently available in the Global Drug Policy Index (GDPI; see Supplementary Information 1.1 for the list of countries with GDPI data available). The GDPI is an index tool that assesses various elements of national drug policy, including the absence of extreme responses, proportionality and criminal justice, harm reduction, access to medicines, and development (Bewley-Taylor et al., 2025). The impact of data reporting and data availability on index performance was also investigated. Given that the data violated normality assumptions, a Kruskal-Wallis *H* test was conducted to evaluate differences in median Composite Index scores across the three-tier classifications (i.e., bronze, silver, gold). All exploratory analyses and figures were conducted and generated in R Studio (Version 2026.01.1+403). Finally, an exploratory Pearson Chi-Square test of independence was conducted in SPSS (version 31.0.0) to investigate whether data availability reporting systematically differed between the Global North (defined here by Organisation for Economic Co-operation and Development [OECD] and/or EU membership) and the Global South (non-OECD, non-EU nations). Data availability was coded as an ordinal variable with

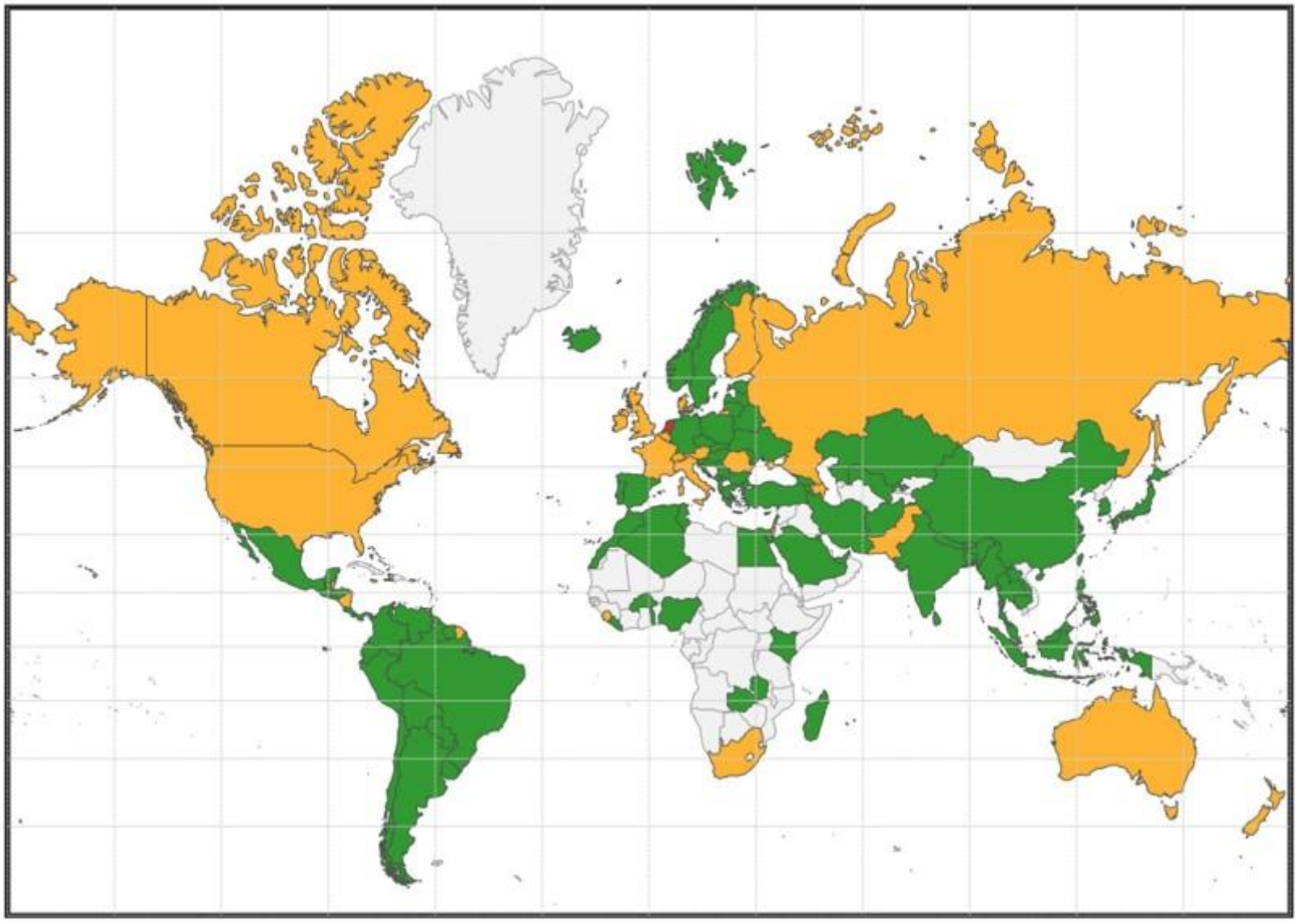
the three data availability tiers (i.e., Bronze, Silver, Gold). An omnibus test was first conducted, with significance defined as $p < 0.05$. Standardised residuals with an absolute value greater than 1.96 were considered indicative of a significant over-or under-representation between regional groupings.

Results

Composite index

Figure 1 illustrates the Composite World Drug Index created for all individuals, where 24 countries had more than 21 indicators (Gold Tier), 68 countries had between 9 and 21 (Silver Tier), and 33 countries had fewer than 9 indicators (Bronze Tier). Ecuador (ranking=2), Greece (ranking=11), Portugal (ranking=17), and Cyprus (ranking=22) were the top performers in the Gold Tier. In contrast, Italy (ranking=102), Belgium (ranking=103), Australia (ranking=108), and the United States of America (USA; ranking=123) were the bottom performers in the Gold Tier. Togo (ranking=5), South Korea (ranking=7), Algeria (ranking=8), and Japan (ranking=10) were the top performers in the Silver Tier. Mauritius (ranking=118), Switzerland (ranking=120), Canada (ranking=121), and the Netherlands (ranking=124) were the bottom performers in the Silver Tier. Finally, Kosovo (ranking=1), United Arab Emirates (UAE; ranking=3), Kuwait (ranking=4), Nepal (ranking=6) were the top performers in the Bronze Tier. Jamaica (ranking=110), Puerto Rico (ranking=111), Azerbaijan (ranking=122), and Monaco (ranking=125) were the bottom performers in the Bronze Tier.

--INSERT FIGURE 1--



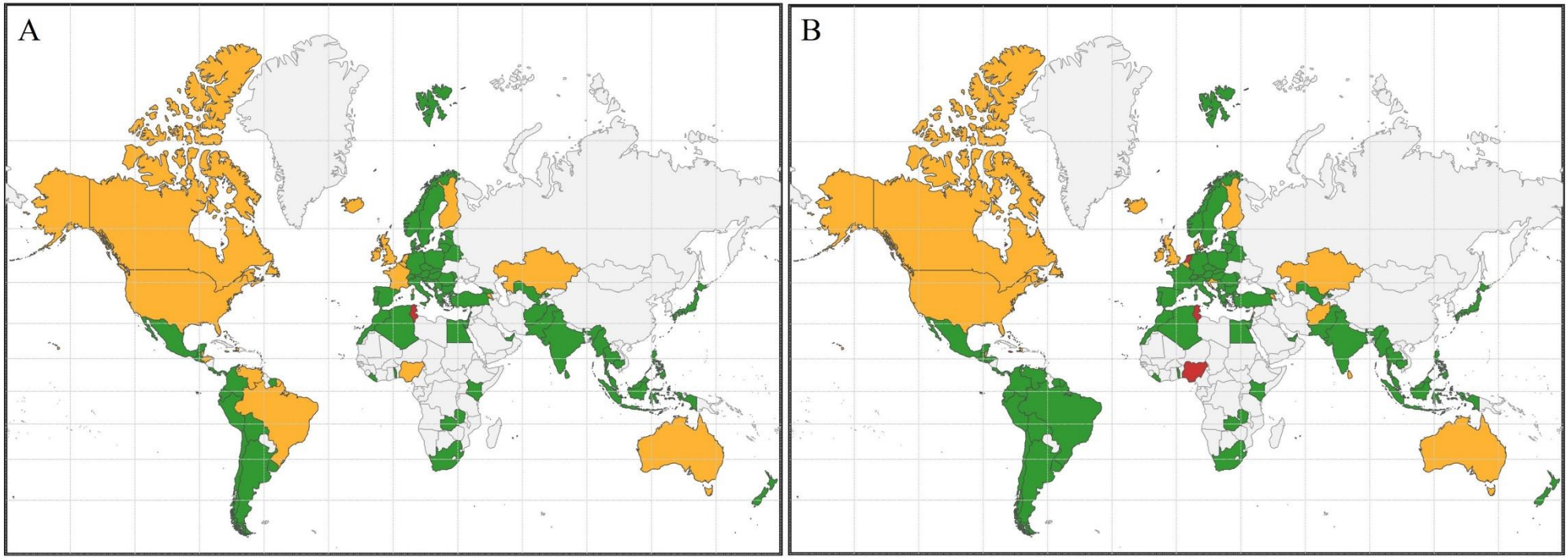
Male and female indices

Figure 2 depicts the Female (A) and Male (B) World Drug Index, where 24 countries had more than 18 indicators (Gold Tier), 52 countries had between 7 and 18 (Silver Tier), 25 countries had fewer than 7 indicators (Bronze Tier), and 27 countries had no indicators. With respect to the Female Index, Portugal (ranking=14), Indonesia (ranking=17), Ecuador (ranking=18), and Mexico (ranking=21) were the top performers in the Gold Tier. In contrast, Germany (ranking=73), Belgium (ranking=75), France (ranking=78), and Australia (ranking=86) were the bottom performers in the Gold Tier. Algeria (ranking=3), India (ranking=5), Greece (ranking=7), and Lithuania (ranking=8) were the top performers in the Silver Tier. Canada (ranking=91), Haiti (ranking=93), the Netherlands (ranking=95), and the USA (ranking=96) were the bottom performers in the Silver Tier. Finally, the Philippines (ranking=1), Moldova (ranking=2), Panama (ranking=4), and Barbados (ranking=6) were the top performers in the Bronze Tier. Nigeria (ranking=92), Trinidad and Tobago (ranking=94), Northern Ireland (ranking=97), and Tunisia (ranking=98) were the bottom performers in the Bronze Tier.

With respect to the Male World Drug Index, Portugal (ranking=9), Ecuador (ranking=14), Cyprus (ranking=18), and Türkiye (ranking=20) were the top performers in the Gold Tier. In contrast, France (ranking=71), Croatia (ranking=74), Belgium (ranking=78), and Australia (ranking=82) were the bottom performers in the Gold Tier. Greece (ranking=5), Japan (ranking=6), Togo (ranking=7), and Algeria (ranking=8) were the top performers in the Silver Tier. Scotland (ranking=86), Malta (ranking=89), the USA (ranking=91), and the Netherlands (ranking=93) were the bottom performers in the Silver Tier. Finally, the Philippines (ranking=1), Moldova (ranking=2), Panama (ranking=3), and the UAE (ranking=4) were the top performers in the Bronze Tier. Northern Ireland (ranking=95),

Tunisia (ranking=96), Nigeria (ranking=97), and Jamaica (ranking=98) were the bottom performers in the Bronze Tier.

--INSERT FIGURE 2-


A
B

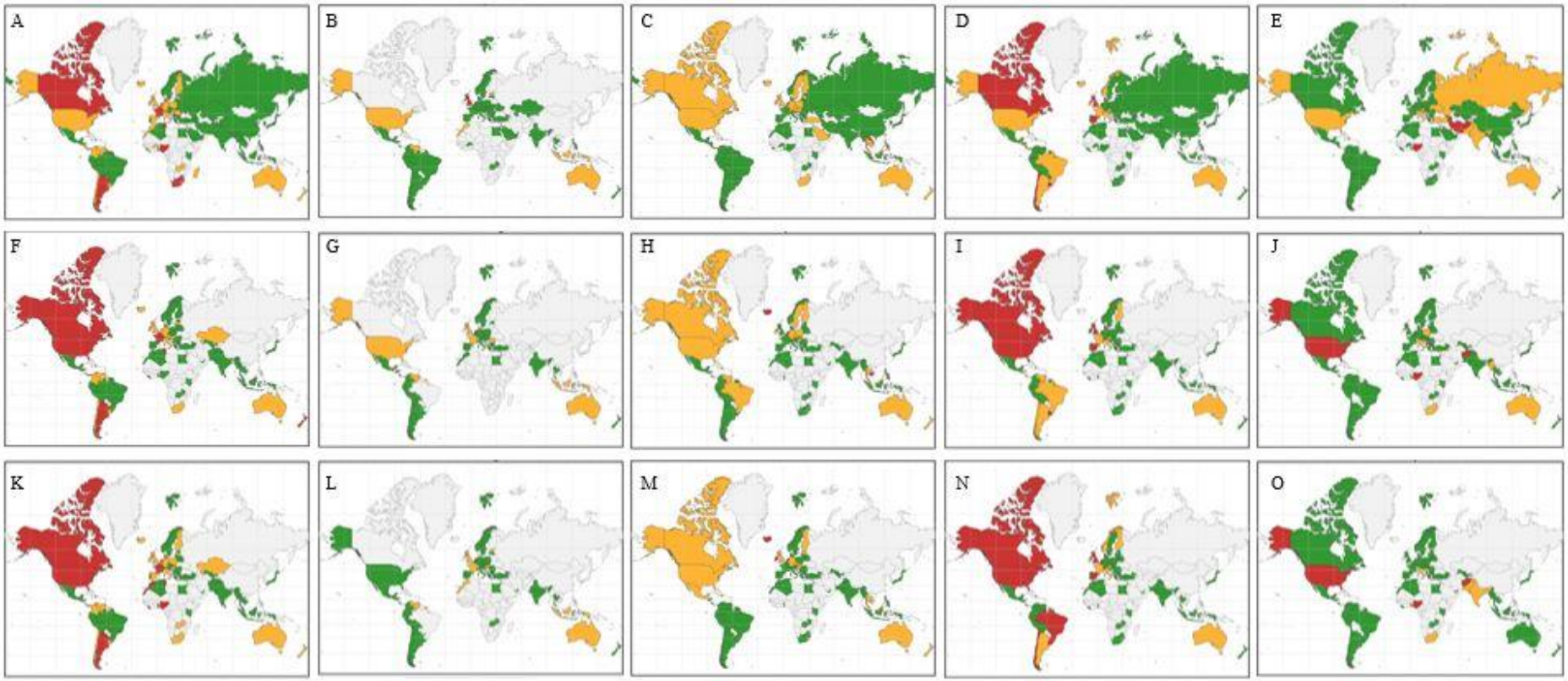
Substance class indices

Figure 3 illustrates the Composite, Female, and Male World Cannabis, Hallucinogen, Amphetamine, Cocaine, and Opioid Indices. With respect to the Composite World Cannabis Index, for example (Figure 3A), Japan (ranking=4), Myanmar (ranking=6), Ecuador (ranking=8), and Indonesia (ranking=18) were the top performers in the Gold Tier. In contrast, New Zealand (ranking=110), Belgium (ranking=11), France (ranking=119), and Australia (ranking=120) were the bottom performers in the Gold Tier. Laos (ranking=7), Belarus (ranking=9), Honduras (ranking=10), and Bosnia and Herzegovina (ranking=16) were the top performers in the Silver Tier. Liberia (ranking=113), Tunisia (ranking=114), Belize (ranking=115), and South Africa (ranking=117) were the bottom performers in the Silver Tier. Finally, Taiwan (ranking=1), Iran (ranking=2), the Republic of Korea (ranking=3), and Nepal (ranking=5) were the top performers in the Bronze Tier. Bermuda (ranking=122), Canada (ranking=123), Israel (ranking=124), and Jamaica (ranking=125) were the bottom performers in the Bronze Tier.

With regards to the Female World Opioid Index (Figure 3J), Algeria (ranking=8), Argentina (ranking=11), Zambia (ranking=15), and Mexico (ranking=16) were the top performers in the Gold Tier. In contrast, Italy (ranking=73), Luxembourg (ranking=75), Serbia (ranking=76), and Afghanistan (ranking=77) were the bottom performers in the Gold Tier. Indonesia (ranking=13), Morocco (ranking=20), El Salvador (ranking=23), and India (ranking=24) were the top performers in the Silver Tier. The UK (ranking=67), Myanmar (ranking=70), Croatia (ranking=71), and the USA (ranking=78) were the bottom performers in the Silver Tier. Finally, Cambodia (ranking=1), Japan (ranking=2), the Netherlands (ranking=3), and Denmark (ranking=4) were the top performers in the Bronze Tier. The Republic of North Macedonia (ranking=74), Nigeria (ranking=79), Armenia (ranking=80), and Montenegro (ranking=81) were the bottom performers in the Bronze Tier.

In relation to the Male World Cocaine Index, Indonesia (ranking=8), Algeria (ranking=9), Kenya (ranking=11), and Türkiye (ranking=12) were the top performers in the Gold Tier. In contrast, France (ranking=58), Argentina (ranking=62), Italy (ranking=65), and Belgium (ranking=67) were the bottom performers in the Gold Tier. India (ranking=14), Venezuela (ranking=19), Greece (ranking=22), and the Bahamas (ranking=23) were the top performers in the Silver Tier. Chile (ranking=71), Spain (ranking=75), Uruguay (ranking=76), and Albania (ranking=78) were the bottom performers in the Silver Tier. Finally, Pakistan (ranking=1), Belarus (ranking=2), Thailand (ranking=4), and Israel (ranking=5) were the top performers in the Bronze Tier. Brazil (ranking=77), Scotland (ranking=79), Malta (ranking=80), and the Netherlands (ranking=81) were the bottom performers in the Bronze Tier.

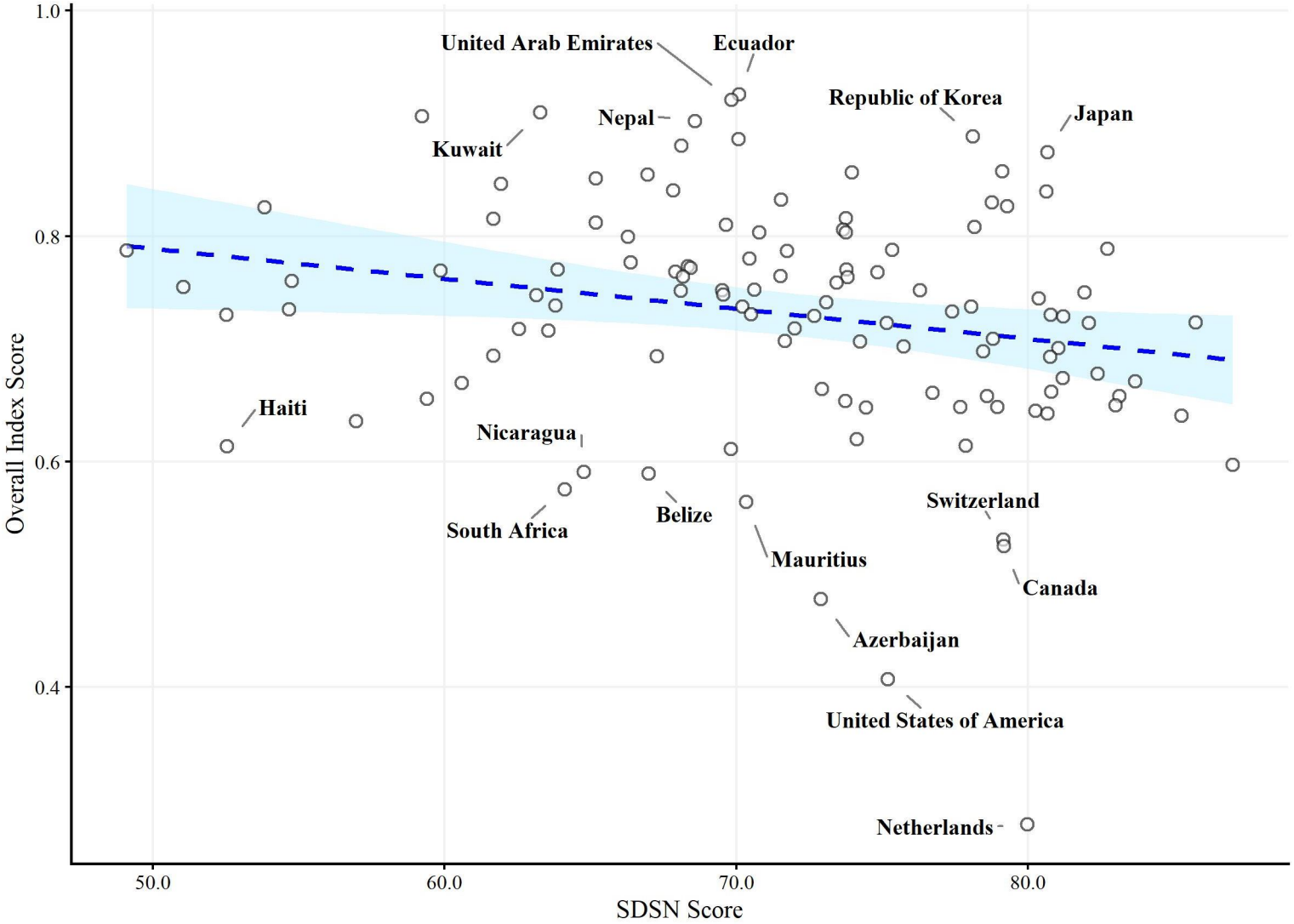
--INSERT FIGURE 3--


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Exploratory regression analyses

As demonstrated in Figure 4, regression analyses revealed a negative association between SDSN and Composite Index scores ($p = 0.022$, $R^2_{adjusted} = 0.037$, $\beta_{standardised} = -0.213$). No significant association emerged between GDPI scores and Composite Index scores ($p = 0.235$). Further, no significant difference was found in Composite Index scores between the three data availability tiers ($p = 0.25$; Supplementary Figure 1). Finally, a significant association was found between geopolitical region and data availability Tier ($X^2 = 22.59$; $p < 0.001$), such that the Global North had a significantly higher proportion of Gold nations ($\beta_{standardised} = 3.2$) compared to the Global South ($\beta_{standardised} = -2.5$). No significant regional differences emerged between Bronze and Silver Tiers (See Supplementary Table 2).

--INSERT FIGURE 4--


1.0
0.8
0.6
0.4
Overall Index Score
50.0
60.0
70.0
80.0
SDSN Score
United Arab Emirates
Ecuador
Republic of Korea
Japan
Nepal
Kuwait
Haiti
Nicaragua
Switzerland
Belize
South Africa
Mauritius
Canada
Azerbaijan
United States of America
Netherlands

Discussion

This study presents the first instance that national substance use has been assessed using an index methodology at the global level. The primary aim of this study was to initiate the holistic assessment of substance use and related problems in 125 countries across 109 indicators. The unique taxonomic system enables a nuanced assessment across distinct demographic groups and substance classes, while the indicator-based approach facilitates the highly granular assessment of national substance use and related problems. General patterns emerge where nations in the Global North typically perform worse across all indices than those in the Global South. Similarly, most nations perform better in the Female Index than the Male Index; however, this gender gap is more pronounced in gender-conservative cultural blocks in the Global South (e.g., Africa, the Middle East, Asia). A nation's performance was significantly negatively associated with its national developmental context, but not, for a subset of countries, with its drug policy framework. Composite World Drug Index scores did not significantly differ between data availability tiers.

Nations in the Global North generally perform worse than those in the Global South across all indices assessed, which might be explained by several factors. For over a decade, epidemiological studies have revealed what has been termed the 'vulnerability paradox', where nations that are less socio-economically vulnerable at the individual level (i.e., high-income, well-developed, 'Global North') report a greater prevalence of mental health disorders than more socio-economically vulnerable nations (i.e., low-income, less developed, 'Global South'; Degenhardt et al., 2018; Dückers et al., 2016; Dückers et al., 2019). The geographic performance pattern might provide early evidence of the vulnerability paradox in substance use, where more developed nations ('Global North') perform worse than less developed nations ('Global South'). Indeed, the results from the regression analysis provide

statistical support for a negative association between development and Composite Index performance. However, substance use policy may play a moderating role in the relationship between development and substance use. Countries that perform worse than expected given their development context include nations with relatively liberal policies (e.g., the Netherlands, the USA, and Canada). In contrast, nations that perform better than expected given their development context possess relatively conservative policies (e.g., the UAE, Kuwait, and Japan). The results from the regression analysis mirror the general pattern across the aggregated indices, where nations with more liberal approaches to substance use (i.e., 'Global North') typically perform worse than nations with more conservative substance use policies (i.e., 'Global South'). It is possible that, globally, liberal substance use policies lead to a higher prevalence of substance use and related problems, as has been demonstrated for countries with liberal cannabis-related policies (Hall & Lynskey, 2020; Kang et al., 2026). Although it is also possible that liberal policy frameworks increase the visibility and reporting of substance use and that a stronger performance in the Global South reflects systematic under-reporting rather than less substance use and related problems (Larney et al., 2017; Peacock et al., 2018). Indeed, the results from the Pearson Chi-squared analysis demonstrate a systematic regional difference in data availability, with the Global North containing significantly more Gold-tier data reporting nations than expected compared to the Global South. Thus, it is possible that differences in data reporting may also have contributed to the regional performance pattern.

In either case, these early findings suggest that, globally, more developed nations perform worse than less developed nations, but that conservative policy frameworks may act as a moderating factor in certain contexts. It should be noted, however, that the cross-sectional nature of this study precludes the establishment of causality or directionality between development, substance use policies, data reporting, and index performance (i.e.,

whether liberal frameworks cause higher substance use, or whether high prevalence necessitates liberalised regulation). Therefore, future research should use this index methodology in a longitudinal study design to investigate how these factors influence national performance over time.

Nations generally perform slightly better in the Female World Drug Index than in the Male World Drug Index, potentially suggesting that globally, substance use policy is more effective in curbing female rather than male substance use and related problems. This gender gap is more pronounced in typically gender-conservative nations like India, Pakistan and Jordan, which perform significantly better in the Male versus the Female Index. This gender-gap performance pattern could reflect that in traditionally gender conservative nations, female substance use is less prevalent (UNODC, 2025), associated with more stigma (Alhyas et al., 2015; Mauseth et al., 2016) and is often hidden from traditional enforcement areas (i.e. public spaces; UN Women, 2014). However, the gender-gap pattern might also reflect systematic underreporting and underestimation of female substance use and related problems in gender-conservative nations where stigmatised groups (i.e., female substance users) are incredibly difficult to reach with general population surveys (Mumtaz et al., 2014; Peacock et al., 2018). In contrast, the convergence of Male and Female Index scores in countries with more gender-balanced legal and enforcement systems could reflect a greater female exposure to substance use and related harms, as has been demonstrated for adolescent substance use (Cosma et al., 2022). Finally, in several nations, including Bolivia, Honduras, Brazil, and Venezuela, the traditional gender gap inverts, with significantly lower scores in the Female Index compared to the Male Index. These findings underscore a critical need to reform current substance use policies that are reportedly disproportionately punitive toward females who use substances in these countries (Giacomello, 2013; Youngers et al., 2020). Overall, the gender-disaggregated

results reveal that ‘one-size-fits-all’ substance use policies typically fail to provide all individuals with equitable protection from substance use and related harms. National policymakers could use the results from this index to identify gender-specific vulnerabilities and develop tailored national policies that effectively target specific demographic groups.

National performance varies significantly across substances, suggesting that current policies do not provide equitable protection across all substances and that a nuanced approach to national policymaking should also be taken, depending on the substance to be targeted. Importantly, this index has been developed using a peer-based normalisation approach to ultimately enable peer-based policy learning and comparative policy analysis (Dolowitz & Marsh, 2000). For example, within the Gold-tier of data availability, Canada, Israel, and Argentina are among the bottom performers in the World Cannabis Index. These poorly ranked nations can evaluate the cannabis-related policies of high-ranking nations, such as Japan and Ecuador, and adopt suitable policies to their national context. The indicator-based methodology enables national policymakers to isolate areas of weak performance, identify global leaders, and adapt context-appropriate national policy responses for any of the 109 indicators assessed. In this sense, this index may simultaneously provide policymakers with a highly granular diagnostic toolkit and a catalyst to advance national drug policy by leveraging existing evidence-based international policy successes.

Limitations and future directions

The current iteration of the World Drug Index comes with several limitations. First, data availability varied significantly across countries. The exploratory analysis did not reveal any differences in Composite Index performance across the three data availability tiers. However, a regional systematic difference was observed between data tier classifications between the

Global North (more Gold-tier nations) and the Global South. Therefore, we cannot rule out the possibility that systematic differences in data reporting contributed to regional differences in performance. Second, all indicators relate to the 'outputs' of substance use (e.g., prevalence, offences). Future iterations could integrate more 'input'-related substance use metrics (i.e., dimensions of substance use policy), such as those created for a subset of nations in the Global Drug Policy Index (Bewley-Taylor et al., 2025). Third, most of the indicators relate to self-report survey data, which can be restricted by global differences in data collection quality and timing, underreporting biases, particularly for highly stigmatised groups, and memory fallibility (Khalili et al., 2021). Future iterations could combine the self-report indicators with more objective indicators, such as wastewater metabolites. Fourth, several indicators relate to the prevalence of substance use across time (e.g., past month, past year, lifetime). Future iterations could use indicators related to frequency and dosage of use, as well as rates of SUDs, should this data become available. Fifth, the choice of aggregated demographic and substance-use classes reflects those currently available. Future iterations could include further groups representing other demographic information, such as age, race and ethnicity and other substances, including licit substances, such as alcohol and tobacco. Finally, one limitation of the relative peer-based normalisation system is that the highest-performing country may not be an ideal target. However, we argue that the benefits to policymaking enabled by a peer-based approach outweigh the risk of a highest-performing nation being off track.

Conclusion

This paper presented the first step towards a World Drug Index that holistically assesses and compares 109 indicators of substance use and related problems in 125 countries using a peer-based methodology. General patterns emerge where the Global North performs worse than

the Global South, which may be due to differences in development, substance use policies, and/or data reporting. Overall, the results reveal that substance use and related problems vary significantly between and within nations, depending on the demographic group and class of substance in question. As such, the results indicate that a nuanced evidence-based approach should be adopted for substance use policymaking. The indices presented may provide national policymakers with the tools necessary to identify particular problem areas, isolate strong performers, and adopt relevant policies to fit their national context. Further, we hope that, by reducing the complexity of substance use assessment and comparison, this index can positively influence awareness of substance use and related problems across various stakeholders. Finally, we urge that more attention be given to substance use in global initiatives, such as the post-2030 Agenda, in light of the negative relationship found between development and World Drug Index performance.

References

Alhyas, L., Al Ozaibi, N., Elarabi, H., El-Kashef, A., Wanigaratne, S., Almarzouqi, A., Alhosani, A., & Al Ghaferi, H. (2015). Adolescents' perception of substance use and factors influencing its use: a qualitative study in Abu Dhabi. *JRSM Open, 6*(2), 2054270414567167. https://doi.org/10.1177/2054270414567167

American Psychiatric Association. (2013). *Diagnostic and Statistical Manual of Mental Disorders (5th ed.)*. American Psychiatric Publishing. https://doi.org/10.1176/appi.books.9780890425596

Attewell, R. G., & McFadden, M. (2008). Measuring the benefits of drug law enforcement: the development of the Australian Federal Police Drug Harm Index. *Bulletin on Narcotics, 60*.

Becker, W., Paruolo, P., Saisana, M., & Saltelli, A. (2017). Weights and importance in composite indicators: mind the gap. *Handbook of Uncertainty Quantification, 80*, 1187-1216. https://doi.org/10.1016/j.ecolind.2017.03.056

Bewley-Taylor, D., Wall, M., Tudor, J., & Ritter, A. (2025). Comparing drug policies: An assessment of the validity and reliability of the global drug policy index. *International Journal of Drug Policy, 143*, 104908. https://doi.org/10.1016/j.drugpo.2025.104908

Colson, R., & Bergeron, H. (2017). *European drug policies: the ways of reform*. Routledge.

Cosma, A., Elgar, F. J., de Looze, M., Canale, N., Lenzi, M., Inchley, J., & Vieno, A. (2022). Structural gender inequality and gender differences in adolescent substance use: A multilevel study from 45 countries. *SSM - Population Health, 19*, 101208. https://doi.org/10.1016/j.ssmph.2022.101208

Csete, J., Kamarulzaman, A., Kazatchkine, M., Altice, F., Balicki, M., Buxton, J., Cepeda, J., Comfort, M., Goosby, E., Goulão, J., Hart, C., Kerr, T., Lajous, A. M., Lewis, S., Martin, N., Mejía, D., Camacho, A., Mathieson, D., Obot, I., Ogunrombi, A., Sherman, S., Stone, J., Vallath, N., Vickerman, P., Zábranský, T., & Beyrer, C. (2016). Public health and international drug policy. *The Lancet, 387*(10026), 1427-1480. https://doi.org/10.1016/S0140-6736(16)00619-X

Degenhardt, L., Charlson, F., Ferrari, A., Santomauro, D., Erskine, H., Mantilla-Herrara, A., Whiteford, H., Leung, J., Naghavi, M., Griswold, M., Rehm, J., Hall, W., Sartorius, B., Scott, J., Vollset, S. E., Knudsen, A. K., Haro, J. M., Patton, G., Kopec, J., Carvalho Malta, D., Topor-Madry, R., McGrath, J., Haagsma, J., Allebeck, P., Phillips, M., Salomon, J., Hay, S., Foreman, K., Lim, S., Mokdad, A., Smith, M., Gakidou, E., Murray, C., & Vos, T. (2018). The global burden of disease attributable to alcohol and drug use in 195 countries and territories, 1990-2016: a systematic analysis for the

Global Burden of Disease Study 2016. *The Lancet Psychiatry, 5*(12), 987-1012. https://doi.org/10.1016/S2215-0366(18)30337-7

Dolowitz, D. P., & Marsh, D. (2000). Learning from Abroad: The Role of Policy Transfer in Contemporary Policy-Making. *Governance, 13*(1), 5-23. https://doi.org/10.1111/0952-1895.00121

Dückers, M. L., Alisic, E., & Brewin, C. R. (2016). A vulnerability paradox in the cross-national prevalence of post-traumatic stress disorder. *British Journal of Psychiatry, 209*(4), 300-305. https://doi.org/10.1192/bjp.bp.115.176628

Dückers, M. L., Reifels, L., De Beurs, D. P., & Brewin, C. R. (2019). The vulnerability paradox in global mental health and its applicability to suicide. *The British Journal of Psychiatry, 215*(4), 588-593. https://doi.org/10.1192/bjp.2019.41

European Union Drug Agency (EUDA). (2024). European Union Drugs Agency. European Drug Report, 2024. https://www.euda.europa.eu/publications/european-drug-report/2024_en

Gan, W. Q., Buxton, J. A., Scheuermeyer, F. X., Palis, H., Zhao, B., Desai, R., Janjua, N. Z., & Slaunwhite, A. K. (2021). Risk of cardiovascular diseases in relation to substance use disorders. *Drug and Alcohol Dependence, 229*, 109132. https://doi.org/10.1016/j.drugalcdep.2021.109132

Giacomello, C. (2013). Women, drug offences, and penitentiary systems in Latin America. *International Drug Policy Consortium*. Retrieved 10 April 2026 from https://idpc.net/publications/2013/11/idpc-briefing-paper-women-drug-offenses-and-penitentiary-systems-in-latin-america

Goodwin, A. (2007). *Measuring the harm from illegal drugs: the Drug Harm Index 2005*. Home Office.

Hall, W., & Lynskey, M. (2020). Assessing the public health impacts of legalizing recreational cannabis use: the US experience. *World Psychiatry, 19*(2), 179-186. https://doi.org/10.1002/wps.20735

Handley, T. E., Kay-Lambkin, F. J., Baker, A. L., Lewin, T. J., Kelly, B. J., Inder, K. J., Attia, J. R., & Kavanagh, D. J. (2016). Investigation of a Suicide Ideation Risk Profile in People With Co-occurring Depression and Substance Use Disorder. *The Journal of Nervous and Mental Disease, 204*(11), 820-826. https://doi.org/10.1097/nmd.0000000000000473

Kang, J., Kim, H. J., Kim, M. S., Il Shin, J., Aalruz, H., Abate, Y. H., Abbas, N., Abbasian, M., ElHafeez, S. A., Abdelmasseh, M., Abdollahi, A., Abdollahi, M., Abdoun, M., Zuñiga, R. A. A., Abiodun, O. O., Abiodun, O., Aboagye, R. G., Abtahi, D., Abubakar, I. J., Abubakar, B., & Collaborators, GBDSU. (2026). Global burden of amphetamine, cannabis, cocaine and opioid use in 204 countries, 1990–2023: a Global Burden of Disease Study. *Nature Medicine, 32*(2), 527-544. https://doi.org/10.1038/s41591-025-04137-0

Khalili, P., Nadimi, A. E., Baradaran, H. R., Janani, L., Rahimi-Movaghar, A., Rajabi, Z., Rahmani, A., Hojati, Z., Khalagi, K., & Motevalian, S. A. (2021). Validity of self-reported substance use: research setting versus primary health care setting. *Substance Abuse Treatment, Prevention, and Policy, 16*(1), 66. https://doi.org/10.1186/s13011-021-00398-3

Lai, H. M. X., Cleary, M., Sitharthan, T., & Hunt, G. E. (2015). Prevalence of comorbid substance use, anxiety and mood disorders in epidemiological surveys, 1990–2014: A systematic review and meta-analysis. *Drug and Alcohol Dependence, 154*, 1-13.

Larney, S., Peacock, A., Leung, J., Colledge, S., Hickman, M., Vickerman, P., Grebely, J., Dumchev, K. V., Griffiths, P., Hines, L., Cunningham, E. B., Mattick, R. P., Lynskey, M., Marsden, J., Strang, J., & Degenhardt, L. (2017). Global, regional, and country-level coverage of interventions to prevent and manage HIV and hepatitis C among people who inject drugs: a systematic review. *The Lancet Global Health, 5*(12), e1208-e1220. https://doi.org/10.1016/S2214-109X(17)30373-X

Lipari, R. N., Hedden, S. L., & Hughes, A. (2016). Substance use and mental health estimates from the 2013 National Survey on Drug Use and Health: overview of findings. In *The CBHSQ Report*. (pp. 1–10). Substance Abuse and Mental Health Services Administration (US).

Manthey, J., Rehm, J., & Verthein, U. (2024). Germany's cannabis act: a catalyst for European drug policy reform? *The Lancet Regional Health – Europe, 42*. https://doi.org/10.1016/j.lanepe.2024.100929

Mauseth, K. B., Skalisky, J., Clark, N. E., & Kaffer, R. (2016). Substance Use in Muslim Culture: Social and Generational Changes in Acceptance and Practice in Jordan. *Journal of Religion and Health, 55*(4), 1312-1325. https://doi.org/10.1007/s10943-015-0064-z

Mumtaz, G. R., Weiss, H. A., Thomas, S. L., Riome, S., Setayesh, H., Riedner, G., Semini, I., Tawil, O., Akala, F. A., Wilson, D., & Abu-Raddad, L. J. (2014). HIV among people who inject drugs in the Middle East and North Africa: systematic review and data synthesis. *PLoS Med, 11*(6), e1001663. https://doi.org/10.1371/journal.pmed.1001663

Murphy, E., Murphy, E., Sachs, J. D., & Walsh, P. P. (2025). How Does the USA Perform in the Sustainable Development Goals: A Northern Hemisphere Peer-Based Index. *Sustainable Development.* https://doi.org/10.1002/sd.3445

Murphy, E., Walsh, P. P., & Murphy, E. (2023). Nation-based peer assessment of Europe's Sustainable Development Goal performance. *PLoS One, 18*(6), e0287771. https://doi.org/10.1371/journal.pone.0287771

Naghavi, M., Kyu, H. H., A, B., Aalipour, M. A., Aalruz, H., Ababneh, H. S., Abafita, B. J., Abaraogu, U. O., Abbafati, C., Abbasi, M., Abbaspour, F., Abbastabar, H., Abd Al Magied, A. H. A., Abd ElHafeez, S., Abdalla, A. N., Abdalla, M. A., Abdallah, E. M., Abdeeq, B. A., Abdel Razeq, N. M. I., Abdelgalil, A. A., Abdel-Hameed, R., Abdelmasseh, M., Abdelnabi, M., Abdel-Rahman, et al. (2025). Global burden of 292 causes of death in 204 countries and territories and 660 subnational locations, 1990-2023: a systematic analysis for the Global Burden of Disease Study 2023. *The Lancet, 406*(10513), 1811-1872. https://doi.org/10.1016/S0140-6736(25)01917-8

Peacock, A., Leung, J., Larney, S., Colledge, S., Hickman, M., Rehm, J., Giovino, G. A., West, R., Hall, W., Griffiths, P., Ali, R., Gowing, L., Marsden, J., Ferrari, A. J., Grebely, J., Farrell, M., & Degenhardt, L. (2018). Global statistics on alcohol, tobacco and illicit drug use: 2017 status report. *Addiction, 113*(10), 1905-1926. https://doi.org/10.1111/add.14234

Reitsma, M. B., Kendrick, P. J., Ababneh, E., Abbafati, C., Abbasi-Kangevari, M., Abdoli, A., Abedi, A., Abhilash, E., Abila, D. B., & Aboyans, V. (2021). Spatial, temporal, and demographic patterns in prevalence of smoking tobacco use and attributable disease burden in 204 countries and territories, 1990–2019: a systematic analysis from the

Global Burden of Disease Study 2019. *The Lancet, 397*(10292), 2337-2360. https://doi.org/10.1016/S0140-6736(21)01169-7

Ritter, A. (2009). Methods for comparing drug policies—The utility of composite Drug Harm Indexes. *International Journal of Drug Policy, 20*(6), 475-479. https://doi.org/10.1016/j.drugpo.2009.02.012

Sachs, J., D. , Lafortune, G., Fuller, G., & Iablonovski, G. (2025). *Financing Sustainable Development to 2030 and Mid-Century. Sustainable Development Report 2025*. Retrieved 10 April 2026 from https://www.unsdsn.org/

Schleifer, R., & Pol, L. (2017). International Guidelines on Human Rights and Drug Control: A Tool for Securing Women's Rights in Drug Control Policy. *Health and Human Rights, 19*(1), 253-261.

Shahi, F., Rafaiee, R., Keikhaei, N., Asadinejad Tahergourabi, S. H., Jomehpour, H., Kalalian-Moghaddam, H., Niroumand Sarvandani, M., & Rafaiee, R. (2025). Pulmonary Complications of Substance Abuse: Pathophysiology, Diagnosis, and Management Strategies. *Addiction Health, 17*, 1641. https://doi.org/10.34172/ahj.1641

Vasilenko, S. A., Evans-Polce, R. J., & Lanza, S. T. (2017). Age trends in rates of substance use disorders across ages 18–90: Differences by gender and race/ethnicity. *Drug and Alcohol Dependence, 180*, 260-264. https://doi.org/10.1016/j.drugalcdep.2017.08.027

United Nations Women. (2014). *A gender perspective on the impact of drug use, the drug trade, and drug control regimes* (UN Women Policy Brief). Retrieved 10 April 2026 from https://www.unodc.org/

United Nations Office on Drugs and Crime (UNODC). (2025). *World Drug Report 2025*. United Nations Office on Drugs and Crime. Retrieved 26 August 2025 from https://www.unodc.org/unodc/data-and-analysis/world-drug-report-2025.html

Youngers, C., García Castro, T., & Manzur, M. (2020). *Women behind bars for drug offenses in Latin America: What the numbers make clear*. Washington Office on Latin America. Retrieved 10 April 2026 from https://www.wola.org/analysis/report-reveals-alarming-levels-women-incarceration/

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Figure Captions

Figure 1. Map Illustrating Scores in the World Composite Drug Index. Red indicates a score less than 0.33, orange a score between 0.33 and 0.66, and green a score greater than 0.66.

Figure 2. Map Illustrating Scores in the World Female (A) and Male (B) Drug Index. Red indicates a score less than 0.33, orange a score between 0.33 and 0.66, and green a score greater than 0.66.

Figure 3. Map Illustrating Scores in the Composite (First Row), Male (Second Row) and Female (Third Row) World Cannabis (First Column), Hallucinogen (Second Column), Amphetamine (Third Column), Cocaine (Fourth Column), and Opioid (Fifth Column) Indices. Red indicates a score less than 0.33, orange a score between 0.33 and 0.66, and green a score greater than 0.66.

Figure 4. Scatterplot of Composite Index Scores (Y-axis) and SDSN Scores (X-axis). Nations with data labels are outliers were greater than 1.5 standard deviations from the regression line.