Estimating the Population of Youth Drug Users During the COVID-19 Pandemic

Mohamad Salleh Abdul Ghani[1], Ravi Ramadah[2], Mohd Syazrin Mohd Sakri[2], Hafidah Mohd@Maasom[2], Siti Badariah Ismi Che Berahim[2], Mohd Nazri Hashim[2], Noor Amirah Hidayah Binti Azmi[2] & Intan Suraya Zainol[2]

[1]Department of Human Development and Family Studies, Faculty of Human Ecology, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia, [2]The National Anti-Drugs Agency Malaysia, Ministry of Home Affairs, Jalan Maktab Perguruan Islam, 43000 Kajang, Selangor, Malaysia
Corresponding Author Email: salleh_ghani@upm.edu.my

Abstract
The COVID-19 has caused many treatment facilities to close down or not operational. This has led to a decrease in the number of drug users detected which causes the population to be underreported. For policies and strategies to be implemented effectively, an accurate estimation of the population is required. This study aims to estimate the population of youth drug users in Malaysia using an indirect method of the benchmark-multiplier method. Data from the NADA's database was used as a benchmark, and secondary data from a prevalence study was used as a multiplier. The results estimated around 654,000 individuals between the ages of 15 and 39 used drugs in 2021. This is a prevalence rate between four to five drug users for every 100 individuals within the age group. The apparent decline in the NADA yearly report could be attributed to most of the drug users being undetected primarily due to the country's focus on the pandemic. Efforts on the issue of substance use should be increased based on the reflected number from this study. The estimates can be useful for future researchers to expand further work in estimating the population of drug users or other hidden populations.
Keywords: Benchmark-Multiplier, Substance Use Disorder, Youth, Prevalence, COVID-19

Introduction
Substance use disorder has a tremendous impact on the legal, public services, and healthcare system and hinders the nation's ability to flourish socially and economically (National Anti-Drugs Agency, 2021; UNODC, 2023). The cost of treating drug users makes up a sizable portion of the healthcare budget (Ali et al., 2009, 2022). In Malaysia, the outlook for this issue is still not looking bright, despite several initiatives made by the government in the past. Several goals were set since the early 2000s such as the "Drug-Free Malaysia 2015", and "All Out

Against Drugs in 2016". Nonetheless, the outcome of these initiatives is still unclear. Recently the government has set another five-year strategy in achieving "Controlled of Drugs Year 2025". This is in line with the country's National Drug Policy (National Anti-Drugs Agency, 2015), whereby the government are working hard to clean up high-risk areas, expanding access to treatment and empowering communities to put this problem under control systematically.

In recent years, Malaysia has seen an increase in the use, possession, and illegal trade of controlled substances and illicit narcotics. However, statistics provided by The National Anti-Drugs Agency (NADA) recently have shown a decrease of 4% in drug users detected compared to the previous year mostly due to the spread of the COVID-19 pandemic (National Anti-Drugs Agency, 2021). The efforts to reduce demand and supply during the pandemic were also interrupted due to lockdowns and the implementation of the Movement Control Order (MCO). Many treatment facilities were closed and those operating had to reduce the number of admissions to curb the spread of the disease. Drug enforcement was also reduced seeing the number of drug use population reduced significantly from the previous year. However, it is not in line with the global estimation which estimates an increase of 23% from the previous year, partly due to population growth (UNODC, 2023).

Youth between the ages of 15 to 39 years old make up the largest segment of the population of drug users in Malaysia in 2021. An estimated prevalence of current drug users among youth in the year 2020 was around 3.5% or a total of 394,133 people from the overall population of Malaysia. This prevalence is somewhat different from the finding of the National Institute of Health Malaysia in 2019, which found the prevalence of the current adult drug user is only around 0.5% or 100,000 people of the overall adult population aged 18 and above (National Institute of Health & Ministry of Health Malaysia, 2019). The discrepancy in these studies might be due to the method used. Common epidemiological methods such as household survey methods and the distribution of questionnaires are less accurate and can cause underreporting of the population (Hiebert et al., 2020). For those detected, the information obtained is usually less accurate considering that most of them avoid revealing and admitting themselves using drugs.

It is a challenge to get an accurate population of drug users in this country. Statistics from law enforcement agencies and treatment facilities are some of the main sources of data used to determine the number of drug users in Malaysia. This number can differ each year depending on the frequency of enforcement activities done and the number of people receiving treatment that year. According to the World Drugs Report, in 2021, one in every 17 people aged 15–64 in the world had used a drug in the past 12 months. The estimated number of users grew from 240 million in 2011 to 296 million in 2021 (5.8 per cent of the global population aged 15–64). It is estimated around 39.5 million people worldwide suffer from drug use disorders in 2021. For each person receiving treatment, there are five more who haven't received any (UNODC, 2023).

Identifying the prevalence of these populations is important to evaluate and develop policies. It helps to foresee the amount of cost needed for treatment and rehabilitation and assess treatment coverage in this country (Hiebert et al., 2020). It is crucial to comprehend the overall costs and lay the groundwork for evidence-based services for drug users (Des Jarlais et al., 2018; Kwon et al., 2019; Larney et al., 2017; Ruiz et al., 2016). Inadequate distribution

of services and resources may cause this issue to worsen (Des Jarlais et al., 2018). A clearer understanding of the population prevalence of drug users provides more informed efforts to assess the coverage of drug treatment services.

Estimating the number of drug users using traditional sampling and estimation methods can cause underrepresenting especially in normal household surveys (Augustin & Kraus, 2004; Bollaerts et al., 2013; Jones et al., 2016; Leclerc et al., 2014; Salganik & Heckathorn, 2004; Vaissade & Legleye, 2009). Direct estimation of drug users is rarely done considering it involves high costs and uses many resources in addition to constraints or limitations in the research methodology used. Indirect approaches are much more reliable and suitable for evaluating the number of these "hidden" populations (Abdul-Quader et al., 2014; Kraus et al., 2003). One of the approaches is the benchmark multiplier method which is frequently employed and regarded as a suitable method for estimating the prevalence of drug users (Abdul-Quader et al., 2014). This methodology has been used to estimate the populations of people who inject drugs (PWID) in Australia, Belgium and India, among others (Bollaerts et al., 2013; Hiebert et al., 2020; Mojtabai, 2022). Thus, this study aimed to estimate an accurate prevalence of youth drug users in Malaysia in the year 2021 using the benchmark multiplier method at the national level and also at the state level. An accurate estimate of the population of drug users will allow relevant agencies and departments to develop effective policies and strategies for the intervention, treatment and rehabilitation of substance use disorders in the country.

Methodology
In estimating the total number of drug addicts and abusers in a country, several estimation methods can be used such as the census and enumeration method, population survey, capture and recapture and the benchmark-multiplier method (EMCDDA, 1996; Pisani et al., 2003). The benchmark multiplier method is an indirect method of estimating the size of the population that is especially for difficult-to-obtain population groups such as drug users. The advantage of the benchmark multiplier method is that it has higher reliability compared to the census or enumeration approach in addition to the data produced being more flexible. The main limitation of the multiplier method is that it depends on the quality of the data and the benchmark that represents the real data. To ensure accurate estimates, data sources must be independently obtained, have a consistent age range and time frame, and be comparable in geographic scope.

The multiplier method generally relies on information from two or more known overlapping sources. The first is usually data from an institution or service with a known population, and the second is a population at risk that is not yet known. Estimates are obtained by multiplying the number of people who are at the benchmark such as people who are in institutions or seeking treatment and rehabilitation services in a certain period by the proportion of the population that is not recorded, which is an estimate of the population based on statistics or other supporting information during the same period (Bollaerts et al., 2013; Hiebert et al., 2020; Mojtabai, 2022).

The multiplier method to determine the population estimate, especially for a specific population, is a commonly used method, but it is rarely highlighted in the scientific literature (Mojtabai, 2022). This strategy has the advantages of being more versatile in the types of data it uses and being potentially more reliable than a census or enumeration approach. The main

drawback of the multiplier technique is that accuracy is highly dependent on the quality of the data, specifically the multiplier's representativeness and the benchmark's completeness. The data sources should be gathered separately, and have equivalent geographic coverage, aligned age ranges, and aligned periods in order to assure reliable estimation.

Benchmark Determination

The benchmark is the data that will be used as the main source of information. In this study, data and statistical information on drug users as recorded in the NADA database were used as a benchmark (National Anti-Drugs Agency, 2021). This data is comprehensive data on substance abusers and addicts in Malaysia which was compiled by NADA a leading agency responsible for the issue of drug problems. These statistics include data from NADA, the Malaysian Prisons Department, the Royal Malaysian Police, the Ministry of Health Malaysia and the Private Drug Rehabilitation Centers. Based on the NADA database, in 2021 there were 83,049 substance users between the ages of 15 to 39 years old detected in the country.

Table 1
Number of Drug Users Detected in 2021 According to Age

Year	Children (0-12)	Adolescent (13-18)	Youth (19-39)	Adult (≥ 40)	No Information	Total
2019	5	3,289	96,773	41,938	194	142,199
2020	-	2,556	83,401	42,211	157	128,325
2021	2	1,961	81,112	39,959	105	123,139

Source: NADA, 2021

Multiplier Value

Determining the multiplier value depends on collecting estimated data on the number of drug addicts and abusers throughout the country from other data and statistics that are not collected or recorded by NADA. Among the data that were considered are primary data from the Ministry of Health Malaysia such as One Stop Center of Addiction (OSCA) program data, HIV patient data, pathology test information and information related to harm reduction programs. Other data is from the Malaysian Prisons Department, the Social Welfare Department, the Royal Malaysian Police, the Private Drug Rehabilitation Center, and the Public Service Department. However, these data are not published, or properly recorded and are difficult to obtain due to limited access to the related agencies and departments. The redundancy issue also plays a vital role in determining the accurate multiplier to use.

In addition, the researcher also used secondary data from previous prevalence studies as the source of the multiplier. Two studies were considered as a multiplier which was a study from the (National Institute of Health & Ministry of Health Malaysia, 2019) which conducted a Malaysia household survey in 2019 and Ismail et al (2022) on youth substance users in 2020. The latter study was found to be more accurate to be used as a multiplier due to it being the latest and the methodology targeting directly on youth substance users is found to be more reliable compared to the study from NHMS which was targeting general Malaysian

households. The prevalence rate from the selected study was used as a multiplier. The lifetime prevalence was set as a high-value estimation of the population meanwhile the current drug use was set as a low-value estimation of drug users.

Table 2
Prevalence of Substance Use According to Previous Studies

Study	Target population	Prevalence (95% CI)	
		Current Use	Lifetime use
National Institute of Health & Ministry of Health Malaysia, (2019)	Malaysian Household Survey targeting (adult) non-communicable disease, healthcare demand and health literacy.	0.5 (0.4, 0.8)	1.5 (1.2, 1.9)
Ismail et al., (2022)	Malaysia Household Survey to find out The Prevalence study of youth (15-39 years old) substance users in Malaysia in 2020.	5.5 (5.0, 6.2)	3.5 (3.1, 4.1)

However, the researcher decided to add an additional prevalence rate which was the midpoint of both high and low value estimation. The additional rate was considered due to the estimated population growth compared to the previous year, the relapse rate and the assumption that the prevalence could be underreported due to the method of household survey used to determine the prevalence rate which shows a significant discrepancy between a study in 2019 and 2020. The prevalence rate for the midpoint value was determined as 4.5 (4.9, 4.2). This new prevalence rate was considered as the actual estimation value used to determine the population of youth substance users in 2021. The calculation for the midpoint estimation is as below.

$$\bar{X} = \frac{\sum X}{x}$$

Where,
$\bar{X}$ is the midpoint of drug use prevalence,
$\sum X$ is the sum of high and low value,
x is the number of values.

After getting the new estimation value from the midpoint of the previous prevalence study, an estimation of the number of multipliers estimation was counted. Based on the calculation the estimation of the multiplier for the three prevalence estimates was 9.6 for the high-value, 7.9 for the actual estimate and 6.1 for the low-value.

$$M = \frac{P \times R_X}{B}$$

Where,
P is the population of youth drug users,
R_X is the rate of drug use prevalence,
B is the benchmark (total number of drug users detected based on NADA's Database)

Estimation of Youth Drug Users Population

This approach combines an estimate of the multiplier's percentage of the total target population with the size of the known subset of the benchmark (Bollaerts et al., 2013; UNDCP, 2002). The multiplier is representative and unbiased, and the number of the target population in the benchmark sample is known (Kimber et al., 2008; UNDCP, 2002). These are the main presumptions of the multiplier approach. In this method, population size = benchmark x multiplier was used to determine the size of the population of interest. The benchmark counts every person who interacts with a given institution or service, has a particular trait, or is a member of a particular population at the population level. The multiplier is a factor that is determined by how frequently a random sample of the population of interest uses that service or institution or has that characteristic. Based on the benchmark and multiplier obtained above, the calculation of this estimation is shown below.

$BM = B \times M$
Where,
BM is the population of youth drug users,
B is the benchmark,
M is the value of the multiplier.

Results

The estimations reveal that in the year 2021, a staggering 654,000 individuals, aged between 15 and 39 years old, were engaged in drug use within Malaysia. This estimation was derived from a suggested prevalence value of 4.5, representing the midpoint between the current and lifetime drug use prevalence rates from the preceding year. Notably, this data uncovers a disconcerting truth, for each substance user identified within the NADA (National Anti-Drug Agency) database, an additional eight individuals remained undetected and without access to treatment throughout that year. This stark increase from the previous year, which stood at an estimated six undetected individuals per drug user in 2020, signifies a concerning trend. It's pivotal to acknowledge that part of this increase can be attributed to the inclusion of various substances that lie beyond the jurisdiction of NADA. These substances, including kratom, depressants, and dissociative substances, fell outside the purview of the Dangerous Drugs Act of 1952, resulting in their omission from official records.

At the state level, the gravity of the issue comes into sharper focus. Selangor emerges as the epicentre, recording the highest concentration of drug users, with an estimated 133,000 individuals ensnared in drug use. Sabah closely follows as the second highest, harbouring an estimated 91,000 drug users, while Johor secures the third position, with approximately 73,000 drug users within the state. These figures underscore an undeniable imperative: the dire need for comprehensive and precisely targeted interventions to confront and surmount the substantial challenges posed by substance abuse in Malaysia.

Table 3
Estimation of Youth Drug Users by State In 2021

State	Detected Youth Drug Users (B)	Estimate of Population (P) ('000)	Estimated population of youth drug users ('000)	95% Confidence Interval of the Difference	
				Lower ('000)	Upper ('000)
Malaysia	83,049	14,530.3	654	293	1,015
Johor	8,905	1,622.3	73	33	113
Kedah	9,889	920.5	41	19	64
Kelantan	8,682	823.8	37	17	58
Melaka	3,035	411.3	19	8	29
Negeri Sembilan	3,959	494.3	22	10	35
Pahang	6,968	750.6	34	15	52
Perak	6,025	1,068.7	48	22	75
Perlis	1,441	109.1	5	2	8
Pulau Pinang	4,797	766.0	34	15	53
Sabah[a]	5,145	2,015.6	91	41	141
Sarawak	4,821	1,257.7	57	25	88
Selangor	8,125	2,966.6	133	60	207
Terengganu	7,806	544.6	25	11	38
Kuala Lumpur[b]	3,451	779.2	35	16	54

[a] includes the Federal Territory of Labuan
[b] includes the Federal Territory of Putrajaya

Discussion

Benchmark multiplier methods were employed to calculate that, in the year 2021, it was estimated that 654,000 individuals between the ages of 15 and 39 engaged in drug use. This translates to a prevalence rate of 4 to 5 drug users for every 100 individuals within this age group. Although statistics from the National Anti-Drug Agency (NADA) in 2021 indicated a decrease in the reported number of drug users in the country the actual number remained consistent. The apparent decline in reported cases could be attributed to the fact that a significant portion of drug users went unidentified or undetected during that year, primarily due to the pervasive impact of the COVID-19 pandemic. Throughout that challenging year, a substantial portion of available resources and allocations were directed towards bolstering the healthcare sector's efforts to combat the spread of the pandemic. Consequently, the focus on drug use prevention and treatment suffered a decline, resulting in a scenario where the true extent of drug use remained underestimated and underreported within the country.

The effects of the COVID-19 pandemic are not just seen in the areas of health and the economy; they are felt in all aspects of society. It impeded the ability to understand societal

issues such as drug use. It conceals the true extent of the drug abuse problem in the country, making it difficult for policymakers, healthcare providers, and support organizations to allocate resources effectively and tailor interventions to address the needs of this vulnerable population. One of the primary reasons for accurately estimating the number of drug users is it led to a misallocation of resources. Overestimating the problem may result in the excessive allocation of resources while underestimating it can lead to insufficient funding for prevention, treatment, and rehabilitation programs. The cost of drug abuse is substantial, it covers details like medical bills, productivity loss, and legal fees. According to Ali et al. (2022), it was estimated that Malaysia has spent around two billion Ringgit each year in dealing with the issue of drug abuse. Accurate data ensures that resources are directed where they are needed most and ultimately saves the country a lot of money.

Every state may have varying patterns of drug use. Accurate data allows for the development of targeted interventions that address the specific needs of different groups. For example, urban and rural areas may have different prevalence rates and require distinct approaches to prevention and treatment. With reliable data, actions can be tailored to be as effective as possible. In addition to addressing the immediate concerns of drug users, accurate data aids in reducing the secondary health risks connected to drug addiction, such as the transmission of infectious diseases like HIV and Hepatitis C through sharing needles. Public health officials can create plans to reduce these dangers by identifying the precise number of drug users.

Monitoring drug use patterns also requires accurate data collection and analysis. Understanding how drug usage habits evolve over time enables timely intervention and strategy modifications. For instance, precise data can assist authorities in acting quickly to stop the development of a new and deadly drug trend. Increased crime rates and a decline in communal well-being can result from drug usage. Authorities can undertake community-based programs that target drug use as well as its broader effects on the community, such as increased crime and decreased safety, by precisely estimating the degree of drug use in a community. Additionally, it makes it possible for authorities to develop extensive preventive and education programs in high-risk areas and schools as well as deliver precise education and prevention.

Limitations
Due to the dynamic and ever-changing nature of addiction, estimating the population of substance users is intrinsically difficult. Various factors, such as mortality rates, the efficacy of rehabilitation, and changes in cultural attitudes towards drug use, might cause substance use patterns to vary over time (Jones et al., 2020; Larney et al., 2017). To present a more accurate and realistic picture of substance usage trends over time (Bollaerts et al., 2013), future research should investigate more complex statistical models that incorporate mortality rates, relapse probability, and other dynamic aspects in future studies. Besides that, different factors and locations also play an important role in determining the population of drug users in certain areas such as between rural and urban locations which shows disparities in the availability of treatment facilities, socioeconomic circumstances, and societal standards that lead to different trends of substance use. To provide a more thorough and accurate analysis of the problem, future studies could consider conducting separate estimations for rural and urban areas to provide a more comprehensive and accurate assessment of the data. From this, policymakers would be able to design policies that specifically address the problems that

each location faces (Abdullah et al., 2019; Augustin & Kraus, 2004; Peiper et al., 2016; Sweeting et al., 2009).

Substance use is a complicated and diverse problem that is affected by a number of elements, including cultural, societal, and economic ones. As a result, it is best to view the estimations presented in this study as indicative rather than final. Policymakers should consider these estimates in conjunction with other relevant data sources and research findings to make informed decisions. Recognizing the limitations of this is crucial to avoid overreliance on these estimates. A validation study involves comparing the estimated values with real-world data or conducting surveys to verify the accuracy of the estimates such as the use of a respondent-driven sampling method is needed (Chabata et al., 2020; Handcock et al., 2014; Hipp & Kohler, 2019). A well-designed validation exercise can identify any biases or inaccuracies in the estimation methods and inform necessary adjustments. Future research should prioritize conducting a validation study to enhance the credibility of the estimates.

Conclusions

Precise data regarding the prevalence of drug users in Malaysia transcends mere statistical relevance; it stands at the crossroads of public health, social well-being, and responsible governance. The underreporting of drug use during the COVID-19 pandemic cast a shroud over the genuine magnitude of this issue, hampering the efficacy of our efforts to combat it comprehensively. The collection and meticulous analysis of accurate data are indispensable not only for resource allocation and tailored interventions but also for mitigating the multifaceted social ramifications of substance abuse, all of which are pivotal in achieving the objectives outlined in the Control of Drugs Year 2025 objectives. The estimations presented herein were generated using relatively straightforward methodologies. However, these estimations can serve as a baseline for future prevalence studies, providing a vital reference point for ongoing research in the pursuit of effective substance abuse prevention and treatment strategies.

Acknowledgements

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