



**HAL**  
open science

# Dynamics of Drug Addiction and Abuse in India: Socio-economic Profiles of Individuals in Treatment for Drug Addiction in Northwest India

Prakat Karki

► **To cite this version:**

Prakat Karki. Dynamics of Drug Addiction and Abuse in India: Socio-economic Profiles of Individuals in Treatment for Drug Addiction in Northwest India. *South Asian Journal of Social Studies and Economics*, 2024, 21 (9), pp.40-46. 10.9734/sajsse/2024/v21i9880 . hal-04691046

**HAL Id: hal-04691046**

**<https://hal.science/hal-04691046v1>**

Submitted on 7 Sep 2024

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution 4.0 International License



# **Dynamics of Drug Addiction and Abuse in India: Socio-economic Profiles of Individuals in Treatment for Drug Addiction in Northwest India**

**Prakat Karki <sup>a++\*</sup>**

<sup>a</sup> *Department of Psychology, CHRIST (Deemed to be) University, Bangalore, India.*

## **Author's contribution**

*The sole author designed, analysed, interpreted and prepared the manuscript.*

## **Article Information**

DOI: <https://doi.org/10.9734/sajsse/2024/v21i9880>

## **Open Peer Review History:**

This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: <https://www.sdiarticle5.com/review-history/121859>

**Scholarly Book Review**

**Received: 28/06/2024**

**Accepted: 02/09/2024**

**Published: 06/09/2024**

## **ABSTRACT**

The book 'Dynamics of Drug Addiction and Abuse in India' by Ranjit Singh Ghuman, Jatinder Singh, and Gurinder Kaur was published in 2023 by Routledge India. It presented the results of an Indian Council of Social Science Research (ICSSR- Government of India) funded research study conducted among 950 individuals (along with their households) with substance addiction, from five north western Indian states (Punjab, Himachal Pradesh, Haryana, Rajasthan, and Jammu and Kashmir). The results of the study were summarized across the chapters and arranged according to themes related to socio demographic profiles of the addicted individuals, the family and household factors in their substance initiation, pattern and types of substances used and the various negative consequences faced by them. The data for the same was collected through interviews, focus group discussions, case studies, literature review, etc. and involved not just the individuals with

<sup>++</sup> Senior Research Fellow (SRF);

\*Corresponding author: Email: [prakat.karki@res.christuniversity.in](mailto:prakat.karki@res.christuniversity.in);

**Cite as:** Karki, Prakat. 2024. "Dynamics of Drug Addiction and Abuse in India: Socio-Economic Profiles of Individuals in Treatment for Drug Addiction in Northwest India". *South Asian Journal of Social Studies and Economics* 21 (9):40-46. <https://doi.org/10.9734/sajsse/2024/v21i9880>.

addictions, but also their family members, community stakeholders and various other parties involved in the efforts towards curbing illicit drug use. The results indicated that most of the addicted individuals were male, young, not highly educated, underemployed and had started using substances before age of 20. The most commonly used drugs were various derivatives of cannabis and opioid/opiates and this included both natural and synthetic forms of the drugs. The addicted individuals faced various negative consequences of their substance use and they were/ had received treatment in various government and private deaddiction and rehabilitation centers for their substance use issues. The study highlighted the issue of the changing drug cultures centered around Punjab and the authors also provided several recommendations in addressing the problems associated with drug abuse and addiction. In the efforts towards combatting the growing substance use epidemic in India, the research study summarized in this book has several important implications for family and community members, administrators, law enforcement agencies and policymakers in coming up with effective intervention strategies.

**Keywords:** *Drug addiction; drug abuse; drug deaddiction; treatment; substance use initiation; socio economic profile; socio economic costs; prevention.*

## 1. INTRODUCTION

The book titled '*Dynamics of Drug Addiction and Abuse in India*' by Ghuman et al. [1] [<https://doi.org/10.4324/9781003318019>] details a multi-state research study commissioned by the Indian Council of Social Science Research (ICSSR), Ministry of Education, Government of India and in collaboration with the Centre for Research in Rural and Industrial Development (CRRID). The study included qualitative and quantitative data collected from over 3300 respondents, with the focus of the study being 950 individuals identified as 'addicts', and their household members. These individuals were undergoing/had undergone treatment for substance use from deaddiction centers, and the data collected included direct interviews, 77 focus group discussions and 40 cases studies. The objective of the study was to understand various socio-economic parameters of drug abuse and addiction, in five Indian states of Punjab, Haryana, Rajasthan, Himachal Pradesh and Jammu and Kashmir (J&K). All five states were from the North west of India and the study was conducted in the context of rising illicit drug use in the mentioned states in recent years.

The use of illicit drug has been rising across India, particularly among youths and the types of substances used has also shifted in recent years to more pharmaceutical and synthetic drugs [2]. Tobacco and alcohol are the most commonly used licit drugs whereas cannabis and opium are the most consumed illicit drugs [3]. The research study described in the book only considered substances that were illicit in India under the Narcotics Drugs and Psychotropic Substances Act (NDPS Act- 1985), and this included

cannabis (and its derivatives), opium/opiates, stimulants, depressants/sedatives, psychedelics, etc. Cannabis and opium/opiates are the most commonly used illicit drugs in India with 31 million (3.1 crore) and 23 million (2.3 crore) yearly users respectively, and among the regular users 20 lakh and 77 lakh cannabis and opium engage in problematic use and require treatment [3]. The rates of illicit drug use and addiction is comparable across the states in India; however, this book particularly highlights the drug problem in Punjab, which has been represented in media in recent years for high rates of illicit drug use in the state. Punjab is precariously placed in the drug networks that span the entire Asian continent, and given various social, political and economic conditions, the rate of illicit drug use has increased in recent years, particularly among younger age groups [4,5]. The other four states chosen for this study are also close to Punjab in proximity and are affected by similar drug cultures and issues. Thus, the study highlighted the socio-economic contexts surrounding illicit drug use in North west India and it had several implications in the efforts towards drug use prevention and intervention in the entire country.

## 2. MAIN FINDINGS OF THE STUDY

The results of the multi state research study were presented across eight chapters in the book which covered various socio-economic aspects of illicit drug use and addiction among the primary sample as well as factors in their substance initiation, family and community contexts, treatment experiences, etc. The primary data of the study were given in five chapters arranged according to topics of socio-economic profiles of addicts, their history of drug

use initiation, socio-economic costs of addiction, and their community perceptions of drug abuse/addiction. Estimates and proportions for the various measures were presented state wise in tables along with interpretations. The main findings of the study have been summarized in the points below.

### **2.1 Socio Economic Profiles of Drug Addicts**

The primary focus of the study were the 950 individuals addicted to illicit substances and seeking treatment. 73 percent of them were in the 17-35 years age group and almost all of them were male (only 0.6% female). Out of the 950, one fifth were illiterate, and half of them had studied up to 12<sup>th</sup> grade only. Two-thirds (67%) were from nuclear families and 26 percent were from agricultural households. Overall, the individuals were from diverse economic strata and occupation fields. However, most of the addicts were engaged in underpaying jobs or in the informal sector. Almost two thirds (61%) of the participants had started working by age of 20 years, and most of them cited factors such as peer pressure, issues with family and childhood as important in their substance use.

### **2.2 Factors in Substance Use Initiation**

The social factors surrounding the participants' substance use were also assessed, particularly the family and household influences in substance initiation. Almost 78 percent of them had household members who also used some drugs, and it was usually the father of the addicted individual. Many households also had more than one member using substances. Alcohol and tobacco were the most commonly used substances by family members. Among the 950 participants, 75 percent of them initiated substance use before the age of 20 years. Alcohol and tobacco were the most common first drugs used, and this eventually led to use of cannabis, opium poppy (*bhukki*), heroin, smack, etc. Almost half (47%) of them had consumed hard narcotic drugs before 20 years and most cited influence of peers as the most significant factor in their drug use initiation.

### **2.3 Patterns of Drug Addiction**

There were some variations in the types of drugs used between the five states. Heroin was more common in Punjab and J&K whereas as the use of opium poppy was common in Punjab, Haryana

and Rajasthan. Use of cannabis was higher in Himachal Pradesh and J&K compared to the other states. Overall, the most commonly used drugs among the 950 participants were heroin (*chitta*/brown sugar) (53%), opium (48%), tramadol (40%), poppy husk (*bhukki*) (48%), cannabis (41%), and buprenorphine (24%). There was a rise in use of pharmaceutical and synthetic drugs in all five states. Drug peddlers (82%) were the primary sources of the drugs and most of the drugs were orally consumed, inhaled or injected. Since the participants were addicted to drugs and in treatment, 66 percent of them also revealed that they had relapsed in previous treatments and almost half (45%) of those relapses happened in the company of peers.

### **2.4 Socio Economic Costs of Drug Addiction**

The study also explored socio economic costs of substance use, measured in terms of loss of business, work like, education, spending on drug addiction and treatment, and negative consequences of drug abuse and addiction. Out of the 950 drug addicted individuals, 72 percent reported that they experienced deterioration of their social image due to their drug use. One third (35% and 32%) were also suffering from physical and mental ailments as a consequence of their substance use. There were also negative effects on family life with increase in distrust, suspicion and quarrels with family members. A majority (78%) also reported that they suffered image loss in their social circles and neighborhoods. There were also serious economic ramifications on family due to the individual's drug use, particularly in funds spent on procuring drugs at first and funds for treatment and rehabilitation later. Overall, the study demonstrated several negative consequences and ramifications of drug abuse and addiction.

### **2.5 Prevalence and Prevention of Drug Menace**

The study also explored the role of the community in the various aspects of drug use and this included FGDs and discussions with various community stakeholders besides the drug addicts. The role of various social and religious institutions and government bodies and agencies in addressing the drug problem were highlighted. Among the 950 participants, only 23 percent reported that they knew of some awareness activities on drug use being carried

out at organization or state levels. Respondents from households (both using and non-using) also revealed expectations in terms of more awareness camps and activities carried out by various legal enforcement and health bodies. Almost 90 percent expressed confidence in the government's capacity to address the drug issues. In terms of the various community influences, 83 percent also believed that there was huge influence of prevalent youth cultures and promotion of youth icons who glorify drug use or violence. There were also marked negative attitudes towards law enforcements and they were viewed as corrupt or complacent in abetting the drug markets. The participants also expressed that political parties played some role in fueling the drug problem by patronizing various drug businesses. Religious and spiritual organizations were however viewed positively in the context of drug use and such principles were even included as part of drug deaddiction programs in various programs. Along with these governmental, private and religious bodies, there were also various roles of Panchayati Raj Institutions (PRIs) and Urban Local Bodies (ULBs) in addressing the addiction epidemic.

### 3. DISCUSSION

The book '*Dynamics of Drug Addiction and Abuse in India*' by Ghuman et al. (2023) primarily presented the results of the ICSSR funded study that included 950 drug addicted individuals and their households (3300 respondents in total) from five states in north west India. The study was conceptualized on the premise that "drug addiction cannot be understood in isolation from historical, systemic, structural, social, psychological, political and economic factors" (p.23) [1]. Based on these principles, comprehensive data was collected using both quantitative and qualitative methods and interviews, focus group discussions, case studies, literature review, etc. were used to compile relevant information. The 950 primary respondents were recruited from 73 rehabilitation and deaddiction centers (both government and private) from across the five states, and their households were also interviewed along with other stakeholders in the community such as members of ULBs, academic institutions, religious/ spiritual organizations, youth clubs, police officers, professionals, experts, etc. The sample can be considered as representative due to the spatial spread of the respondents along with the holistic nature of data collection. As it focused on the five north western states, the

findings are more relevant to that geographic area; however, the study also highlighted several points that were relevant for the rest of the country as well. For the richness of the data presented across the book, the study can be considered as significant in substance use literature.

The study also highlighted the difference in drug use patterns and cultures across the five states and also the rise in use of pharmaceutical and synthetic drugs. Cannabis and opium have traditionally been cultivated in the northern parts of India and both have a rich heritage with various religious and social connotations in many Indian communities [6,7]. However, in recent decades, the influx of newer drugs has changed the drug landscape and there has been a huge increase in use of synthetic and pharmaceutical drugs, particularly opioids [8-10]. The study highlighted a list of common drugs used by the respondents; however, it did not follow standard classification of drug types (p.75) [1]. Among the 10 substances, six were opioid based (natural or synthetic) and three were derivatives of cannabis (last one being cocaine- a stimulant). Derivatives of cannabis included *ganja*, *bhanga*, *charas*, hashish, etc. Both natural forms of opium (poppy and husks- *bhukki*) and synthetic opioids (heroin, tramadol, buprenorphine, codeine) were reported; however, since these drugs were studied as separate categories, the true extent of illicit drug use among the sample might be different. It is also complicated by the fact that most respondents also reported using two or three substances together. The high prevalence of opioid/opiate drugs reported in the study is an important finding, particularly for that geographical region, and the major shift has mostly occurred in terms of switch from natural opium products to synthetic ones procured illegally through pharmaceuticals.

The study also explored the profiles of the individuals who were addicted to various illicit substances and presented various socio demographics that painted the typical addict as a young male below age of 35 years, not highly educated or progressing in their careers. Most of the findings related to the various socio economics aspects of substance use and addiction were based on frequency estimates which were provided for the five states along with a total. While these descriptive statistics provided valuable insights into the dynamics of drug addiction in the India, there was more scope of testing the significance of the estimates and also

the relationship between the different variables through inferential statistical analyses. Since the sample size (950) was quite decent, there remains more scope to explore the dynamics of the variables studied, and also test the significance of differences between and across the five states on the substance use related variables. Since the study was funded by a ministry of the Indian government, making research data of such national programs available in the public domain could foster more exploration of the collected data as well as further research in the field of substance use.

#### 4. IMPLICATIONS

The book and the research study it details has several important implications in the ongoing efforts towards curbing illicit drug use and addiction in India. The authors also addressed the implications of their study and provided their recommendations in a separate section of the book. Their main emphasis was on breaking on supply chain and curbing the demands for drugs and they also stressed on identifying and addressing the various socio cultural and politico-economic factors perpetuating the problems. The authors also recognized the importance of age of onset of drug use, and they emphasized the importance of early awareness among children and the role of school administrators, health professionals, parents, policymakers, etc. in creating optimum environments for children. The study identified several risk factors that are relevant to illicit substance use among Indian youths, and this information can be valuable in developing effective preventative interventions. Indian youths are particularly vulnerable to substance use and it often begins with licit substances such as alcohol and tobacco. Every year millions of Indian youths take up tobacco or alcohol and a significant proportion of them move on to also experiment with illicit substances as well [11,12]. The earlier the age of onset of any substance initiation, the more likelier that the person will also use illicit substances, reach substance dependence and/or face various substance related negative consequences [13,14]. Hence, there is higher scope for preventative interventions, particularly among younger age groups, and effective awareness programs and support systems at schools can be valuable in preventing substance initiation and subsequently reducing the burden of illicit substances as well [12,15]. The reviewed study provided several key risk factors related to substance initiation such as gender, age,

psychological traits, family dynamics, occupation, peer group, parental substance use, community settings, etc. which have been demonstrated as significant in studies outside India [16-18]. Preventative and intervention efforts based on indigenous scientific evidence can be valuable in identifying youths at risk as well as providing culturally sound and evidence based treatment [19].

The findings of the study and the authors' recommendations also highlight the existent dearth in resources in treating the thousands of people in India who are dependent on illicit drugs. There is lack of treatment coverage in many parts of the country and despite substance use rehabilitation being included in the Mental Health Care Act (2017) recently, the majority of substance using people in India do not get the right or effective treatment [20,21]. In India, there have been a number of nationwide research and intervention programs in recent decades, to combat rising drug use; however, the greater focus of these efforts have been on alcohol and tobacco, both of which are legal in most parts of India. Similar initiatives are also needed to address the health and social problems caused by illicit drug trafficking and use [22,23]. First, there is urgent need of measures to curb the supply chains of various illicit substances and clamp down at all levels of cultivation, transportation and distribution [24]. For this, India needs more robust illicit drug abuse and addiction monitoring systems and more scientific data need to be collected from within India to better inform drug policies and programs in the future [25] Among the large number of Indians already suffering from substance use disorders and its related consequences, there is also need of more resources across the country to provide treatment in terms of medical and mental health care, detoxification and rehabilitation, group programs, occupational therapy, etc [3,12].

#### 5. CONCLUSION

The book '*Dynamics of Drug Addiction and Abuse in India*' by Ghuman et al. (2023) can be considered as an important landmark in the scientific study of substance abuse and addiction in India, as it comprehensively details the results of a multi-state research study comprising over 3000 respondents and hundreds of geographical areas. The study underscores the issue of illicit drug use and addiction in Punjab along with its neighboring states, which has reached national importance and is in urgent need of more

informed policy and other interventions. The study provides a comprehensive picture of the various socio-economic aspects of drug use and addiction, and it has important implications in informing the efforts towards combatting the drug epidemic in India.

### DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

### COMPETING INTERESTS

Author has declared that no competing interests exist.

### REFERENCES

1. Ghuman RS, Singh J, Kaur G. Dynamics of drug addiction and abuse in India. Taylor & Francis; 2023, Oct 16. Available: <https://doi.org/10.4324/978100318019>
2. United Nations Office on Drugs and Crime (UNODC). Synthetic Drugs in East & Southeast Asia. United Nations Publications; 2023. Available: [https://www.unodc.org/roseap/uploads/documents/Publications/2023/Synthetic\\_Drugs\\_in\\_East\\_and\\_Southeast\\_Asia\\_2023.pdf](https://www.unodc.org/roseap/uploads/documents/Publications/2023/Synthetic_Drugs_in_East_and_Southeast_Asia_2023.pdf)
3. Ambekar A, Agrawal A, Rao R, Mishra AK, Khandelwal SK, Chadda RK, et al. Magnitude of substance use in India. New Delhi: Ministry of Social Justice and Empowerment, Government of India; 2019, 23 October. Available: <https://socialjustice.gov.in/writereaddata/UploadFile/Survey%20Report.pdf>
4. Sharma B, Arora A, Singh K, Singh H, Kaur P. Drug abuse: Uncovering the burden in rural Punjab. Journal of Family Medicine and Primary Care. 2017, Jul 1;6(3):558-62. Available: <https://doi.org/10.4103/2249-4863.222037>
5. Kaur K. Drug abuse! problem is intense in Punjab, India. Human Biology Review. 2017;6(1):20-29. Available: <https://www.humanbiologyjournal.com/>
6. Charles M. The drug scene in India; 2001. Available: <https://www.indiaseminar.com/2001/504/504%20molly%20charles.htm>
7. Karki P, Rangaswamy M. A review of historical context and current research on cannabis use in India. Indian Journal of Psychological Medicine. 2023;45(2):105-16. Available: <https://doi.org/10.1177/02537176221109272>
8. United Nations Office on Drugs and Crime (UNODC). World Drug Report 2023. United Nations Publications; 2023, Jun. Available: <http://www.unodc.org/unodc/en/data-and-analysis/world-drug-report-2023.html>
9. Chauhan N. Drug trafficking through maritime routes, postal services on rise: NCB. The Hindustan Times; 2022, Sep 28. Available: <https://www.hindustantimes.com/india-news/drug-trafficking-through-maritime-routes-postal-services-on-risencb-101664305955719.html>
10. Prajapati N. Drug Trafficking in India. Legal Service India E-Journal; 2021. Available: <https://www.legalserviceindia.com/legal/article-2839-drug-trafficking-in-india.html>
11. Bate SL, Stigler MH, Thompson MS, Arora M, Perry CL, Reddy KS, MacKinnon DP. Psychosocial mediators of a school-based tobacco prevention program in India: results from the first year of project MYTRI. Prevention Science. 2009, Jun;10:116-28. Available: <https://doi.org/10.1007/s11121-008-0113-x>
12. Jiloha RC. Prevention, early intervention, and harm reduction of substance use in adolescents. Indian Journal of Psychiatry. 2017, Jan 1;59(1):111-8. Available: <https://doi.org/10.4103/0019-5545.204444>
13. Dhawan A, Pattanayak RD, Chopra A, Tikoo VK, Kumar R. Pattern and profile of children using substances in India: Insights and recommendations. National Medical Journal of India. 2017, Jul 1;30(4). Available: <https://doi.org/10.4103/0970-258x.218679>
14. Moss HB, Chen CM, Yi HY. Early adolescent patterns of alcohol, cigarettes, and marijuana polysubstance use and young adult substance use outcomes in a nationally representative sample. Drug and Alcohol Dependence. 2014, Mar 1;136:51-62. Available: <https://doi.org/10.1016/j.drugalcdep.2013.12.011>
15. Murthy P. Guidelines for psychosocial interventions in addictive disorders in India:

- An introduction and overview. Indian Journal of Psychiatry. 2018, Feb 1; 60(Suppl 4):S433-9.  
Available:[https://doi.org/10.4103/psychiatry.IndianJPsychiatry\\_35\\_18](https://doi.org/10.4103/psychiatry.IndianJPsychiatry_35_18)
16. Ruisoto P, Contador I. The role of stress in drug addiction. An integrative review. Physiology & Behavior. 2019, Apr 1;202:62-8.  
Available:<https://doi.org/10.1016/j.physbeh.2019.01.022>
17. Hayatbakhsh MR, Najman JM, Bor W, O'Callaghan MJ, Williams GM. Multiple risk factor model predicting cannabis use and use disorders: A longitudinal study. The American Journal of Drug and Alcohol Abuse. 2009, Dec 15;35(6):399-407.  
Available:<https://doi.org/10.3109/00952990903353415>
18. Mason M, Cheung I, Walker L. Substance use, social networks, and the geography of urban adolescents. Substance Use & Misuse. 2004, Jan 1;39(10-12):1751-77.  
Available:<https://doi.org/10.1081/JA-200033222>
19. Okamoto SK, Helm S, Pel S, McClain LL, Hill AP, Hayashida JK. Developing empirically based, culturally grounded drug prevention interventions for indigenous youth populations. The Journal of Behavioral Health Services & Research. 2014, Jan;41(1):8-19.  
Available:<https://doi.org/10.1007/s11414-012-9304-0>
20. Athawale AP. Legal provisions for proclivities of illegal drug trafficking in India: NDPS Act, 1985. International Journal of Law Management and Humanities. 2021;2(4):413-8.
21. Avasthi A, Ghosh A. Drug misuse in India: Where do we stand & where to go from here?. The Indian Journal of Medical Research. 2019;149(6):689.  
Available:[https://doi.org/10.4103%2Fijmr.IJMR\\_548\\_19](https://doi.org/10.4103%2Fijmr.IJMR_548_19)
22. Pradeep BS, Gururaj G, Varghese M, Benegal V, Rao GN, Sukumar GM, Bhaskarapillai B. National mental health survey of India, 2016-rationale, design and methods. Plos One. 2018;13(10):e0205096.  
Available:<https://doi.org/10.1371/journal.pone.0205096>
23. Dalal PK. Changing scenario of addiction psychiatry: Challenges and opportunities. Indian Journal of Psychiatry. 2020;62(3):235-41.  
Available:[https://doi.org/10.4103%2Fpsychiatry.IndianJPsychiatry\\_346\\_20](https://doi.org/10.4103%2Fpsychiatry.IndianJPsychiatry_346_20)
24. Deb KS, Gupta SK. Prevention strategies for substance use disorders in low-resource settings. Indian Journal of Social Psychiatry. 2017, Apr 1;33(2):112-7.  
Available:[https://doi.org/10.4103/ijsp.ijsp\\_41\\_17](https://doi.org/10.4103/ijsp.ijsp_41_17)
25. Ray R, Chopra A. Monitoring of substance abuse in India—Initiatives & experiences. The Indian Journal of Medical Research. 2012;135(6):806-8.  
Available:<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3410206/>

**Disclaimer/Publisher's Note:** The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of the publisher and/or the editor(s). This publisher and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.

© Copyright (2024): Author(s). The licensee is the journal publisher. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

*Peer-review history:*

*The peer review history for this paper can be accessed here:*

<https://www.sdiarticle5.com/review-history/121859>