# INDIAN PSYCHIATRIC UPDATE

## Psychiatric Epidemiology in India

Editors
**Vidhukumar K, Saikrishna Puli**

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K Vidhukumar

Sai Krishna Puli

June 2023

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Founder: Dr. K. Ramakrishnan,
President - IPS SZB 2021

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# FOREWORD

I am extremely happy and feel privileged to write a foreword because it's the best book, the first of its kind, as there had been never a book dedicated solely to epidemiological studies in psychiatry in India. This book is being introduced and presented on behalf of the IPS-South zonal branch's Publication subcommittee offering a thorough introduction and overview of epidemiological studies in psychiatry. I have a strong hope that this book intends to provide readers to have a strong foundation with fundamentals to caveats explorations of psychiatric epidemiology and making a valuable resource and reckoner, bridging the gap, fostering deeper understanding to PGs, Researchers, and Practitioners with more confidence and efficiency.

I heartfully congratulate Dr Vidhukumar and Dr Saikrishna Puli the editors who have put a lot of sincere effort to bring out this best Edition, Dr Vikas Menon, and Dr Anil Kakunje the chair and co-chairman of the Publication subcommittee to support and their efforts.

I congratulate all the Authors, Reviewers for their hard work and effort.

Best wishes, with regards
Dr Kadiveti Uday kumar.
President, IPS- SZB

# PREFACE

The field of public health interventions and clinical medicine owes a great deal to epidemiology for its scientific foundation. In various areas of medicine, epidemiology has made immense contributions to promotion, prevention, and treatment. However, when it comes to psychiatric epidemiology, a field with inherent challenges in case definition, the contributions have been relatively modest. Surprisingly, to the best of our knowledge, no book or volume has been dedicated solely to epidemiological studies in psychiatry in India.

It is with this understanding and purpose that the book "Psychiatric Epidemiology in India" is being introduced as part of the "Indian Psychiatric Update" series. The primary aim of this book is to introduce the field of epidemiology and showcase Indian epidemiological studies in various domains. The initial two chapters will delve into the fundamental principles of epidemiology, laying a strong foundation for the subsequent chapters that will shed light on different areas of psychiatric epidemiology. The final chapter will explore the potential caveats of psychiatric epidemiology.

We sincerely hope that this book will serve as a valuable resource for postgraduates, researchers, practising psychiatrists, and policymakers alike. By presenting a comprehensive overview of psychiatric epidemiology in India, it aims to become a ready reckoner for those seeking to deepen their understanding of this important field.

We are incredibly grateful to the pioneering authors in the field of psychiatric epidemiology who responded enthusiastically to our call for contributions. On behalf of the publication committee of the South Zonal Branch of the Indian Psychiatric Society, we extend our heartfelt thanks to all the contributors. We also express our sincere appreciation to the office bearers of the IPS South Zone and fellow members of the publication committee for providing us with this wonderful opportunity to bring this important work to fruition.

We also thank Dr K Ramakrishnan for the wholehearted support for the endeavour. In fact, Indian Psychiatric Update had been the brainchild of Dr Ramakrishan while his tenure as President IPS South Zone.

Through this book, we hope to bridge the gap in the literature and foster a deeper understanding of psychiatric epidemiology in India. May it serve as a catalyst for further research, collaboration, and advancements in the field, ultimately contributing to the well-being of individuals and communities.

Vidhukumar K, Saikrishna Puli

Section Editors, Psychiatric Epidemiology in India
On Behalf of, The Publication Committee (2022-23),
The Indian Psychiatric Society, South Zone

# INDIAN PSYCHIATRIC SOCIETY SOUTH ZONAL BRANCH

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Contents In Brief

Globally, suicide remains a major cause of morbidity and mortality, especially in developing countries like India. Recent literature reveals that India's proportional contribution to global suicide death rates has increased. Various risk factors have been identified and reiterated across nationwide and regional studies. Young age, elderly, male gender, economic hardships, family conflict, chronic illness/pain, trait impulsivity, and aggression are reported as risk factors for suicide among the Indian population. Hanging remains the most common mode of suicide among the general population. Though some methods of suicide have increased among specific populations – farmers (pesticide ingestion), some suicidal behaviours have decreased in recent years due to social changes (self-immolation using domestic combustion fuels). Celebrity suicide and the way the media reports such suicides have a significant bearing on the suicidal behaviour among the general population. Various psychosocial and psychological risk factors have been identified for suicidal behaviours among vulnerable populations such as women, sexual minorities, children and adolescents, prisoners, and cancer patients. COVID and the pandemic-related psychosocial changes had pronounced effects on the suicidal behaviour among the general population, especially the healthcare professionals. Subjective psychological factors such as need for "relaxation/punishment" underlie the rising rates of non-suicidal self-injury. The present chapter intends to summarize the recent literature on the epidemiological characteristics of suicidal behaviour in India, which would, in turn, enable early identification of at-risk populations and allocate resources for effective suicide prevention strategies.

## 6. Geriatric mental health epidemiology

Indu PV

Population ageing is happening in India. With the increase in longevity, there is a rise in the prevalence of mental health problems among the elderly population. Community studies have found the prevalence of psychiatric morbidity to range from 2.23% to 61%. Depression was found to be the most common psychiatric disorder in older adults, with various studies reporting prevalences ranging from 8.6% to 72.5%. Dementia was found to be the next most common disorder, with prevalences varying widely – from 0.3% to 11.04%. Anxiety disorders, sleep disorders, somatoform disorders, bipolar disorders, substance use disorders and psychotic disorders were also reported to be common in older adults. Wide variance is observed in the prevalence rates due to differences in the sampling strategies and questionnaires/tools/diagnostic criteria used. There is a need for well-designed descriptive and analytical studies to understand the prevalence and predictors of psychiatric morbidities in older adults.

## 7. Epidemiology of Personality Disorders

Pratap Sharan, Deeksha Kalra

Personality disorders in India present an increasing medical and socio-economic burden, including high rates of morbidity and mortality, familial and marital discord, and unemployment. Although academic interest in the subject has grown since the introduction of a separate diagnostic category in the DSM-III in 1980, most of the existing epidemiological data from India is focused on clinical populations, with minimal community-based research. Methodological inconsistencies, such as varying diagnostic criteria and assessment tools, make it further challenging to interpret these studies. The new ICD-11 classification system has further created a need for comprehensive epidemiological research on personality disorders in India, particularly considering cultural influences. Despite current limitations, growing expertise in this field indicates a promising direction for future studies.

## 8. Psychiatric epidemiology in India – the way forward

Sai Krishna Puli, ND Sanjay Kumar, Swetha Cheryle

In this chapter we had highlighted various epidemiological studies in India. Mental health awareness, epidemiological studies in India were poor and steps to improve mental health literacy were not taken in the past. This led to substantial increase in mental health issues. Prevalence of mental health problems of India was compared to various other countries and conclusions were drawn. Disability and DALY was discussed and impact of mental illness on economy of country were highlighted. Cost of mental health and burden on families were highlighted. Current mental health programmes and Ayushman Bharat programmes were discussed. Future directions to improve mental health surveys and epidemiology were discussed in detail

## 9. Psychiatric Epidemiology in India – problems and Pitfalls

Sandeep Grover, Raj Laxmi

There is wide variation in the estimates of prevalence of mental disorders reported in epidemiological studies in India. One of the possible reasons is that mental disorders range from epidemiologically visible to invisible mental health problems and, consequently, there is subjectivity in case definitions. Oher reasons are lack of use of validated or locally adapted instruments, studies being limited to smaller geographical regions, improper sampling techniques

and information bias. The predominant use of two stage surveys in which the initial there was screening might had led to significant false negativity in certain studies. Data on disability, care giver burden, cost of care and access to care are conspicuously scarce. The incidence of mental disorders is also less studied. Finally, the chapter focuses on National Mental Health Survey (NMHS) based on the above observations.

# Basics of psychiatric epidemiology

Gajanan Ganapati Sabhahit, [1] Aishwarya John, [2] Rahul Patley[3], Suresh Bada Math*[4]

## Introduction

Epidemiology is the branch of science which studies the distribution and determinants of disease frequency in the human population.[1] The term epidemiology is derived from the Greek words, 'Epi'- which means upon or on, 'demos' – which means human beings and 'logy'- which means study.[2] Psychiatric epidemiology is the study of the distribution and determinants of mental illness frequency in human beings with the fundamental aim to understand and control the occurrence of mental illness. [3]

Mental disorders constitute a wide spectrum ranging from sub-clinical states to very severe forms of disorders. Mental health problems can attain the disorder/disease/syndrome level, which is usually considered easy to recognize, define, diagnose and treat them. Hence, they can be called **Visible/Detectable Mental Health Problems** in a community. These visible mental health problems are again can be classified into Major mental health disorders and Minor mental health disorders. Another group of mental health problems remain at the sub-clinical/ non-clinical/ sub-syndrome

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level and is usually related to the behaviour of an individual. Hence, they can be called **'Invisible/Undetectable Mental Health Problems'** in a community (figure 1). Understanding the nature and prevalence of mental health problems is very essential, from policy making to the allocation of meagre resources to the needy. [4]

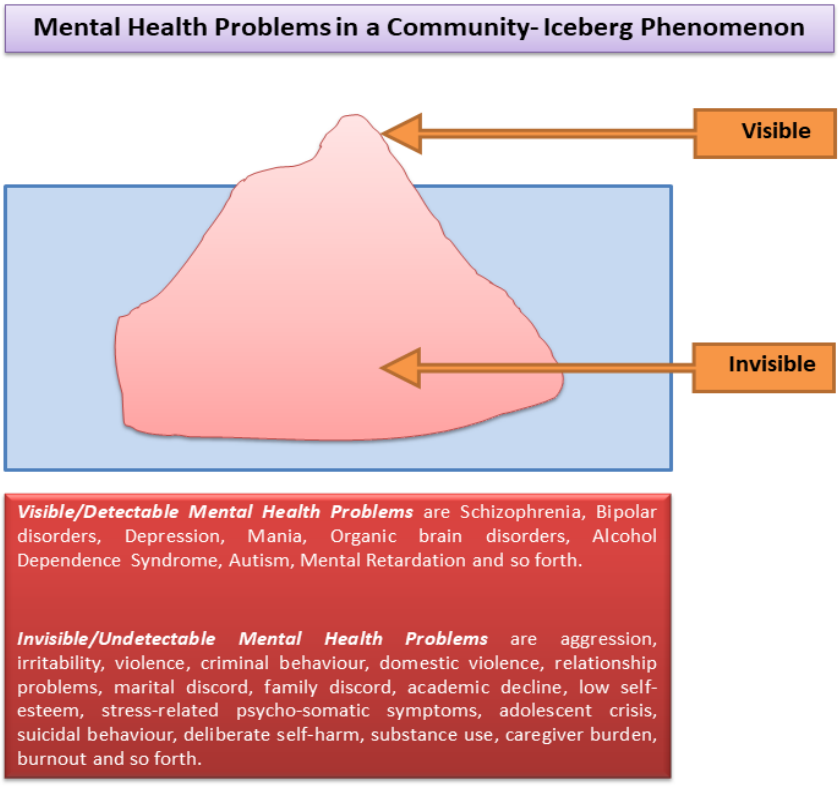



**Fig. 1-** Mental Health Problems in a community-Iceberg Phenomenon

*This flow chart is taken from [49] Math SB, Narayanaswamy J, Raveendranathan D. "Psychiatric epidemiology: What do post-graduate psychiatric residents need to Know?" in a book titled- Psychiatry in India: Training and Training Centres. Pub of Indian Psychiatric Society, pp347-364:2011.*

This chapter focuses on the basics, definition and various components of psychiatric epidemiology, measurement of the psychiatric disorders, basic epidemiologic research designs, and the determinants of psychiatric disorders. More details regarding these topics are dealt with in the subsequent chapters.

The concept of epidemiology dates back to the 18th century - John Snow's work on the association between cholera and contaminated River Thames. Epidemiological construct in Psychiatry and its research picked up during the post-world War era when epidemiologists started studying non-communicable diseases. [5] India has seen vast growth in psychiatric epidemiology over the past five decades, starting from the first psychiatric epidemiological study by K.C. Dube, in 1961 at Agra,[6] to the National Mental Health Survey, in 2016 [7] and National Survey on Drug Use and Health, in 2019.[8]

## Importance of psychiatric epidemiology:

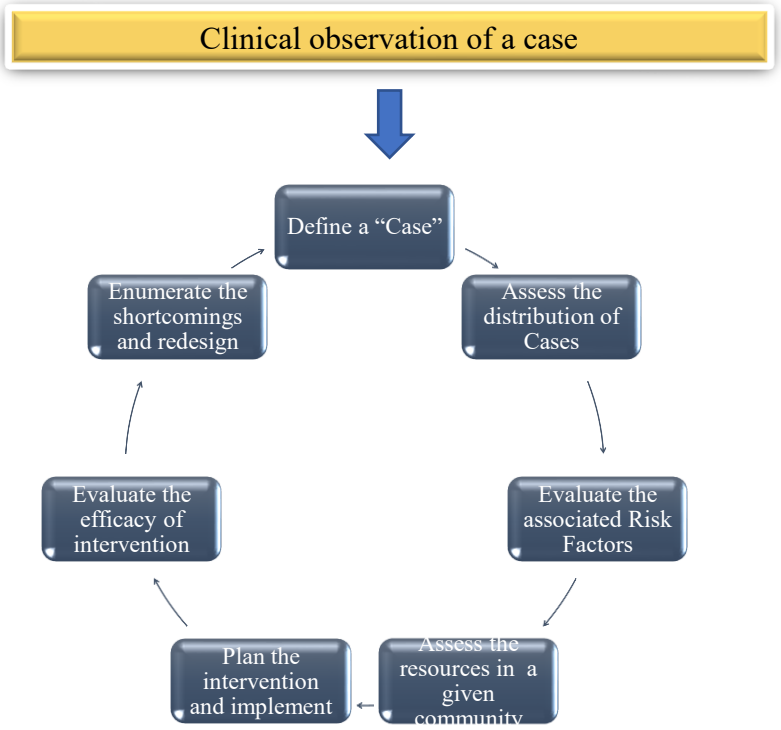
The etiological model of illness in psychiatric disorders is multifactorial and is under conceptualization. Hence, psychiatric epidemiology is still in the stage of describing, classifying, and investigating the determinants of a psychiatric illness. The importance of psychiatric epidemiology lies in the objectives of the field of epidemiology which are as follows: [4]

- To know the magnitude/occurrence of a psychiatric disorder in a given population
- To identify the risk factors closely associated with a psychiatric disorder
- To plan interventions (primary, secondary, and tertiary)
- To evaluate the efficacy of the interventions
- To explore the predictors of the course and outcome of the psychiatric disorder in the community
- To identify the cause of the psychiatric disorder through genetic epidemiological studies
- Evidence-based investment of sparse resources in the field of mental health at a national level

## Steps in Epidemiological Studies:

Psychiatric epidemiology has focused on description in recent years because of the continuing debates that exist in the mental health field on what constitutes a **"case"**. [9-12] If the threshold for diagnosis of a disease is high, the occurrence of the disorder decreases dramatically and vice versa. The wide variations reported in the prevalence rates across epidemiological studies may be due to the difference in the case definition used by various studies. Defining 'case' depends on various factors like perception of illness, availability, accessibility & acceptability of treatment, distress, disability, and caregiver burden. To determine the presence of a disorder, the need for treatment, distress, dysfunction, disability, and availability of resources need to be established [13,14]. To overcome the hurdle of defining 'a case' various initiatives were undertaken in the form of developing diagnostic guidelines, schedules, and scales. The various steps involved in epidemiological studies are depicted in Figure-2.

**Fig. 2-** Steps involved in epidemiological studies

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## Tools in Psychiatric Epidemiology:

To overcome the wide variations in defining a case and have homogeneity and standardisation across epidemiological studies, various tools were developed. These include:

- Screening instruments
- Diagnostic schedules and
- Specific scales

## Screening Instruments:

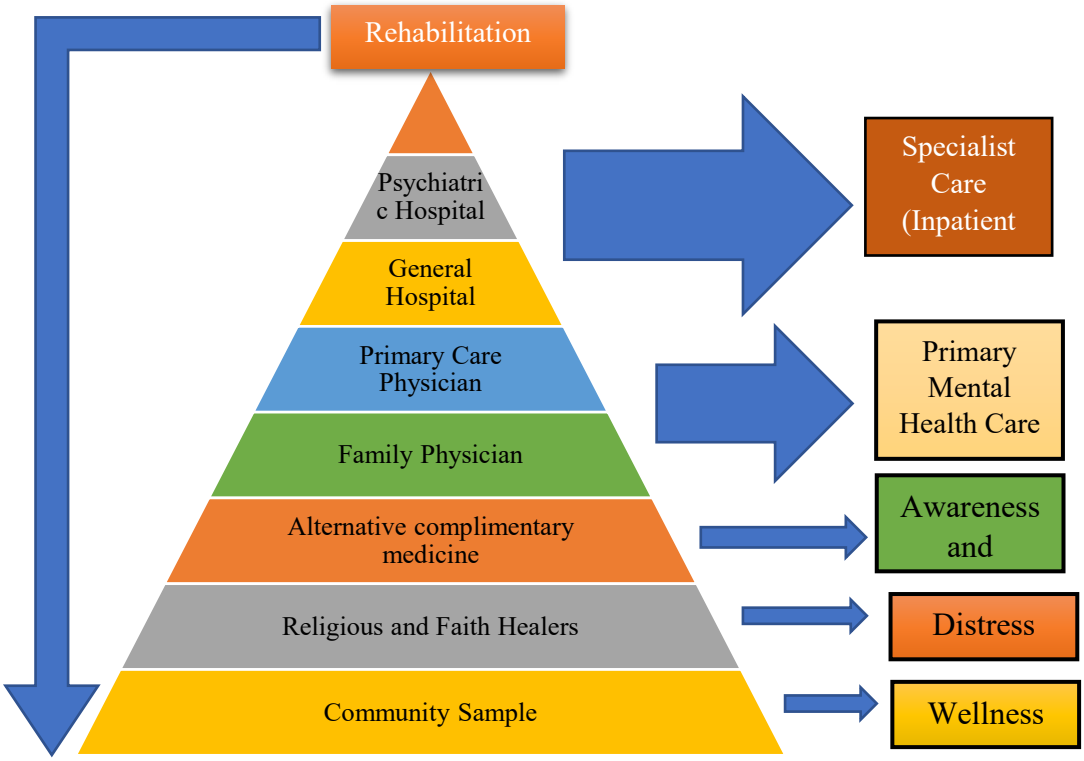
Screening instruments are those instruments used to screen probable psychiatric cases in the community. When a person meets certain cut-off points on the screening instrument then a

complete diagnostic schedule is used for confirming the diagnosis. These can be used both in-person and tele-psychiatrically.

**Table no. 1 Commonly used instruments**

| SCREENING INSTRUMENTS |
|---|
| General Health Questionnaire (GHQ) [15] |
| Self-Reporting Questionnaire (SRQ) [16] |
| **DIAGNOSTIC SCHEDULES** |
| The ICD-10 International Symptom Checklists (ISCL) [17] |
| International Classification of Diseases (ICD-11) [18] |
| Diagnostic and Statistical Manual, 5th edition (DSM-5) [19] |
| Present State Examination (PSE) [20] |
| Schedule for Assessment in Neuropsychiatry (SCAN) [21] |
| Composite International Diagnostic Interview (CIDI) [22] |
| The Mini-International Neuropsychiatric Interview (M.I.N.I.) [23] |
| Structured Clinical Interview (SCID) [24] |
| Diagnostic Interview Schedule. (DIS) [25] |
| **SPECIFIC SCALES** |
| FOR ALCOHOL USE |
| Alcohol Use Disorders Identification Test (AUDIT) [26] |
| CAGE Questionnaire [27] |
| PERSONALITY ASSESSMENT |
| International Personality Disorder Examination (IPDE) [28] |
| Structured Clinical Interview-5 (SCID-5) [29] |
| DISABILITY ASSESSMENT |
| Indian Disability Evaluation & Assessment Scale (IDEAS) [30] |
| WHO Disability Assessment Schedule 2.0 (WHODAS 2.0) [31] |
| Global Assessment of Functioning (GAF) Scale [32] |
| Brief Disability Questionnaire (BDQ) [33] |

**Fig. 3-** Pathway to care pyramid

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## Diagnostic Schedules:

Diagnostic schedules are comprehensive instruments used to arrive at a clinical diagnosis. A diagnostic schedule follows a standardised and tested diagnostic algorithm that requires the presence of essential features of the disorder and determines the syndrome's completeness by a threshold for the associated symptoms.

Diagnostic schedules can be structured or semi-structured. Structured schedules have specific ways of assessment and specific questions to be asked. On the other hand, semi-structured diagnostic schedules which allow the interviewer to frame his/her relevant questions to arrive at the diagnosis. These are used only by clinicians or trained personnel only.

## Specific Scales:

Specific scales are simpler than schedules. They are just symptom inventories, or questionnaires to arrive at a diagnosis. Specific scales are targeted to identify specific diagnoses or syndromes alone such as depression or alcohol use. These specific scales are simple, less time-consuming and are self-administered most often. Some of the commonly used tools in Psychiatric Epidemiology are listed in Table 1.

## Epidemiological approaches to measuring disease/case:

Popular approaches to measuring the disease frequency in a given population are (i) Hospital catchment population approach and (ii) Community survey. [34] Hospital-based approach counts the number of cases diagnosed by a clinician (as the numerator) and the catchment population served by the hospital facilities (as the denominator). The pathway to care pyramid is shown in Figure no 3. At the bottom of the pyramid remains a huge population of mentally ill patients who may not receive treatment at all. Hence, to get the true picture community sampling is advocated.

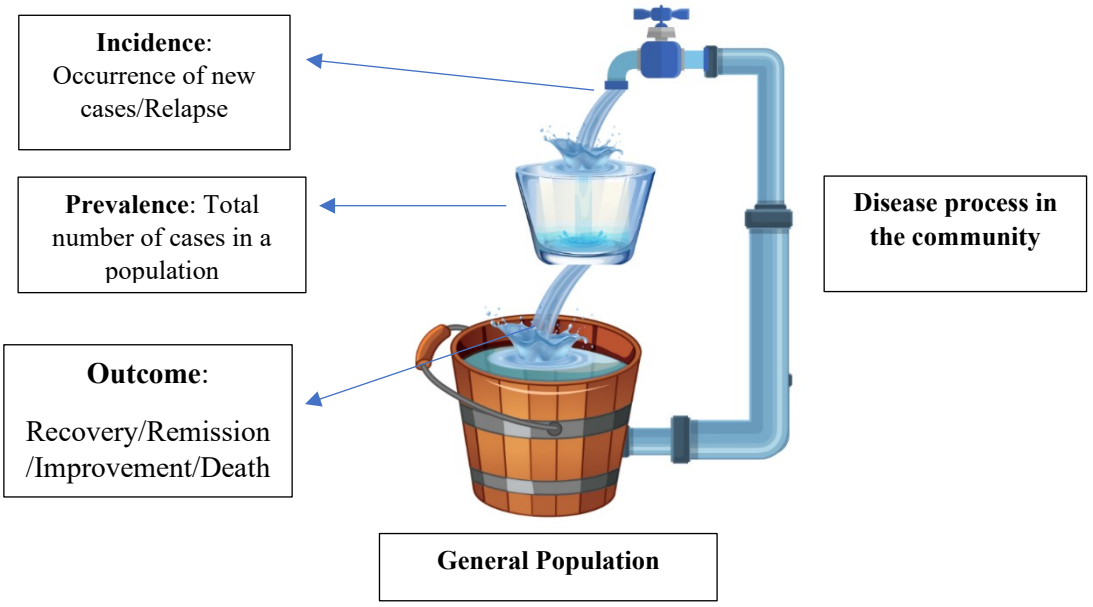


**Fig 4-** Basic measures in epidemiological studies

*This diagram is taken from [49] Math SB, Narayanaswamy J, Raveendranathan D. "Psychiatric epidemiology: What do post-graduate psychiatric residents need to Know?" in a book titled- Psychiatry in India: Training and Training Centres. Pub of Indian Psychiatric Society, pp347-364:2011.*

## Basic measures used in epidemiological studies:

Disease status is a very dynamic process. Once a population is defined various parameters are used to determine the occurrence of a case in a population. These can be understood in a very simplistic manner using figure (figure 4) depicted. Various outcome measures used are improvement, recovery, remission etc based on the type, purpose and feasibility of the study.

## Determinants of psychiatric disorders:

Dimensions of diseases have various aspects like external and internal factors which act in concert to influence the occurrence and outcome of illness. Internal factors such as genetic makeup, gender, age, coping skills, premorbid personality and need for treatment play a role in the development of illness. External factors such as family, stigma, literacy, health policy and legal provisions also play an essential role in the development of illness. This can be easily understood on the basis web of causation of psychiatric disorders.

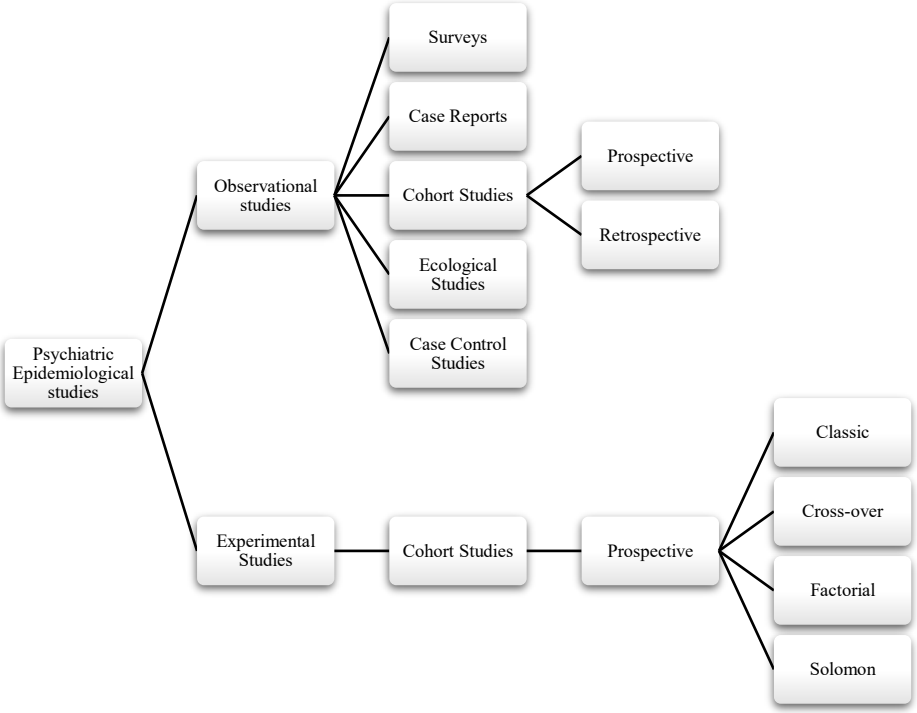


**Fig-5:** Types of Psychiatric Epidemiological Studies

*This flow chart is taken from [49] Math SB, Narayanaswamy J, Raveendran than D. "Psychiatric epidemiology: What do post-graduate psychiatric residents need to Know?" in a book titled- Psychiatry in India: Training and Training Centres. Pub of Indian Psychiatric Society, pp347-364:2011.*

**Types of Psychiatric Epidemiological Studies:**

Psychiatric epidemiology has taken almost all of its tools from general epidemiology or epidemiology of chronic diseases. Thus, the types of studies used are also the same as those used in general epidemiology. Psychiatric epidemiologic study designs are comprised of both observational (non-experimental) and experimental studies. Observational studies include descriptive and analytical studies.[35]

## A) Observational Studies

### 1. Descriptive epidemiology

Descriptive epidemiology makes use of available data to describe the occurrence of a disorder or a related phenomenon. It gives us information on the frequency and patterns of occurrence of a particular condition.

These studies are used to define high-risk groups for certain disorders depending on the frequency of occurrence in certain groups based on age, gender, educational status, marital status, cultural background etc. This data is also used to help support revisions of the DSM and ICD diagnostic systems. [36]

### 2. Analytical epidemiology

Analytical epidemiology [37] addresses the question of why diseases are distributed the way they are. They allow the assessment of hypotheses related to associations of suspected risk factor exposures with health outcomes. Two types of studies are used for such assessments:

1) studies that use populations as units of observation—ecologic studies

2) studies that use individuals as units of observation- this can be cohort, case-control and cross-sectional study designs.

### 2.1 Ecologic Studies

Ecologic studies are also called correlation studies. Here, information is collected not on individuals but on groups of people. Correlation studies use data from entire populations to compare disease frequencies either between different groups during the same period of time or in the same population at different points in time. [38,39]

Ecologic studies "can suggest avenues of research that may be promising in casting light on etiological relationships".

## 2.2 Cohort studies:

Here, a group of healthy people, or a *cohort* is classified according to their exposure status and followed over a specified period to ascertain the occurrence of health-related events. The usual objective of a cohort study is to investigate whether the incidence of an event is related to a suspected exposure. Study populations in cohort studies may include a sample of the general population (e.g., the Framingham Study), an occupational cohort, or a group of people who are at a higher risk for a given disease. Cohort studies can be prospective and retrospective. In prospective studies, exposed and non-exposed individuals are classified before the occurrence of a disorder and followed over time while in retrospective studies, the disorder has already occurred, and we look back to assess the exposure or non-exposure status. Prospective cohort studies allow us to eliminate section bias (as the outcome has not yet occurred) and also allow us to assess the temporal relationship between exposure and outcome. Retrospective studies depend on the quality of records maintained to be of value.

For example, to study the association of relapse of a manic episode and substance use disorder, patients who have had one episode of mania (cohort) could be selected and categorised as those with substance use disorder and those without (exposed and non-exposed). They could now be followed up over the next few years to see whether they experience another manic/ affective episode or not (outcome). This would be a prospective cohort study.

## 2.3 Case-control studies:

Case-control studies classify cases (individuals with a disorder) and controls (individuals without the disorder) and then assess their exposure levels. Compared to cohort studies, they are easier to conduct and cost lesser. They are ideal for studying rare disorders. However, one problem with case-control studies is recall bias. Cases are more likely to remember certain exposures as compared to controls.

For example, if patients of schizophrenia (cases) and those without schizophrenia (controls) are studied for presence or absence of life events (exposure), it would be a case-control study.

## 2.4 Cross-Sectional Studies:

In a cross-sectional study design, a sample from the population or the total population is examined at a given point in time. This gives a snapshot of the health parameters of a cohort, i.e., gives information on health parameters at a single point. This method is mostly used to obtain prevalence data of a given population.

## B) Experimental Studies

Typical experimental studies are those where participants are exposed to different treatments or interventions. The investigator decides the allotment of subjects to various comparison groups and also decides the experimental conditions of each group. Subjects are assigned to groups randomly and followed up over time to record the outcome of interest. Clinical trials, field trials, and community intervention studies are the most common forms of experimental studies in human populations. To ensure the comparability between groups and obtain valid results, an experimental study employs three basic research strategies: randomization, use of placebo and blinding. Randomisation is important to ensure comparability of the populations and to ensure that socio-demographic and other clinical characteristics are as similar as possible between the two groups. Placebo is useful to nullify the psychological benefits of believing that someone is receiving/not receiving a certain treatment. Blinding is also important to ensure the comparability of results. Blinding is of the following types-

1. single-blind study- the patient is unaware of the treatment assigned

2. double-blind study- both the investigator and patient are unaware of the treatment assigned

3. triple-blind study- even the statistician is unaware of the treatment assigned

Four commonly used experimental study designs are:
a) Classic
b) Cross-over
c) Solomon four group
d) Factorial studies

The most common design is the Pretest-Posttest Group Design with random assignment. This design is used very frequently; hence, it is often referred to as, "classic" experimental design. In cross-over experiments, the same experimental unit receives more than one treatment during the non-overlapping time period. For example, in a pre-test & post-test design, group 'A' receives treatment 'X' and control group 'B' will receive placebo. After a certain specified period, post-assessment is done. A washout period is allowed and now group 'A' will receive placebo and group 'B' will receive treatment 'X'. This is called cross-over design.

Another important experimental design is the Solomon Four-Group Design which is more sophisticated. The major advantage of the Solomon design is that it can tell us whether changes in the dependent variable are due to some interaction effect between the pre-test and the treatment. For example, if a study is conducted to know the effect of cannabis on depression. During the

baseline assessment of group X (X cases & X controls), the assessment may cause inherent bias in the participants and may result in lifestyle change and many participants may decrease their cannabis intake during the study. This may give false results. Hence, to overcome this bias another group Y (Y cases & Y controls) will be added without any pretest assessments. There will be only post-test assessments done to assess if the change is produced only by the intervention or treatment.

In a factorial design, each level of a factor occurs with every level of every other factor. Experimental units are assigned randomly to treatment combinations. For example, to assess the effectiveness of treatment combinations in OCD, the appropriate method can be factorial design methods. [4]

**Concept of Bias, Chance, and Causation in Epidemiology:**

To have a complete understanding of epidemiological studies and how to conduct them, one must have a good understanding of bias, chance factors and causation. (Abrahamson and Abrahamson, 2001) [40]

**Bias:**

In epidemiology, Bias refers to a systematic error in either selection, observation or measurement which occurs repeatedly. This leads to aberration in the inference or results of the studies. There are various types of biases. For simpler understanding, they can be divided into selection bias, observation/measurement bias and confounding bias.

**Types of biases in epidemiological research:** [41]

1. **Selection Bias:**

Selection bias can be seen in retrospective cohort studies where it is more likely to classify someone as 'exposed' when we know that the expected outcome has occurred in that individual. Similarly, individuals with exposure are more likely to volunteer for studies exposing certain outcomes. For example, individuals with childhood abuse are more likely to volunteer for a study assessing the relationship of childhood abuse with depression.

2. **Observation Bias:**

Observation bias, also called information/measurement bias, is when observing certain exposures in individuals with disorders is easier. For example, individuals with certain disorders like depression or mania might recall and report life events more than those without the disorders.

3. **Confounding Bias:**

Confounding bias is seen when a factor is independently associated with both the disorder and the exposure being assessed. In such cases, a spurious association is formed between the exposure being studied and the health outcome. For example, if the association between suicide attempts and substance abuse is being studied, it has to be kept in mind that a depressive disorder can be associated with both of these conditions and can cause a spurious association between substance abuse and suicide attempts. Thus, such studies need to be adjusted for the presence or absence of depressive disorder.

Bias during selection can be tackled by **randomisation.** Randomisation gives an equal chance of representation for the samples in the study and hence reduces bias. More about the ways of randomisation are discussed in the next chapter.

Observation/information/measurement bias can be tackled by **blinding.** Blinding can be at the level of the subject, the person collecting data or at the level of the person analysing the data.

**Chance:**

When studying the association between two variables, a frequently raised question is the association by chance, which means that the association is purely coincidental. This is tackled by appropriate statistical analysis of the data and the variables in the study. For most of the studies, the statistical significance is taken at p-value = 0.05, which means there is only a 5% probability that the results are by chance. Reducing it to 0.001 makes the probability of chance to only one in a thousand. More details regarding statistics are outside the purview of this chapter. However, the reader needs to understand that statistics forms an integral part of epidemiology and is important in ruling out any chance association.

**Causation:**

The third and most complex step is establishing causation. Most of the psychiatric diagnoses are multifactorial. Hence, establishing causation becomes difficult. Most of the statistical and epidemiological understanding of causation comes from the work of A. Bradford Hill. He gave a criterion to establish causation. [42]

**Bradford Hill Criteria for causation:**

- Strength of association
- Consistency of association
- Specificity of association
- Temporality
- Biological gradient
- Plausibility
- Coherence
- Experiment

## Leveraging digital technology in epidemiological studies:

In recent decades, medicine and healthcare are moving towards digitisation. Multitudes of data are now being recorded and stored online. Similarly, epidemiology should also follow a similar path towards using and analysing this digital data. The majority of epidemiological studies face the problem of high attrition rates and 'study fatigue'. This problem could be solved by using already maintained digitised administrative and health records. It helps to study the incidence and prevalence of diseases, common risk factors, utilisation of psychiatric services and also the outcomes of various psychiatric disorders. In addition, it also helps to study rare disorders or rare adverse events associated with psychotropic medications.

If we take the example of Nordic countries like Finland, Norway, Denmark or Sweden, digitised records are being maintained for a long time. They have both local and nationwide case registers. They include details of referrals to psychiatric facilities along with the cause of death registers, disability pension registers and prescription registers. Linking these with their administrative records has enabled them to conduct some high-quality epidemiological research on the most prevalent mental illnesses.

India has made significant progress in leveraging technology to make health care available, affordable and accessible to everyone. One such initiative is Digital Nerve Centre (DiNC). [43] Taking this forward, the Ayushman Bharat Digital Mission by India (ABDM) [44] aims at the digital integration of health data. Implementation of e-MANAS [45] for mental health helps in the maintenance of a single registry with womb-to-tomb data. Digitization and establishment of digital centres help in the continuous surveillance of chronic illness and maintenance of a registry system to facilitate epidemiological data for studies.

In addition, every Health and Wellness Centre (HWC) has an IT system for maintaining standardized digital health records and ensuring the flow of information across all levels of healthcare facilities. The HWCs are expected to empanel all individuals and families in the catchment area and create a longitudinal health record of each empanelled individual. They record service delivery coverage and also measure health outcomes using population-based analytics. There are pilot programs such as DiNC (Digital Nerve Centre) of TATA [43] which have enormous potential to change the scenario of rural health across the globe. This provides us with enormous amounts of data that can be analysed to understand the rates of occurrence of psychiatric disorders and associated risk factors as well. This will help India to achieve its goal of delivering Comprehensive primary healthcare services. Another similar avenue is the Tele Manas (Tele Mental Health Services and Networking Across States) [46]. Data about the caller's needs and the type of distress or disorder they needed help with is stored and can be analysed to provide more structured and targeted service delivery. Digital technology surveillance of chronic illness is going to change the picture of epidemiology across the globe,

## Pharmacoepidemiology of Psychotropic Medications:

The WHO definition of pharmacoepidemiology is ''the study of the use and effects/side-effects of drugs in large number of people with the purpose of supporting the rational and cost-effective use of drugs in the population thereby improving health outcomes.'' [47]

Pharmacoepidemiology is the study of interactions between drugs and human populations to assess the benefits and risks associated with the use of drugs. Psychopharmacoepidemiology applies to psychotropic medications. Clinical trials performed before the approval of a drug to assess its efficacy does always reflect its effectiveness in real life, due to well controlled and strictly designed methodology of the clinical trials. A better judge of the effectiveness is the use and effects of the drug in the real world, post-approval. Thus, psycho-pharmacoepidemiology utilises studies conducted in real-life situations and is essential to improve the rational use of drugs. The methods used are predominantly observational –it includes both the descriptive and the analytical approach. The descriptive approach observes this relationship retrospectively, prospectively and transversally. The analytic approach investigates possible associations between the occurrence of effects- both positive and negative and exposure to a drug. It allows for assessing the different determinants and understanding their role. The major difficulty involves several other factors that can influence the measurement and comparison, confounding factors. Thus, these studies are to be used as a supplement to the clinical epidemiological trials. The major applications of these studies include- a) studying prescriptions and consumption of drugs, b) studying the effectiveness of drugs/interventions in the community and c) studying the risks and adverse drug reactions associated with drugs.

## The road ahead in Psychiatric Epidemiology:

There is an urgent need for epidemiological studies (both descriptive and analytical studies) to focus on high-risk populations such as disaster survivors, migrant populations, urban slum dwellers, single parents, orphans, abandoned children, children with conflict with the law, parents with mental illness or substance use, homeless mentally ill population, prison population and other custodial population. This will help us to understand and make local policies regarding disease surveillance, the impact of interventions, the outcome of interventions and the cost-effectiveness of the program. It's time to invest more in intervention-based studies (Analytical studies). Research should also focus on various epidemiological outcome variables such as decrease in the prevalence of psychiatric epidemiology, reduction in the prevalence of disability, years of life lost due to premature mortality, reduction in the prevalence of attempted suicide and death by suicide, reduction in the prevalence of substance use and death because of drug abuse, disability-adjusted life years, improvement in economic, social and human capital.

## Conclusion:

Psychiatric epidemiology deals with the distribution and determinants of psychiatric disorders. Various types of study designs exist in epidemiology. Choosing the right study design, good knowledge about bias, statistics and causation becomes important for any epidemiological study to be effective in reaching the right conclusions and planning cost-effective interventions will be the way forward in the near future. With advances in technology, epidemiological studies have become easier to carry out. However, its success lies in the translation of results into implementation, management, policy-making and further research.

**Take-home points:**

- **Psychiatric epidemiology deals with the study of the distribution and determinants of psychiatric disorders.**
- **Defining a "case" is the most important epidemiological study step.**
- **Various study designs exist in epidemiology and choosing the right study design is crucial.**
- **Concepts of Confounding/Bias, Chance and Causation are crucial for research.**
- **Randomisation and Blinding help in reducing selection and observation bias.**
- **Digital technology is going to change the picture of epidemiology across the globe**

## References:


1. Timmreck TC. *An Introduction to epidemiology*. Sudbury, Massachusetts: Jones and Bartlett Inc; 2002.
2. Mac Mahon B, Pugh TF. *Epidemiology: principles and methods*. Boston: Little, Brown; 1970. p. 137–198.
3. Tsuang MT, Tohen M. *Textbook in Psychiatric Epidemiology*. 2nd ed. New York: Wiley-Liss; 2002.
4. Math SB, Chandrashekar CR, Bhugra D. *Psychiatric epidemiology in India*. Indian J Med Res. 2007 Sep;126(3):183-92.
5. Tsuang MT, Tohen M, Zahner GE. *Textbook in psychiatric epidemiology*. New York: Wiley-Liss; 1995.
6. Dube KC. *A Study of prevalence and biosocial variables in mental illness in rural and urban community in Uttar Pradesh, India*. Acta Psychiatr Scand. 1970; 46:327-59.
7. Murthy RS. *National mental health survey of India 2015–2016.* Indian J Psychiatry. 2017 Jan;59(1):21.
8. Atul A, Rakesh KC, Sudhir KK, Ravindra R, Ashwani KM, Alok A. *National Survey on extent and pattern of substance use in India*. Ministry of Social Justice and Empowerment, Government of India and NDDTC, AIIMS, New Delhi, 2019 Feb.
9. Kendell R, Jablensky A. *Distinguishing between the validity and utility of psychiatric diagnoses*. Am J Psychiatry. 2003 Jan;160(1):4-12.
10. Kessler RC, Üstün TB. *Mild disorders should not be eliminated from the DSM-V*. Arch Gen Psychiatry. 2003 Nov;60(11):1117-22.
11. Regier DA, Narrow WE, Rae DS. *The epidemiology of anxiety disorders: the Epidemiologic Catchment Area (ECA) experience*. J Psychiatr Res. 1990-1991 Winter;24(2 Suppl):3-14.
12. Wakefield JC, Spitzer RL. *Lowered estimates--but of what?* Arch Gen Psychiatry. 2002 Feb;59(2):129-30.
13. Regier DA, Narrow WE, Rae DS. *Limitations of diagnostic criteria and assessment instruments for mental disorders. Implications for research and policy*. Arch Gen Psychiatry. 1998 Feb;55(2):109-15.
14. Pincus HA, Zarin DA, First M. *"Clinical significance" and DSM-IV*. Arch Gen Psychiatry. 1998 Dec;55(12):1145. doi: 10.1001/archpsyc.55.12.1145. PMID: 9862556.
15. Goldberg DP, Williams P. *A User's Guide to the General Health Questionnaire*. Windsor: NFER-Nelson; 1998.
16. Beusenberg M, Orley J. *A User's Guide to the Self Reporting Questionnaire*. Geneva: WHO; 1994.
17. Janca A, Ustun TB, Sartorius N. *The ICD-10 Symptom Checklist, Version 2.0*. World Health Organization, Geneva; 1994.
18. *International Classification of Diseases, Eleventh Revision (ICD-11),* World Health Organization (WHO) 2019/2021 [Internet]. Geneva, Switzerland: WHO; [cited 2023 May 13]. Available from: https://icd.who.int/browse11
19. *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; DSM-5; American Psychiatric Association, 2013).

20. Wing JK, Cooper JE, and Sartorius N, *The Measurement and Classification of Psychiatric Symptoms*. Cambridge: Cambridge University Press; 1974.
21. World Health Organization. *Schedules for Clinical Assessment in Neuropsychiatry (SCAN), Version 2.0*. American Psychiatric Press, Washington, DC, for the World Health Organization; 1994.
22. World Health Organization. *Composite International Diagnostic Interview (CIDI).* American Psychiatric Press, Washington, DC, for the World Health Organization; 1993.
23. Sheehan DV, Lecrubier Y, Sheehan KH, et al. *The Mini-International Neuropsychiatric Interview (M.I.N.I.): the development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10*. J Clin Psychiatry. 1998;59 Suppl 20:22-33; quiz 34-57.
24. Spitzer RL, Williams JBW, Gibbon M, First MB. *The Structured Clinical Interview for DSM-III-R (SCID). I:* History, rationale, and description. Arch Gen Psychiatry. 1992;49(8):624-9.
25. Robins LN, Wing J, Wittchen HU, et al. *The Composite International Diagnostic Interview. An epidemiologic Instrument suitable for use in conjunction with different diagnostic systems and in different cultures*. Arch Gen Psychiatry. 1988;45(12):1069-77.
26. Conigrave KM, Saunders JB, and Reznik RB. *Predictive capacity of the AUDIT questionnaire for alcohol-related harm*. Addiction. 1995;90(11):1479-85.
27. Ewing JA. *Detecting alcoholism. The CAGE questionnaire*. Jama. 1984;252(14):1905-7.
28. World Health Organization. *International Personality Disorder Examination (IPDE)*. ICD-10. Geneva: WHO; 1992.
29. First MB, Williams JBW, Benjamin LS, Spitzer RL. *User's Guide for the SCID-5-PD (Structured Clinical Interview for DSM-5 Personality Disorder)*. Arlington, VA: American Psychiatric Association; 2015.
30. The Rehabilitation Committee of the Indian Psychiatric Society. *IDEAS (Indian Disability Evaluation and Assessment Scale) - A scale for measuring and quantifying disability in mental disorders.* Gurgaon: Indian Psychiatric Society; 2002.
31. Üstün TB, Chatterji S, Kostanjsek N, Rehm J, Kennedy C, Epping-Jordan J, et al. *Developing the World Health Organization disability assessment schedule 2.0.* Bulletin of the World Health Organization. 2010; 88:815–23.
32. Patterson DA and Lee MS. *Field trial of the Global Assessment of Functioning Scale--Modified.* Am J Psychiatry. 1995;152(9):1386-8.
33. Von Korff M, Ormel J, Keefe FJ, et al. *Grading the severity of chronic pain*. Pain. 1992;50(2):133-49.
34. Silman AJ, Macfarlane GJ. *Epidemiological studies: a practical guide*. 2nd ed. Cambridge: Cambridge University Press; 2002.
35. Rothman KJ, Greenland S, Lash TL. *Modern Epidemiology. 3rd ed*. Philadelphia: Lippincott Williams & Wilkins; 2008.
36. Kessler RC. *Psychiatric epidemiology: challenges and opportunities*. Int Rev Psychiatry. 2007;19(5):509-21.
37. Ross BC, Diana BP. *Applied Epidemiology: Theory to Practice.* New York: Oxford University Press; 1998.

38. Beaglehole R, Bonita R, Kjellström T. *Basic Epidemiology*. Geneva: World Health Organization; 2006.
39. Norman GR, Streiner DL. PDQ *Epidemiology*. Hamilton, Ontario: B.C. Decker Inc; 1998.
40. Rothman KJ, Greenland S, Lash TL. *Modern Epidemiology*. 3rd ed. Philadelphia: Lippincott Williams & Wilkins; 2008.
41. Ross BC, Diana BP. *Applied Epidemiology: Theory to Practice*. New York: Oxford University Press; 1998.
42. Hill AB. *The environment and disease: association or causation?* Proc R Soc Med. 1965; 58:295-300.
43. Digital Nerve Center [Internet]. [cited 2023 May 13]. Available from: https://www.tatasustainability.com/SocialAndHumanCapital/DigitalNerve
44. Sharma RS, Rohatgi A, Jain S, Singh D. *The Ayushman Bharat Digital Mission (ABDM): making of India's Digital Health Story*. Curr Sci Tech. 2023;11(1):3-9.
45. Math SB, Manjunatha N, Kumar CN, Dinakaran D, Gowda GS, Rao GN, Parthasarathy R, Raj D, Srikanth TK, Gangadhar BN. *Mental Healthcare Management System (e-MANAS) to implement India's mental healthcare act, 2017: Methodological design, components, and its implications*. Asian J Psychiatry. 2021 Mar; 57:102391.
46. Tele Manas [Internet]. India: Ministry of Health and Family Welfare; c2021 [cited 2023 May 13]. Available from: https://telemanas.mohfw.gov.in/#/home
47. Montastruc JL, Benevent J, Montastruc F, Bagheri H, Despas F, Lapeyre-Mestre M, Sommet A. *What is pharmacoepidemiology? Definition, methods, interest and clinical applications.* Therapies. 2019 Apr;74(2):169-74.
48. Math SB, Srinivasaraju R. *Indian Psychiatric epidemiological studies: Learning from the past.* Indian J Psychiatry. 2010 Jan;52(Suppl1): S95.
49. Math SB, Narayanaswamy J, Raveendranathan D. *Psychiatric epidemiology: What do post-graduate psychiatric residents need to Know?* In: Gautam S, Kulhara P, editors. Psychiatry in India: Training and Training Centres. New Delhi: Indian Psychiatric Society; 2011. p. 347-64.

# Measurements in psychiatric epidemiology

Deenu Chacko[1], Vidhukumar K* [2]

## Introduction

The word epidemiology comes from the Greek words, 'epi',' demos' and 'logos' which means on, people and study of respectively. It is the study of the distribution and determinants of health-related states or events in a specific population and its application for the control of health-related problems.[1] It follows that epidemiology could be used to describe the frequency and distribution of disease and to find the determinants of the disease.

The frequency of a particular event in the population represents the number of that event in the population and its relationship with the entire population of interest. Pattern refers to the occurrence of health-related events with respect to age, sex, geography, ethnicity etc. The pattern could be seasonal, annual, related to ethnic groups, etc. The description of health events based on these characteristics is called as descriptive epidemiology.[2]

Epidemiological studies are also done to find the determinants of a particular disease or health-related event. Any factor that brings a change in the health condition or any other defined characteristics is called a determinant, for example, low birth weight is a determinant for neurodevelopmental disorders. The determinants of health are of various types like biological which includes genetics, immunological status etc., physical for example geographic area and other environmental factors, social like economic status, and income. The determinants can have a direct effect on the event like the immunological status and respiratory infection or can have an indirect effect like the lower economic status and ill health which may be mediated through poor nutrition and hygiene, psychological stress etc.[3]

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immunological status and respiratory infection or can have an indirect effect like lower economic status and ill health which may be mediated through poor nutrition and hygiene, psychological stress etc.[3]

So, the measurements in epidemiology are of two kinds: One, measures of disease frequency and the other, measures of association between determinants and the disease, measures of effect.

Almost as important as the estimation of these measures, is to establish whether the measures obtained are valid, free from systematic errors and random error. The former is established by design aspects of the study. The latter is established by statistical estimates and hypothesis testing.

In this chapter, the various measures of disease frequency and measures of effect are described with examples. How design aspects of the study and statistical methods are used to ensure the validity of these measures will also be briefly examined.

## Measures of disease frequency

There are three basic measures of disease frequency, cumulative incidence, incidence rate and prevalence.

### 1. Incidence

Incidence reflects the number of new cases of disease within a certain period. It could be expressed as a proportion or a rate.

The proportion is variously known as risk, attack rate, incidence proportion and cumulative incidence.

$$\text{Cumulative incidence} = \frac{No.of\ subjeccts\ developing\ a\ disease\ over\ a\ period}{Total\ No.of\ subjects\ followed\ over\ that\ time\ period}$$

Like any proportion value of cumulative incidence ranges from zero to one. Calculation of incidence proportion is valid only if we follow a closed population without dropout, migration or death because the period of observation of each individual varies based on the above.

In a nationwide cohort study of children and adolescents of 1.3 million individuals in Denmark, which involved follow-up from birth, a total of 99 926 individuals were diagnosed with a mental disorder. The authors calculated cumulative incidence or risk of any psychiatric disorder as 15.01% up to 18 years of age.[4]

In a dynamic cohort, a usual reality, the measure used to denote incidence is the incidence rate. The incidence rate ranges from zero to infinity.

$$\text{Incidence rate} = \frac{Number\ of\ new\ case\ or\ injury\ occuring\ a\ specified\ period}{Time\ each\ person\ was\ observed,totaled\ for\ all\ subjects}$$

The denominator is calculated based on the period of observation each subject is followed up. All such observations are totalled to find out the total person-time of observation.

In a large cohort study of temporal trends in annual incidence rates for psychiatric disorders and self-harm among children and adolescents in the UK from 2003-2018, the investigators used data from two sources to select 69,85,303 subjects which contributed to 14,34,68,656 person-years of observation to calculate incidence rates. [5]

## 2. Prevalence

Prevalence is the proportion of patients having the disease in a population at a given point in time.[6] It is the measure of disease status in the population, unlike incidence where the focus is on events.[3]

$$Prevalence = \frac{Number\ of\ subjects\ with\ disease\ in\ the\ population}{Total\ number\ of\ subjects\ in\ the\ population}$$

It indicates the burden of the disease in the community. This burden can also be expressed in terms of quality of life, mortality, morbidity, and economic burden. For example, the national mental health survey ( NMHS) of India has found the current prevalence of depression as 2.68% and the direct cost for depression/ month as INR 1500.[7] This translates the annual cost of depression in India among adults (1000 million) as 18 trillion INR. Thus, prevalence is a better measure for planning for health resources and facilities, unlike incidence measures which are important in aetiologic research.[3]

### Measures of effect

Measuring the strength of association between exposure, risk factor or intervention to disease, outcome or treatment effect is an important aim in epidemiological and clinical research. Often this is achieved by the comparisons of the measures of frequency in groups of interest.

### 1. Relative risk

It is the ratio of the incidence of an event after exposure to the risk factor to the incidence of the event in the non-exposed group. Relative risk is also called Risk Ratio or hazard ratio. Relative risk is calculated in cohort studies.

$$\text{Relative Risk} = \frac{Incidence\ rate\ of\ disease\ among\ exposed}{Incidence\ rate\ \ of\ disease\ among\ non-exposed}$$

Table1. shows the results of a population-based cohort study of mortality in schizophrenia. It indicates a 68% excess risk of mortality in subjects with schizophrenia.[8]

*Table 1. Calculation of incidence rate ratio*

| Groups | Death/ person-years | Incidence rate/1000 person-years | Incidence rate ratio |
|---|---|---|---|
| Schizophrenia | 1225/40362 | 30.35 | 1.68 |
| Controls | 7702/427000 | 18.04 | |

Although risk ratio is ideally calculated for incidence rate, (called incidence rate ratio), it is often calculated based on cumulative incidence. According to Rothman, this approximation of cumulative incidence ratio to incidence rate ratio is acceptable for smaller time intervals.[3]

$$\text{Then, the relative risk} = \frac{Cumulative\ incidence\ among\ exposed}{Cumulative\ incidence\ among\ non-exposed}$$

In a hypothetical example of a cohort study of surviving children of association between low birthweight and dyslexia the calculation of relative risk is demonstrated in Table.2.

Table 2. Calculation of risk ratio based on cumulative incidence

| Groups | Dyslexia | No dyslexia | Total | Risk | Risk ratio |
|---|---|---|---|---|---|
| Low birth weight | 30(a) | 10(b) | 40 (a+b) | 30/40 | $\frac{a/a+b}{c/c+d} =$ |
| Normal birthweight | 40(c) | 20(d) | 60 (c+d) | 40/ 60 | $\frac{30/40}{40/60} = 1.12$ |

This means low birth weight is associated with a 1.12-fold increased risk of dyslexia relative to normal birth weight, i.e., 12 % excess risk of dyslexia among low birthweight children. RR=1 means the risk is the same in both groups. RR >1 means risk is greater in the exposed group and

RR <1 means risk is lesser in the exposed group or the exposure is protective. RR is usually considered significant if it is less than 0.5 or if more than 2.00. But in serious public health events, it is considered significant even if it is close to 1.00.

### 2. Odds ratio

In certain situations, instead of the risk ratio, the ratio between odds of exposure among cases to odds of exposure among controls called odds ratio, is used as a measure of effect. The classical example is a case-control study in which you cannot get the risk because the exposure estimation is after the selection of the outcome (cases and controls). The odds ratio can also be calculated from a cohort study in addition to the risk ratio.[9]

Table 2 in the dyslexia example has been reframed based on a case-control study in Table 3. The OR = 1 means there is no risk for dyslexia with low birth weight. An OR >1 means the exposure increases the risk for an event, here low birth weight increases the risk for dyslexia. An OR <1 means the exposure reduces the risk of developing a particular event. The odds ratio will be approximately equal to the risk ratio when rare disease is studied as cases.

*Table 3. Calculation of Odds ratio*

| Groups | Low birth weight | Normal birthweight | Odds of exposure | Odds ratio |
|---|---|---|---|---|
| Dyslexia | 30 (a) | 40(c) | a/c= 30/40 | $\frac{a/c}{b/d}$= ad/bc=1.5 |
| No Dyslexia | 10(b) | 20 (d) | b/d= 10/20 | |

### 3. Attributable risk:

Attributable risk or risk difference is considered as a measure of absolute effect. It is the risk of an event that can be attributed to a specific exposure.[9] It is calculated as the difference in the risk of exposed and non-exposed. In the example given in Table.2, the risk of dyslexia attributable to low birth weight is 75%- 66.7% = 8.3% i.e., only 8.3% of dyslexia incidence can be attributed to low birth weight and the rest may be due to some other cause. Attributable risk is a measure of public health importance since it gives the magnitude of disease due to exposure.

## Measure of effects specific to Clinical Epidemiology

### Number needed to treat (NNT), and number needed to harm (NNH)

One of the logical extensions of attributable risk is the number needed to treat. Instead of risk increase, here the risk reduction due to a treatment is the focus. The evaluation of treatment effect is inevitable in clinical practice. The NNT is one method that facilitates the interpretation of clinical trials in a meaningful way. The number needed to treat is the number of people who would need to receive treatment for one of them to benefit who would not have benefitted without treatment. The incidence of an event occurring due to intervention is called the experimental event rate (EER) and the incidence of an event occurring in the control group is called the control event rate (CER). The difference between these two rates is called absolute risk reduction (ARR). i.e., ARR= CER-EER.

The NNT is the reciprocal of absolute risk reduction i.e., NNT= 1/ (CER-EER).[10]

Suppose the two drugs X and Y are used to treat anxiety disorder and the 8 weeks response rate is 50% and 70% respectively. Then the difference in response rate is 0.7 - 0.5 = 0.2. Therefore, the NNT is 1/0.2 = 5. This means that we should have treated 5 patients with drug Y instead of drug X to see one responder. If NNT obtained is a decimal, then it is conventionally approximated to the next whole number. The larger the NNT the smaller is the difference between the two drugs. Thus, for an ideal drug, NNT should be small. But if the outcome measure is very significant like death, an even larger NNT is considered significant.

In the CATIE study, the discontinuation rate of antipsychotic (primary outcome measure) was 64% for Olanzapine and 82% for Quetiapine.

NNT = 1/ (0.82- 0.62) = 1/0.18 = 5.6

So, the NNT calculated comparing Olanzapine to Quetiapine is 5.6 and on rounding up to the next whole number it becomes 6. i.e., for every 6 patients treated with Olanzapine 1 patient continued the drug compared to patients on Quetiapine.[11]

Likewise, the number needed to harm (NNH) is the inverse of the absolute difference in adverse events rate between the treatment arm and the control arm. It is rounded off to the nearest whole figure conventionally. NNH can show how often you could expect specific tolerability outcomes when compared to medications.

In CATIE phase 1 for every 5-8 patients treated with Olanzapine one patient gained weight more than 7%, NNH 5 to 8. The NNH for clozapine compared with FGAs is 49. This means that we need to treat 49 patients with Clozapine instead of FGAs to encounter one case of new-onset diabetes mellitus. A large NNH shows the harm due to the drug is small and vice versa. For an ideal drug, NNH should be large.[12] Thus the calculation of NNT and NNH can help in assessing a clinical trial and making clinical judgment in routine practice.

## Effect Sizes in Interventional Studies

*The primary product of a research inquiry is one or more measures of effect size, not P values.*

-*Jacob Cohen*[13]

In interventional studies, comparisons are made between experimental and control groups on measures of treatment response or remission and the quantitative expression of such a difference is called effect size. The measurement may be numerical or categorical. The risk ratio and odds ratio are the effect sizes for categorical measurements, which were discussed in previous sections. For numerical measures, the measures of effect often used are mean differences. In a randomised double-blind non-inferiority trial of lurasidone and risperidone, the mean change in PANSS scores was 31.2 and 34.9 respectively. The effect size, unstandardised mean difference, is 3.7.[14] Thus, effect size helps us to determine the magnitude of the difference.

Since measurements vary in units, often effect size is reported as standardised mean difference (SMD). The SMD is the mean difference divided by some expression of standard deviation reported as Corens'd, Glass's delta or Hedge's G. An SMD of 1 indicates that the groups differ by one standard deviation. In the comparison of lurasidone and risperidone Corens'd, the mean difference divided by pooled standard deviation, was calculated as 0.27.[14] Standardised mean differences are classified as:<0.10 (Trivial effect), 0.10–0.34 (small effect), 0.10–0.34 (medium effect), 0.65–1.19 (large effect), ≥1.20 ( very large effect).[15]

The effect size is the main finding in a quantitative study. The P value can give information about whether an effect exists, but it will not reveal the size of the effect. While reporting and interpreting studies both substantive (effect size) and statistical (p-value) significance are essential. With a sufficiently large sample, a statistical test will almost always demonstrate statistical significance, so reporting only a significant p-value is not enough to fully interpret the study results.[13]

A commonly cited example of this problem is the Physicians Health Study of aspirin to prevent myocardial infarction (MI). It was found that aspirin was associated with a reduction in MI in more than 22 000 subjects over an average of 5 years, which was highly statistically significant: $P < .00001$. However, the effect size was very small: a risk difference of 0.77% with $r2 = 0.001$—an extremely small effect size. As a result of that study, many people were advised to take aspirin who would not experience benefits yet were also at risk for adverse effects. Further studies found even smaller effects, and the recommendation to use aspirin has since been modified.[16]

In meta-analysis, the effect sizes of the selected studies are all combined into a single analysis. In quantitative experiments, effect sizes are among the essential and elementary summary statistics to be mentioned. Ideally, an effect size report should include:

1) the direction of effect i.e., which intervention is effective A-B or B-A.
2) the type of uncertainty information reported e.g., 95% confidence interval, or a credible level or standard deviation.

Other effect size indices reported in the literature are correlation coefficient and coefficient of determination.

## Measures of Burden and Indices for economic evaluation

To estimate the burden of disease and to compare and prioritise public health interventions certain indices are used. They are the endpoints in economic analysis like cost-effectiveness analysis, cost-utility analysis and health technology assessment. The findings from these research areas may be informed to the policymakers. Two commonly used measures in this framework are DALY (disability-adjusted life years) and QALY (Quality-adjusted life years).

## Disability-adjusted life years (DALY)

One DALY represents the loss of the equivalent of one year of full health. It assesses the overall burden of a disease. It is a time-based measurement, and it is the years of healthy life lost due to disability. Using DALY, the burden of disease that causes premature death, but little disability can be compared to diseases that do not cause death but cause disability. DALYs are the sum of years of life lost (YLL) due to premature mortality and years lived with disability (YLD).

DALY = YLL+YLD i.e., it is a sum of morbidity and mortality for each illness.

One DALY is the equivalent of losing one year in good health due to premature death or disease or disability. DALY of zero equates to perfect health and one equates to death.

Figure.1 illustrates the principles of calculation of DALY in an individual with schizophrenia. The onset of illness is at 20 years of age and the patient dies at the age of 60 years. The estimated disability weights for acute and residual states of schizophrenia were 0.778 (0.606–0.900) and 0.588 (0.411–0.754), respectively.[17] For convenience of calculation, we will consider the point estimate of 0.60. So YLD is 40 x 0.60, i.e., 24 years. YLL is 20 years. So, the total DALY for the patient is 44 years. This is a relatively straightforward calculation, here the comorbidities, moderation for advancing age etc. are not considered in this calculation.

In estimating the global burden of disease, the age-adjusted prevalence of the disease is considered and the total DALY for a particular disease is calculated by adjusting for other illnesses. It was estimated that schizophrenia contributes 13.4 (UI: 9.7-16.7) million years of lives lived with disability.[17]

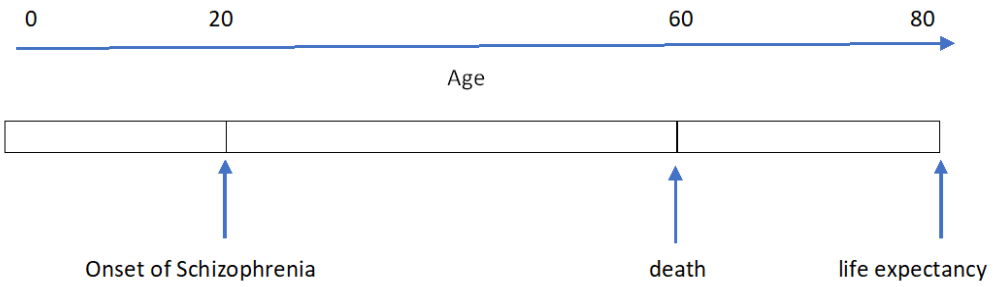


*Figure 1. Illustration of the principles of calculating DALY in a subject with schizophrenia*

Between 1990 and 2019, the global number of DALYs due to mental disorders increased from 80.8 million to 125.3 million. Globally, the age-standardised DALY rate for mental disorders was 1426.5 per 100000 population among males and 1703.3 per 100000 population among females.[18]

## Quality-adjusted life years (QALY)

A QALY is the arithmetic product of life expectancy combined with a measure of the quality of life -years remaining. It is a measure of how many years of life are lived in good health or years of healthy life lived. The quality of life is measured as Health State Units (HSUs) based on accepted generic or specific instruments relevant to the diseased condition. A value of 1 equates perfect health and 0 equates to death. The health conditions that cause pain and severe disability are regarded as worse than death, they are assigned negative values. It gives an idea of how many extra months or years of the life of a reasonable quality a person might gain because of treatment. QALY is considered as the cornerstone of economic analysis which combines morbidity gains and the mortality impact of a treatment.

QALY= Year of life x Utility, half a year lived in perfect health is equivalent to 0.5 QALYs (0.5 years x1 utility = 0.5 QALY)

Though DALY and QALY can be applied to a wide range of conditions, these measures are not free of criticism. Neither measure captures the wider effects of ill health: impact on carers, the economic and social impact of illness etc. QALY lacks sensitivity and may be difficult to apply to chronic illness. The social preference weighting and discounting in disability weight and Q (quality index) estimation may lead to ethical issues like: are non-disabled more productive and valuable to society? Despite these DALY and QALY have got a wider application in the realm of public health policy-making to make informed decisions and to choose vital and cost-effective health interventions.[19,20]

## Are estimated measures of effect true?

So far, we have discussed the magnitude of effect estimates. The question is whether these estimates we calculated are real. We want true estimates and not erroneous ones, usually, the result of errors in study design. Another issue is whether the measures are independent of other naturally co-occurring variables. These two aspects are called systematic errors or lack of validity in the estimation of measures of effect. Whether the estimate is a random finding of the sample studied is an equally pertinent issue. Such an error is called sampling error. Only if the estimate has passed through the process of maximum possible elimination of these errors, they can be considered true.

## Systematic Error

As mentioned above, both estimates of frequency measures and measures of effect can be false or not valid because of improper study design. These errors in estimates are called biases. One type

of bias arises because of the error in selection of study subjects which usually results from improper sampling methods. This applies equally to both frequency measures and measures of effect. Non-response is one of the main reasons for a biased prevalence estimate. For example, Cottler et al have demonstrated difficult-to-recruit respondents and their effect on prevalence estimates in the first wave of the Epidemiological catchment area (ECA) study.[21] In case control studies erroneous selection of controls is a common bias. A priori defects in the identification of associated variables or confounders are usually a problem in analytic epidemiological studies.

Measurement error is also a major problem in both descriptive and analytic studies. It leads to under or over-estimation of frequency measures. In analytic studies, the measure of effect deviates away from either side of null because of the differential measurements of exposure or disease status. If the error of measurement is equal on both groups of an analytic study the measure of effect may tend towards null.

## Random Error

The next problem is the randomness of the estimates. Provided the sampling is random, inferential statistics come to our help to solve the problem. The main purpose of applying statistical analysis to research studies is to discern whether the estimate is an attribute of the sample, or it represents the population from which the sample has come, and this can be dealt with either by interval estimation or hypothesis testing. In interval estimation, in a certain probability (usually 95%), how much the values can deviate on either side of the estimate is calculated. In hypothesis testing, we estimate the probability the association demonstrated falls assuming the null hypothesis is true. This probability is called the p-value and usually, if it is less than 0.05, we conclude that our findings are significant. This arbitrary probability of acceptance is known as alpha error.

## Conclusions

In epidemiological studies, primary measures are measures of disease frequency. In analytic studies we compare and compute measures of association or difference of these frequency measures between groups of interest, resulting in estimates called measures of effect. Measures of effect include risk ratio, odds ratio, risk difference and effect sizes. Some intuitively important measures like NNT and NNH are also measures of effect. For estimating the burden of disease, economic analysis and health technology assessment which are the stepping stones of evidence-based public health policy formation some composite indicators like DALY and QALY are used. Finally, care must be taken in the design and interpretation of study findings for possible biases and the ways they have been addressed. By statistical inference, we are trying to eliminate the random error of study findings.

Take home points

- Prevalence and incidence are the basic measures of disease frequency. Prevalence gives an estimate of the burden of disease, while incidence indicates the force of occurrence.
- Risk Ratio and odds ratio are the commonly used measures of effect in epidemiological studies. In interventional studies, the measures of effect can include other effect sizes based on mean difference in addition to risk ratio or odds ratio.
- NNT and NNH are intuitively simple expressions of measure of effect in Interventional studies
- Composite and general measures of disease burden are DALY & QALY. They are primarily used to compare disease conditions for prioritisation and resource allocation. They also form the basis of economic evaluation and health technology assessment
- The Truth of estimates depends on the relative lack of biases or systematic errors, which should be addressed at the design stage of the study. Interpretation of estimates should be based on the biases the source study encountered.
- The role of the statistics is to estimate the chance factors or random error the estimate is likely to have

## References:


1. Porta MS, Greenland S, Hernán M, dos Santos Silva I, Last JM. A Dictionary of Epidemiology. Oxford University Press; 2014.

2. Ahrens W, Pigeot I. Handbook of Epidemiology. Springer Science \& Business Media; 2007.

3. Lash TL, VanderWeele TJ, Haneause S, Rothman K. Modern Epidemiology. Lippincott Williams \& Wilkins; 2020.

4. Dalsgaard S, Thorsteinsson E, Trabjerg BB, Schullehner J, Plana-Ripoll O, Brikell I, et al. Incidence Rates and Cumulative Incidences of the Full Spectrum of Diagnosed Mental Disorders in Childhood and Adolescence. JAMA Psychiatry. 2020 Feb;77(2):155–64.

5. Cybulski L, Ashcroft DM, Carr MJ, Garg S, Chew-Graham CA, Kapur N, et al. Temporal trends in annual incidence rates for psychiatric disorders and self-harm among children and adolescents in the {UK}, 2003-2018. BMC Psychiatry. 2021 May;21(1):229.

6. Noordzij M, Dekker FW, Zoccali C, Jager KJ. Measures of Disease Frequency: Prevalence and Incidence. NEC. 2010;115(1):c17--c20.

7. Arvind BA, Gururaj G, Loganathan S, Amudhan S, Varghese M, Benegal V, et al. Prevalence and socioeconomic impact of depressive disorders in India: multisite population-based cross-sectional study. BMJ Open. 2019 Jun;9(6):e027250.

8. Chan JKN, Wong CSM, Or PCF, Chen EYH, Chang WC. Risk of mortality and complications in patients with schizophrenia and diabetes mellitus: population-based cohort study. Br J Psychiatry. 2021 Jul;219(1):375–82.

9. Andrade C. Understanding relative risk, odds ratio, and related terms: as simple as it can get. J Clin Psychiatry. 2015 Jul;76(7):e857--61.

10. Andrade C. The numbers needed to treat and harm ({NNT}, {NNH}) statistics: what they tell us and what they do not. J Clin Psychiatry. 2015 Mar;76(3):e330--3.

11. Citrome L. Interpreting and Applying the {CATIE} Results: With {CATIE}, context is key, when sorting out Phases 1, 1A, 1B, 2E, and {2T}. Psychiatry. 2007 Oct;4(10):23–9.

12. Suter K, Briel M, Günther J. [The number needed to treat (NNT) and the number needed to harm (NNH)]. Med Monatsschr Pharm. 2015 Mar;38(3):103–6.

13. Sullivan GM, Feinn R. Using Effect Size-or Why the {P} Value Is Not Enough. J Grad Med Educ. 2012 Sep;4(3):279–82.

14. Feng Y, Shi J, Wang L, Zhang X, Tan Y, Zhao J, et al. Randomized, double-blind, 6-week non-inferiority study of lurasidone and risperidone for the treatment of schizophrenia. Psychiatry Clin Neurosci. 2020 Jun;74(6):336–43.

15. Schober P, Mascha EJ, Vetter TR. Statistics From A (Agreement) to {Z} (z Score): A Guide to Interpreting Common Measures of Association, Agreement, Diagnostic Accuracy, Effect Size, Heterogeneity, and Reliability in Medical Research. Anesth Analg. 2021 Dec;133(6):1633–41.

16. Bartolucci AA, Tendera M, Howard G. Meta-analysis of multiple primary prevention trials of cardiovascular events using aspirin. Am J Cardiol. 2011 Jun;107(12):1796–801.

17. Charlson FJ, Ferrari AJ, Santomauro DF, Diminic S, Stockings E, Scott JG, et al. Global Epidemiology and Burden of Schizophrenia: Findings From the Global Burden of Disease Study 2016. Schizophr Bull. 2018 Oct;44(6):1195–203.

18. Global, regional, and national burden of 12 mental disorders in 204 countries and territories, 1990--2019: a systematic analysis for the Global Burden of Disease Study 2019. The Lancet Psychiatry. 2022 Feb;9(2):137–50.

19. Sassi F. Calculating {QALYs}, comparing {QALY} and {DALY} calculations. Heal Policy Plan. 2006 Jul;21(5):402–8.

20. Anand S, Hanson K, University of Oxford. Institute of Economics and Statistics. Disability-adjusted Life Years: A Critical Review. 1995.

21. National Institute of Mental Health (U.S.). Epidemiologic Catchment Area ({ECA}) Five-site Survey of Mental Disorders, 1980-1985: Household Survey, Wave {I}. 1991.

# Epidemiology of Mental Disorders in India

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## Introduction

Psychiatric epidemiology is the application of principles of epidemiological research to the study of mental disorders with the fundamental aim of understanding and controlling their occurrence. Data from epidemiological studies are critical in planning for the prevention and management of psychiatric conditions. The first epidemiological study of psychiatric conditions was conducted in the early 1960s by Prof. K.C Dube (1) in Agra, which is considered to be a watershed event in Indian psychiatric epidemiology. A number of studies were conducted through the decades that followed. Most of these had relatively small sample sizes, typically of a few thousands. These had other methodological concerns as well. The National Mental Health Survey (NMHS) conducted in 2015-16 is arguably the most comprehensive and methodologically sound epidemiological study with regard to prevalence of mental illnesses and the treatment-gap in India.

In this chapter we review the extant literature regarding epidemiology of psychiatric conditions in India, focusing on the adult population. We first provide a gist of influential reviews and meta-analyses of the epidemiological studies done in late 1990s and early 2000s, which reviewed psychiatric epidemiological studies done in India before the turn of the century. We follow it with a description of studies conducted in the 21st century and a detailed description of the findings from the NMHS, 2015-16 thereafter. We then provide a brief review of epidemiological studies conducted in primary healthcare settings and among specific populations. We end the chapter with discussions on future directions. Several influential longitudinal studies have been conducted in India, particularly focusing on schizophrenia. We have not considered these studies under the scope of this paper.

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## Psychiatric Epidemiological Studies of the 20th century in India:

Wig (2) classified growth of psychiatric research in India into 2 periods – 1947 to 1960 (slow growth due to lack of researchers and clarity) and 1960 to 1972 (a period of many epidemiological studies and surveys and focussed studies). In the period from 1975 up to the turn of the millennium, epidemiological research in India got refined with the use of more refined tools and conduct of incidence and follow up studies. A thorough review by *Math et al* in 2007 included all major Indian epidemiological studies conducted in the field of psychiatry in 20th century (3). The findings of the review are summarised here. Sixteen prevalence studies were included in the review (Table 1). The cross-sectional prevalence rates of mental disorders ranged from 9.5 to 102.8 per thousand adult population across studies. These studies provided important insights into the prevalence of psychiatric conditions in the community. However, they had notable methodological limitations and differences, and the wide variation in the prevalence figures perhaps reflect these. Only a few studies used random sampling method; the rest used house to house survey, a much inferior sampling method. Except one study (1), the sample size in the rest of the studies was less than 6000, which is low by contemporary standards. Most of them had two-step method of identifying the cases - an initial screening, followed by diagnosis by a psychiatrist. The main drawback with this two-step approach was inadequacies in screening (3). It had poor sensitivity in identifying less severe psychiatric illnesses and illnesses presenting with symptoms less known to be associated with psychiatric conditions (e.g., somatization, sexual dysfunction, anxiety disorders including panic disorders and phobias, obsessive compulsive disorder, etc.). Moreover, these had questionable validity in certain populations like persons with substance use, children, and the elderly. There was considerable variation in the screening instruments used (self-rated, observer-rated and based on information from an informant) and the method of defining a 'case' –broad range of definitions used across studies also contributed to the wide variations in the reported prevalence of psychiatric conditions. Also, the range of psychiatric conditions planned to be identified through these studies was limited in comparison to the contemporary understanding.

There were only two incidence studies (4,5), which reported incidence rates of 17.6 and 16 per thousand population per year respectively. Two follow up studies conducted by *Nandi et al* in West Bengal - a ten-year follow up (4) and another, a twenty-year follow up (5) - showed that the prevalence rates were almost similar (84.9 and 81.9 per thousand in the ten-year follow-up study and 116.8 and 105.2 per thousand in the twenty-year follow-up study).

The prevalence rates reported in the Indian studies were far less than those reported elsewhere. For instance, the Epidemiological Catchment Area study conducted in the 1980s in the USA revealed one month prevalence to be 151 per thousand and one-year incidence to be 60 per thousand population (6). The US National Co-morbidity Survey reported the 12-month prevalence to be 277 per thousand population (7). It is not clear whether the low prevalence rates reported in the Indian studies reflected truly low prevalence of psychiatric conditions, or it is

attributable to methodological factors. The conclusion of the review by Math et al (3) was that more multi-centre, prospective and analytical studies using adequate sample size and standardized instruments, with due focus on wider range of disorders, were needed to accurately determine the burden of mental illnesses in India. The authors also expressed the need for more incidence studies. A summary of major Indian psychiatric epidemiological studies included in the review is given in Tables 1 and 2.

A meta-analysis (8) of 13 psychiatric epidemiological studies conducted by Reddy and Chandrashekhar in 1998, consisting of 33,752 individuals yielded a pooled prevalence rate of 58.2 (95% CI: 55.7 – 60.7) per thousand population. The pooled prevalence rate per thousand population for neurotic disorders was 20.7, affective disorders was 12.3, alcohol/drug addiction was 6.9, mental retardation was 6.9 and schizophrenia was 2.7 per thousand population. Another meta-analysis in 2000 by *Ganguli et al.* (9) included 15 studies and showed a prevalence rate of 73 per thousand population. The prevalence of schizophrenia was consistent (2.5 per thousand) in the majority of the studies. Prevalence of psychiatric conditions was overall higher in urban than in the rural setting, with some differences across diagnoses.

**Major Epidemiological Studies Conducted in India in the 21st Century:**

1. World Mental Health (WMH) Survey, 2005 – Findings in India

The WMH survey of 2005 (10) was a multi-site epidemiologic survey carried out in 29 countries using identical methodology. In India, there were eight sites, namely, Faridabad, Lucknow, Bhavnagar, Pune, Chittoor and Tirupati, Pondicherry, Dibrugarh and Imphal. Stratified multistage cluster sampling method was used with probability proportional to size. One adult who was 18 years and older per household was selected randomly and trained lay interviewers used translated versions of the WMH Composite International Diagnostic Interview (CIDI). The disorders assessed in the survey were mood disorders, anxiety disorders and substance use disorders. This was the first survey which assessed 'diagnosable' substance use disorders in a large sample from multiple sites in the country. However, schizophrenia and other non-affective psychoses were not assessed. Sagar et al., (2017) published the findings for adults (n=24,371) in the Indian sites (10). The key findings were:

- 12-month prevalence for any mental or behavioural disorder was 5.5%.
- Anxiety disorders (3.4%) had the highest prevalence, with specific phobia being the most common.
- Mood disorders had a prevalence of 1.4%, depressive episode being the most common. The rate was lowest in the 18–34 years age group, and it increased over subsequent age groups with 50–64 years age group showing highest prevalence.

- For substance use disorders (SUDs), the prevalence was 1.18% for the entire sample and 2.23% for men.

**Table 1: Major Psychiatric epidemiological prevalence studies done in India in 20th century**

| Study | Centre | Sampling method* | Diagnostic Tool(s) | Sample size | Prevalence (per 1000 population) |
|---|---|---|---|---|---|
| Dube (1970) | Agra | House to House Survey | Diagnosis by Psychiatrist(s) | 29,468 | 24 |
| Sethi et al. (1967) | Lucknow | House to House Survey | Questionnaire for assessment of psychiatric state of the family (QAPF) | 1,733 | 73 |
| Elnagar et al. (1971) | Hooghly | House to House Survey | Case History Method and Diagnosis by Psychiatrist(s) | 1,383 | 27 |
| Sethi et al. (1972) | Lucknow | House to House Survey | Case History Method and Case History Questionnaire | 2,691 | 39 |
| Sethi et al. (1974) | Lucknow | Three stage probability sampling | Psychiatric Screening Questionnaire and Diagnosis by Psychiatrist(s) using DSM II | 4,481 | 67 |
| Nandi et al. (1975) | West Bengal | House to House Survey | Household Schedule, Questionnaire Schedule and Case Record Schedule | 1060 | 103 |
| Nandi et al. (1979) | West Bengal | House to House Survey | Household Schedule, Socioeconomic Schedule, Case Record Schedule and Case Detection Schedule | 3,718 | 102 |
| Shah et al. (1980) | Ahmedabad | House to House Survey | Mental Health Screening Questionnaire (MHSQ) and Diagnosis by Psychiatrist(s) | 2,712 | 47 |
| Mehta et al. (1985) | Tamil Nadu | Systematic Random Sampling | Indian Psychiatric Survey Schedule (IPSS) and Diagnosis by Psychiatrist(s) | 5,941 | 14.5 |
| Shaji et al. (1995) | Ernakulam | House to House Survey | Indian Psychiatric Survey Schedule (IPSS) and Diagnosis by Psychiatrist(s) using ICD-10 | 5,284 | 14.5 |

* Dube (1970) had mixed rural and urban sample; Sethi et al., (1967) had urban sample. All others had rural samples.

**Table 2: Major Psychiatric epidemiological incidence studies done in India in 20th century**

| Study by | Year | Centre | Sampling method | Tool(s) used | Sample size | Incidence (per 1000 population per year) |
|---|---|---|---|---|---|---|
| Nandi et al. | 1972-73 | West Bengal | House to house survey | Household Schedule, Questionnaire Schedule and Case Detection Schedule | 1060 in 1972 and 1078 in 1973 | 17.6 |
| Nandi et al. | 1972-23 | West Bengal | House to house survey | Household Schedule, Case Detection Schedule, Case Record Schedule | 2230 in 1972 and 2250 in 1973 | 16 |

The survey assessed services received by individuals having mental illness – any form of services including mental health professionals, general health professionals, religious counselors, and traditional healers was considered (11). Treatment gap (percentage of individuals having mental illness and not accessing the services) was a staggering 95%. The prevalence was significantly lower in the Indian centers than in the other countries, which were part of this survey. The reasons attributed were, under-reporting due to prevalent stigma and shame in the Indian setting, along with inability of instrument to capture 'somatic depression' which is highly prevalent in India.

2. The Pune Study – 2012

Deswal and Pawar (2012) (12) estimated the prevalence of mental illnesses in Pune city. Trained interviewers interviewed 3023 adult respondents (selected through stratified multistage systemic sampling scheme with probability proportion to size (PPS) measures) using the WHO-Composite International Diagnostic Interview (CIDI 3.0). They reported lifetime and 12-month prevalence of 5.03% and 3.18% for any mental illness; depression (3.14% and 1.75%) and substance use disorders (1.39% and 0.99%) were the commonest conditions. Small sample size was an important drawback of this study, exemplified by the fact that there was no respondent with a diagnosis of psychosis or bipolar disorder in their sample.

3. The Suttur study - 2014

An exploratory epidemiological study involving door to door interviews was conducted by *Rao et al.* in 2014 (13) in Suttur village, near Mysore. A team comprising of a psychiatrist, a postgraduate student and three trained social workers administered the Mini International Neuro-Psychiatric Interview (MINI). 3,033 individuals belonging to all age groups were interviewed. About 25% were found to have mental illness, with depressive disorders accounting for 15% and alcohol dependence, 4%; dementia had a prevalence of 0.9%. The prevalence of mental illnesses was in line with western epidemiological study results. Authors attributed this to the use of the MINI instead of screening instruments and interviewing of whole population by trained staff. However, small sample size is an important drawback of this study. For instance, the prevalence figures for adult population were as high as 50% and 58% respectively for age groups 61-65 and 65-70 years of age. 95% CIs were not provided. As the sample size was small, the 95% CIs are likely to be broad. Thus, the figures provided may not accurately reflect the exact prevalence of psychiatric conditions.

4. Indian National Sample Survey Organization (NSSO) 2018 report (14)

It was conducted to estimate indicators of incidence and prevalence of disability. The team surveyed 1,18,152 households and 5,76,569 persons across the urban and rural parts of India. With the help of three questions to screen persons with disability due to mental illness, the survey reported cross-sectional prevalence of about 1 in 1000. Critical methodological considerations including the sensitivity of the questions to identify persons with mental illness and the rigor of training imparted to the surveyors preclude any firm interpretations of the findings of this survey.

5. The National Mental Health Survey (NMHS), 2015-16 – A milestone in Indian Psychiatric Epidemiology

The NMHS (15) was a large-scale multi-centered national study on the prevalence of mental disorders. It was carried out in 12 states (two in each of the six regions) namely – Punjab and Uttar Pradesh (North), Kerala and Tamil Nadu (South), Rajasthan and Gujarat (West), Jharkhand and West Bengal (East), Madhya Pradesh and Chhattisgarh (Central) and Assam and Manipur (Northeast). The master protocol was drafted on the basis of a pilot study in Kolar district of Karnataka. The methodology involved multi-stage, stratified, random cluster sampling, based on probability proportionate to size at each stage. All individuals >18 years of age in the selected households were interviewed. Ten instruments, including the M.I.N.I 6.0 were used in the survey. Field Data Collectors (FDCs) underwent rigorous training spanning over 8 weeks which included classroom sessions, observatory activities in hospital, training in the community (both supervised and independent) and data collection training. FDCs conducted interviews in the selected households using hand-held devices to capture data. About 200 online meetings were also held during the course of the survey to rectify any errors in data received. Lifetime and current

prevalence rates for mental disorders were derived from conditions described in International Classification of Diseases, 10th revision, Diagnostic Criteria for Research (ICD-10-DCR). Common Mental Disorders (CMDs), including depressive disorders and anxiety disorders (generalized anxiety disorder, agoraphobia, social phobia, panic disorder, obsessive-compulsive disorder, and posttraumatic stress disorder) were included. A total of 39,532 individuals from 720 clusters of 80 talukas in 43 districts of the 12 selected states were interviewed; the characteristics of the sample interviewed were similar to state population characteristics as per Census 2011. The findings of the survey were (tables 3 and 4):

- As per the MINI, lifetime prevalence was calculated for some, and both current and lifetime prevalence was calculated for the others. The overall lifetime and current prevalence of any mental illness were respectively 13.7% and 10.6% (excluding tobacco use disorder). Prevalence of mental disorders was higher among individuals residing in urban metros and having low income.
- The prevalence of substance use disorders was maximum in the 50-59 years age group, whereas all other major mental illnesses (psychotic disorder, bipolar affective disorder, depressive disorder and neurotic and stress related disorder) were seen maximum in 40-49 years age group. There was a striking gender difference in the prevalence of alcohol use disorders, with men and women having prevalence of 9.1% and 0.5% respectively.
- The lifetime prevalence for CMDs was 5.1%. Lifetime prevalence for psychotic disorders was almost similar among men (1.5%) and women (1.3%). Prevalence of bipolar disorders was also more among men (0.6%) than among women (0.4%). There was a slight female predominance for depressive disorders and for neurotic and stress related disorders.

Treatment gap, i.e., the percentage of individuals with a mental illness who were not receiving any treatment for the same, ranged between 70% to 92% for different mental disorders according to NMHS, 2016 (Table 4). Recent studies (16) have shown that training Accredited Social Health Activists (ASHAs) and other Community Health Workers (CHWs) in identification and referring individuals with possible mental illness can help bridge this wide treatment gap.

The NMHS was conducted using contemporary standards of epidemiological studies and the findings, thus, have notable public health significance. However, a few limitations of the NMHS are worth noting. Re-interview agreement (Kappa, a measure of reliability) in the NMHS was 0.52, which is only moderate. Moreover, diagnosis-wise data regarding reliability of has not been provided; hence, the reliability across diagnoses is unknown.

**Table 3: Prevalence of different mental disorders according to NMHS 2015-16**

| Diagnosis | Lifetime prevalence (%) | Current prevalence (%) |
|---|---|---|
| Mental and behavioural problems due to psychoactive substance use | 22.4 (lifetime) | |
| Alcohol Use Disorder | 4.7 | |
| Tobacco Use Disorder | 20.9 | |
| Schizophrenia and other psychotic disorders | 1.4 | 0.4 |
| Mood (Affective disorders) | 5.6 | 2.8 |
| Bipolar Affective Disorder | 0.5 | 0.3 |
| Depressive disorder | 5.3 | 2.7 |
| Neurotic and stress related disorders | 3.7 | 3.5 |
| Phobic anxiety disorders | 1.9 (lifetime) | |
| Other anxiety disorders | 1.3 | 1.2 |
| Obsessive Compulsive Disorder | 0.8 | |
| Post Traumatic Stress Disorder | 0.2 | |

**Table 4: Treatment gap for different mental disorders according to NMHS, 2015-16**

| Mental disorder | Treatment Gap (%) |
|---|---|
| Common mental disorders | 85.0 |
| Severe mental disorders | 73.6 |
| Psychosis | 75.5 |
| Bipolar affective disorder | 70.4 |
| Alcohol use disorder | 86.3 |
| Tobacco use disorder | 91.8 |

## Studies conducted on specific mental disorders in India:

1. Schizophrenia and other psychotic disorders (Table 5)

- The ICMR multi-centric study (1987) (17)

It had 4 centres – Calcutta, Patiala, Bangalore, and Baroda. The cross-sectional prevalence per thousand population varied from 1.77 to 3.09. This was immediately followed by ICMR functional psychosis project (1988) (18) which was the largest community-based survey for identifying schizophrenia. Door to door surveys were carried out in two catchment areas in Madras and more than 1 lakh population was screened, which revealed a prevalence of 2.49 per thousand population.

Prevalence figures from these studies are largely comparable to the figure of 4 per thousand population found in the NMHS. Saha et al (2005) (19) systematically reviewed the prevalence of schizophrenia across 188 studies and found a median point prevalence of 4.6 per thousand with a 10% - 90% quantile range of 1.9 – 10. The prevalence figures for Indian studies fall at the lower range of the latter, and hence, not substantially different from the rest of the world. Table 6 summarizes the incidence studies for schizophrenia conducted in India. Both studies indicate an annual incidence of about 3.6 – 4.4 per 10,000 population.

- Chandigarh Acute Psychosis Study (CAPS) (22)

WHO conducted study on acute psychosis at 11 sites across the world, known as "Cross-cultural study of Acute Psychosis". Chandigarh was one of the sites for the study. Two samples (urban and rural) of patients were included over the course of 12 months (1981-1982) after screening by a psychiatrist. The inclusion criteria included – age between 15 and 60 years, acute onset of illness (1 week or less), non-organic psychosis and treatment naïve. A total of 109 (57 rural and 52 urban) patients were included in the study. Present State Examination (PSE) was administered by a trained psychiatrist, followed by assessment using Schedule for Clinical Assessment of Acute Psychotic States (SCAAPS). A provisional diagnosis was given according to ICD-9 for all patients. SCAAPS was applied again at 3 months and 12 months of follow up.

Complete follow-up was done for 91 out of 109 patients who were included in the final assessment. The overall prognosis of illness was good, with 64 (70 %) patients achieving full remission. 13 (14 %) patients had a relapse during the follow up period and only 9 (10%) patients did not achieve remission at 12 months of follow up. There were no significant differences in both genders and in urban and rural population. Majority of patients (71%) had no social and functional impairment after 12 months, which signifies an overall favorable prognosis and short course in acute and transient psychosis.

2. Depression

Several studies have estimated the prevalence of depression among specific groups of respondents (e.g., postpartum women; elderly population) in India. Poongothai et al (24) estimated the prevalence of depression in the general population in 25,455 adults selected using systematic random sampling using the Patient Health Questionnaire (PHQ-12). Age-adjusted cross-sectional prevalence was 15.9% with a slight female preponderance. The use of self-report method of identifying depression may partly explain this unusually high prevalence figure.

**Table 5: Major prevalence studies for schizophrenia done in India**

| Study and Year | Centre | Sampling method | Study method and instrument(s) used | Study Population | Cross-sectional Prevalence (per thousand population) |
|---|---|---|---|---|---|
| ICMR multi-centric study (1987) | Calcutta-rural | Two stage sampling, screening followed by confirmation by psychiatrist | | 34,582 | 2.05 |
| | Patiala-rural | | | 36,595 | 3.09 |
| | Bangalore-rural | | | 35,548 | 1.83 |
| | Baroda-rural | | | 39,655 | 1.77 |
| Padmavati et al - ICMR Functional Psychosis Project (1988) | Madras – urban | Door to door survey | Screening by field workers using Indian Psychiatric Survey Schedule (IPSS), followed by confirmation by psychiatrist using Present Status Examination (PSE) | 1,01,229 | 2.49 |

**Table 6: Incidence studies for schizophrenia in India**

| Study and Year | Centre | Sampling method | Study method and instrument(s) used | Study Population | Incidence: (per 1000 / year) |
|---|---|---|---|---|---|
| Determinants of Outcome of Severe Mental Disorders (DOSMeD) | Chandigarh – rural and urban | 1. First-in-lifetime contact with health agencies<br>2. Case-to-case method (enquiring from index case/family about other potential cases in the catchment area)<br>3. Key informant method (enquiring from community leaders) | Screening by WHO Screening Schedule, followed by confirmation by two psychiatrists using Present Status Examination (PSE) | Rural – 1,03,865<br>Urban – 3,48,609 | Rural – 0.44<br>Urban – 0.38 |
| Rajkumar et al. (23) | Madras Urban Area | Door to door survey + "Leakage study" (scrutiny of records of mental health facilities and repeated contacts with medical & alternative medicine practitioners and psychiatrists | Screening by field workers using Indian Psychiatric Survey Schedule (IPSS), followed by confirmation by psychiatrist using Present Status Examination (PSE) | 25,661 adults in the risk age group | 0.35 |

## Prevalence of psychiatric disorders in primary care settings

Many patients with psychiatric conditions (with or without comorbid physical conditions) consult primary healthcare services. Studies summarized in Table 7 have shown a prevalence of 11.8% to 46.5% for CMDs. The figures suggest that about a third to about half of the patients that attend the PHCs suffer from at least one psychiatric condition. This is largely undetected and untreated. Psychiatric conditions contribute much to disability, the burden of disease and poor quality of life. A recent meta-analysis by Fekadu et al. (2022) (25) assessed under reporting of depression in primary care settings in LMICs and concluded that there is massive under detection (>90%) and there is a need to integrate mental healthcare into primary healthcare services by training physicians, PHC staff and developing effective instruments for screening and identification. Patients attending PHCs with any clinical concern provide the medical systems with opportunity to identify and treat these conditions with least concerns about stigma attached to psychiatric conditions. The figures presented in this review highlight the need for improving the skills of primary health care staff in identifying and treating psychiatric conditions. In this context, it may be noted that Clinical Schedules for Primary Care Psychiatry (PCP) (26) was validated for use by Primary Care Doctors (PCDs) in identifying and treating mental disorders in primary care.

## Prevalence of psychiatric disorders in specific groups of individuals:

1. Post-partum women

The current literature suggests that prevalence of post-partum depression is high, particularly in Low- and Middle-Income Countries (LMICs). In a recent meta-analysis by Upadhyay et al (2017)(34), 38 studies done in India having a total sample of 20,043 women were included. The pooled prevalence of post-partum depression was 22%, meaning one in about five Indian women has depression after delivery.

The risk factors attributed were financial difficulties, past history of psychiatric illness in mother, domestic violence and lack of family support.

In another study done by Lanjewar (2021)(35), prevalence of post-partum depression was assessed in 240 new mothers (up to 6 weeks of delivery) belonging to urban milieu (Pune, Maharashtra). A cross-sectional, hospital-based cross-sectional design was used, and Marathi version of Edinburgh Post-partum Depression scale (EPDS) was administered. 63 (26%) new mothers scored more than or equal to 13 on EPDS and were categorized as having postpartum depression.

Table 7: Prevalence of psychiatric disorders in primary care settings

| Study | Sample size | Instruments used | Mental illness(es) assessed | Prevalence |
|---|---|---|---|---|
| Harding et al. (1980) – Raipur Rani (27) | 361 | Initial screening using Self-Report Questionnaire (SRQ) followed by confirming diagnosis using Present Status Examination (PSE) | CMDs | 17.7% |
| Seshadri et al. (1988) – Sakalwara (28) | 573 | Screening using WHO SEARO instrument | CMDs | 11.8% |
| Channabasavanna et al. (1995) – Jigani (29) | 1374 | Initial screening using General Health Questionnaire -12 (GHQ-12), confirmation by Composite International Diagnostic Interview (CIDI) and ICD 10 | CMDs | 23.9% |
| Patel et al. (1998) – Panjim (30) | 303 | Clinical Interview Schedule-Revised (CIS-R) | CMDs | 46.5% |
| Pothen et al. (2003) – Vellore (31) | 327 | Clinical Interview Schedule-Revised (CIS-R), ICD 10 | CMDs | 33.9% |
| Bodke et al. (2014) – 9 PHCs in Rural Maharasthra (32) | 500 | Detailed history, Mental Status Examination and DSM IV | Psychiatric morbidity (neurosis, psychosis, alcoholism, epilepsy, MR) | 42.4 % |
| Pal et al. (2018)- Gujarat (33) | 335 males | Screening using PHQ-9 followed by confirmation of diagnosis by a psychiatrist using DSM IV TR | Major Depressive Disorder | 12.5% |
| Kulkarni et al (2019) (26) | 180 | Semi-structured interview by a psychiatrist and confirmation by ICD 10 | Severe Mental Disorders (SMDs), Common Mental Disorders (CMDs) and substance use disorders (SUDs) | 43.9 % |

Considering the high prevalence, more robust research needs to be done in the area. Post partum psychiatric issues including psychosis and depression should be addressed in National Programmes, as both mother and child health is affected by these illnesses.

2. Tribal population:

*Verma et al* (36) conducted a systematic review of prevalence studies of psychiatric conditions in tribal population in India. They reviewed eleven studies. Seven of these estimated the prevalence of alcohol use disorder, revealing a pooled cross-sectional prevalence of almost 40%, which is manifold higher than seen in other populations. Two studies reported lifetime prevalence of suicidal attempts to be 22% and 14.2%, significantly higher than in the general population. The high prevalence rates were attributed to poor living conditions, low socioeconomic status, discrimination by others and poor help seeking behavior among tribals. The authors concluded that there is a need for more research focusing on all psychiatric illnesses in indigenous tribal population of India and also stressed on the need of research focused on particularly vulnerable tribal groups (PVTG).

3. Transgender Population:

A cross sectional study done by *Sartaj et al* (37) on 50 individuals belonging to *Hijra* community revealed high rates of substance use disorders (46% for tobacco and 25% for alcohol) and other mental illnesses. Another worrying finding was that only 4% individuals of *Hijra* community with a diagnosable lifetime mental illness seek treatment. Another study done on *Hijras* by *Kalra et al* (2013) (38) showed a prevalence of 48% for alcohol use disorders and depressive disorders and 84% met criteria for gender identity disorder according to DSM IV TR, in addition to very low help seeking behavior (<5%). These findings can be attributed to poor self and social acceptance, discrimination by family and society, stigma and presence of co-morbid Sexually Transmitted Diseases (STDs) like HIV.

## Future Directions – Numbers, and Beyond

Important epidemiological research is in the pipeline in India. The National Megacity Survey is underway to study the prevalence and correlates of psychiatric disorders in six mega cities across India, including Delhi, Kolkata, Mumbai, Chennai, Hyderabad, and Bengaluru. The results of this are expected in the near future. In the National Mental Health Survey, Part-2 (NMHS-2), every state and union territory will be sampled (vis-à-vis 12 states surveyed in the NMHS-1). Moreover, its scope would be widened to include contemporary issues like the effects of disasters and climate change on the mental health of the population. Assessment of systems is also being broadened to study them comprehensively.

Substantial amount of research conducted by Indian researchers in psychiatric epidemiology has focused on estimating the prevalence and incidence of psychiatric conditions. The numbers have varied substantially, but it is reasonable to surmise that the number of individuals with psychiatric conditions is in tens of crores. It is not just that the numbers are high. The Global Burden of Diseases study estimates that psychiatric conditions contribute to as high as about 5% of the total disability-adjusted life years (DALYs) in India (39). We believe that it is time that research in mental illness should go beyond counting numbers.

Estimates of treatment gap are high. Treatment gap is a complex issue, which needs to be studied using more nuanced studies. Increasing human resources may appear an obvious solution to reduce the treatment gap. However, there is need for epidemiological research to study this aspect because of several reasons: (1) The District Mental Health Program is now operational in about 90% of the districts of India. There is a significant increase in the number of mental health professionals also. Substantial efforts are being made to train non-mental health professionals in delivering mental health care. For example, certificate courses and diplomas are being run through programmes like the NIMHANS Digital Academy (40) and Karnataka Telemedicine Mentoring and Monitoring Programme (41). The National Tele Mental Health Program (Tele MANAS) is launched and operational since October 2022. However, little is known whether this has reduced the effective treatment gap. (2) 'Demand side' of the treatment gap is poorly studied. Several questions need to be answered: (a) What constitutes an effective treatment for which condition? (b) How effective are interventions which individuals with mental illnesses are known to receive but which are not considered as modern mental healthcare (e.g., faith healing, complementary and alternative medical systems)? (c) To what extent modern mental healthcare is acceptable in different communities?

While research on these has potential to find solutions to address the issue of mental illnesses, epidemiology has larger role to play by investigating methods of promotion of mental health and prevention of mental illness. We end this chapter by expressing optimism that researchers in India would go beyond counting numbers and contribute substantially to the improving the mental health of citizens of this country. Box 1 highlights the suggested directions of future work.

Box 1: Future Directions for Epidemiological Studies in India:

Studies examining the following are imperative in the near future:

- Effect of DMHP on treatment gap (both contact and effective coverage of treatment)
- Impact of training of different cadres of healthcare staff on outcomes like:
    - Mental health literacy in rural and urban communities
    - Reduction of treatment gap
    - Distress, absenteeism and disability associated with mental health conditions
    - Stigma and discrimination against persons with mental illnesses
    - Utilization of disability-related welfare benefits by persons with disability due to mental illnesses
- 'Demand side' challenges for mental healthcare including perceived need of the target populations and acceptability, feasibility and sustainability of mental health interventions
- Utilization pattern of traditional, complementary and alternative forms of treatments by persons with mental illness and its impact
- Public health methods of prevention of mental health conditions such as substance use / behavioral addictions
- Effectiveness of targeted interventions addressing vulnerable populations
- Effect of mental health promotional activities on resilience and wellbeing of populations

Take home points:

- There is rich history of conducting epidemiological studies of mental illnesses in India
- Prevalence of mental illnesses reported in these studies have varied substantially
- There are methodological variations across studies. Hence, it is hard to attribute the variations to be reflective of true variations in the population
- The National Mental Health Survey of 2015-16, conducted using the most contemporary standards, reports a substantial burden of 13.7% and 10.6% lifetime and current prevalence of all mental illnesses (excluding tobacco use disorders)
- The National Megacity Survey and the National Mental Health Survey, Part-2 (NMHS-2) are likely to contribute much to our knowledge about prevalence of mental illnesses across different cities and states.
- There is need for epidemiological studies to move beyond counting numbers to investigate public health programmes of providing care and preventing mental illnesses

## References:


1. Dube KC. A study of prevalence and biosocial variables in mental illness in a rural and an urban community in Uttar Pradesh--India. Acta Psychiatr Scand. 1970;46(4):327–59.
2. NN WIG, S AKHTAR. TWENTY-FIVE YEARS OF PSYCHIATRIC RESEARCH IN INDIA/1. Indian Journal of Psychiatry. 1974 Mar; 16:48–64.
3. Math SB, Chandrashekar CR, Bhugra D. Psychiatric epidemiology in India. Indian J Med Res. 2007 Sep;126(3):183–92.
4. Nandi DN, Ajmany S, Ganguli H. Psychiatric disorders in a rural community in West Bengal: an epidemiological study. Indian Journal of Psychiatry. 1975; 17:87–99.
5. Nandi DN, Banerjee G, Boral GC, Ganguli H, Ajmany (Sachdev) S, Ghosh A, et al. Socio-economic status and prevalence of mental disorders in certain rural communities in India. Acta Psychiatr Scand. 1979 Mar;59(3):276–93.
6. Regier DA, Farmer ME, Rae DS, Locke BZ, Keith SJ, Judd LL, et al. Comorbidity of mental disorders with alcohol and other drug abuse. Results from the Epidemiologic Catchment Area (ECA) Study. JAMA. 1990 Nov 21;264(19):2511–8.
7. Kessler RC, Anthony JC, Blazer DG, Bromet E, Eaton WW, Kendler K, et al. The US National Comorbidity Survey: overview and future directions. Epidemiol Psichiatr Soc. 1997;6(1):4–16.
8. Reddy VM, Chandrashekar CR. Prevalence of mental and behavioural disorders in India: a meta-analysis. Indian J Psychiatry. 1998 Apr;40(2):149–57.
9. Ganguli HC. Epidemiological findings on prevalence of mental disorders in India. Indian J Psychiatry. 2000 Jan;42(1):14–20.
10. Sagar R, Pattanayak RD, Chandrasekaran R, Chaudhury PK, Deswal BS, Lenin Singh RK, et al. Twelve-month prevalence and treatment gap for common mental disorders: Findings from a large-scale epidemiological survey in India. Indian J Psychiatry. 2017;59(1):46–55.
11. Wang PS, Aguilar-Gaxiola S, Alonso J, Angermeyer MC, Borges G, Bromet EJ, et al. Use of mental health services for anxiety, mood, and substance disorders in 17 countries in the WHO world mental health surveys. Lancet. 2007 Sep 8;370(9590):841–50.
12. Deswal BS, Pawar A. An epidemiological study of mental disorders at pune, maharashtra. Indian J Community Med. 2012 Apr;37(2):116–21.
13. Sathyanarayana Rao TS, Darshan MS, Tandon A, Raman R, Karthik KN, Saraswathi N, et al. Suttur study: An epidemiological study of psychiatric disorders in south Indian rural population. Indian J Psychiatry. 2014 Jul;56(3):238–45.
14. Persons with Disabilities in India: NSS 76th round (July-December 2018) [Internet]. Available from: https://ruralindiaonline.org/en/library/resource/persons-with-disabilities-in-india-nss-76th-round-july-december-2018/
15. Murthy RS. National Mental Health Survey of India 2015-2016. Indian J Psychiatry. 2017;59(1):21–6.
16. Gakkhar S. Reducing the Treatment Gap for Psychiatric Disorders – The Role of Accredited Social Health Activists in South India. World Soc Psychiatry. 2023 Apr 26;5(1):63–70.

17. ICMR. Collaborative study on severe mental morbidity report. Indian Council of Medical Research and Department of Science and Technology. 1987.
18. Padmavathi R, Rajkumar S, Kumar N, Manoharan A, Kamath S. Prevalence of schizophrenia in an urban community in madras. Indian J Psychiatry. 1988 Jul;30(3):233–9.
19. Saha S, Chant D, Welham J, McGrath J. A systematic review of the prevalence of schizophrenia. PLoS Med. 2005 May;2(5): e141.
20. Thara R, Henrietta M, Joseph A, Rajkumar S, Eaton WW. Ten-year course of schizophrenia--the Madras longitudinal study. Acta Psychiatr Scand. 1994 Nov;90(5):329–36.
21. Rangaswamy T. Twenty-five years of schizophrenia: The Madras longitudinal study. Indian J Psychiatry. 2012 Apr;54(2):134–7.
22. Varma VK, Malhotra S, Yoo ES, Jiloha RC, Finnerty MT, Susser E. Course and outcome of acute non-organic psychotic states in India. Psychiatr Q. 1996;67(3):195–207.
23. Rajkumar S, Padmavathi R, Thara R, Menon MS. Incidence of schizophrenia in an urban community in madras. Indian J Psychiatry. 1993 Jan;35(1):18–21.
24. Poongothai S, Pradeepa R, Ganesan A, Mohan V. Prevalence of depression in a large urban South Indian population--the Chennai Urban Rural Epidemiology Study (CURES-70). PLoS One. 2009 Sep 28;4(9): e7185.
25. Fekadu A, Demissie M, Birhane R, Medhin G, Bitew T, Hailemariam M, et al. Under detection of depression in primary care settings in low and middle-income countries: a systematic review and meta-analysis. Syst Rev. 2022 Feb 5;11(1):21.
26. Kulkarni K, Adarsha AM, Parthasarathy R, Philip M, Shashidhara HN, Vinay B, et al. Concurrent Validity and Interrater Reliability of the "Clinical Schedules for Primary Care Psychiatry." J Neurosci Rural Pract. 2019 Jul;10(3):483–8.
27. Harding TW, de Arango MV, Baltazar J, Climent CE, Ibrahim HH, Ladrido-Ignacio L, et al. Mental disorders in primary health care: a study of their frequency and diagnosis in four developing countries. Psychol Med. 1980 May;10(2):231–41.
28. Seshadri Shekhar. Patients Presenting with Multiple Somatic Complaints to a Rural Health Clinic (Sakalawara) - A Preliminary Report. NIMHANS journal. 1988 Jan;6(1):13–7.
29. Channabasavanna TS. Mental Illness in General Health Care. An International Study. 1995.
30. Patel V, Pereira J, Mann AH. Somatic and psychological models of common mental disorder in primary care in India. Psychol Med. 1998 Jan;28(1):135–43.
31. Pothen M, Kuruvilla A, Philip K, Joseph A, Jacob KS. Common mental disorders among primary care attenders in Vellore, South India: nature, prevalence and risk factors. Int J Soc Psychiatry. 2003 Jun;49(2):119–25.
32. Bodke Pradeep. Prevalence of psychiatric illness in rural Maharashtra. 2014 Mar 25; Available from: https://www.medpulse.in/Article/Volume1Issue3/MedPulse_1_3_12.pdf
33. Pal S. Recognition of major depressive disorder and its correlates among adult male patients in primary care. Archives of Psychiatry and Psychotherapy. 2018;55–62.

34. Upadhyay RP, Chowdhury R, Aslyeh Salehi, Sarkar K, Singh SK, Sinha B, et al. Postpartum depression in India: a systematic review and meta-analysis. Bull World Health Organ. 2017 Oct 1;95(10):706-717C.
35. Lanjewar S, Nimkar S, Jungari S. Depressed Motherhood: Prevalence and Covariates of Maternal Postpartum Depression among Urban Mothers in India. Asian Journal of Psychiatry. 2021 Mar; 57:102567.
36. Verma P, Sahoo KC, Mahapatra P, Kaur H, Pati S. A systematic review of community-based studies on mental health issues among tribal populations in India. Indian J Med Res. 2022 Aug;156(2):291–8.
37. Sartaj D, Krishnan V, Rao R, Ambekar A, Dhingra N, Sharan P. Mental illnesses and related vulnerabilities in the Hijra community: A cross-sectional study from India. Int J Soc Psychiatry. 2021 May;67(3):290–7.
38. Kalra G, Nilesh Shah. The Cultural, Psychiatric, and Sexuality Aspects of Hijras in India. International Journal of Transgenderism. 2013 Oct;171–81.
39. India State-Level Disease Burden Initiative Mental Disorders Collaborators. The burden of mental disorders across the states of India: The Global Burden of Disease Study 1990-2017. Lancet Psychiatry. 2020 Feb;7(2):148–61.
40. NIMHANS DIGITAL ACADEMY(NDA) [Internet]. [cited 2023 May 19]. Home. Available from: https://nda.nimhans.ac.in/
41. Manjunatha N, Parthasarathy R, Paul DR, Basavaraju V, Shashidhara HN, Binukumar B, et al. Karnataka telemedicine mentoring and monitoring program for complete integration of psychiatry in the general health care. Indian J Psychiatry. 2021;63(2):171–4.

# Epidemiology of substance use in India

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## Introduction

Substance use has been a part of Indian culture since ancient times. Terms related to the use of alcohol, cannabis and other substances have been mentioned in scriptures like the *Rigveda*, *Atharva Veda* (1700 – 1100 BC) etc. Indigenous communities have been brewing and using alcohol since ages. Cannabis has been used in the form of *bhang* or *ganja*, especially during festivals which is still prevalent in many parts of the country [1]. Opium cultivation and use has been recorded as early as by 14th century in India. Its ritualistic use as a drink offered to welcome guests and as a household remedy for common ailments is a known practice in some parts of the country [2]. Tobacco is believed to have been introduced in India by Portuguese traders during 1600s and its use has continued through smoking and chewing routes since then [3]. Various facets of the Indian culture have been going through changes over time; parallelly there are changes in the pattern and magnitude of substance use in India as well. Substances once popular, do not enjoy the same status now, which, along with changing lifestyle, has also led to use of newer drugs consumed in newer patterns and contexts.

Addressing addictive disorders in India has numerous obstacles, including a lack of awareness and stigma, limited access to prevention and treatment services, weak regulatory frameworks and enforcement, and socioeconomic barriers and cultural complexities. To add to these, studying the epidemiology of substance use in India presents a particularly complex and challenging scenario, given the large size of the

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country, diverse population in terms of geographical, socioeconomic and cultural factors, and inadequate infrastructure and resources. To address these obstacles and challenges, the policy makers and service provides must have access to reliable and credible information on the distribution, magnitude and determinants of substance use in the country. This chapter provides a comprehensive overview of key epidemiological studies that contribute to our understanding of substance use in India.

## 1. Methodological Challenges in the Estimation of Substance Use

Epidemiology is a necessary discipline that investigates diseases' extent, distribution, and determinants within specific geographic areas. However, when examining substance use, the associated social stigma and marginalisation of people who use psychoactive substances pose unique challenges that conventional epidemiological methods struggle to address adequately. Substance use is a pervasive public health and welfare issue, and its accurate estimation remains a formidable challenge due to various methodological complexities. These range from complexities related to study design and data collection issues to ethical considerations and cultural contexts.

The first set of challenges relates to the study design. Substance use is a dynamic phenomenon, influenced by various demographic, socioeconomic, cultural, and environmental factors. Therefore, a cross-sectional study design while capturing the extent of the problem at a given time point, loses its relevance and utility eventually. Longitudinal studies, while providing a more accurate depiction of substance use patterns, are resource-intensive and may be influenced by factors such as attrition bias. Periodic, regular cross-sectional studies are an alternative which allows comparisons across time periods and drawing inferences about the trends.

Moreover, defining what constitutes substance ‘use’ or ‘misuse’ can be challenging. Different studies may employ different definitions, making cross-study comparisons difficult. For instance, one study might define "regular use" as use of the substance every day, while another might define it as “use at least once a week over a period of time”. Similarly, the definition of misuse or addiction might differ across studies, leading to differing prevalence estimates.

Data collection poses another set of challenges. Self-report surveys, the most common data collection method, are fraught with issues of reliability and validity. Respondents may underreport or overreport their substance use due to social desirability or recall bias. For instance, the most popular epidemiological method is a household, general-population survey. Usually, these are done by conducting interviews with a sample of individuals drawn by the probability sampling methods such as simple, systematic, or stratified random sampling for adequate population representation. However, household surveys are marred by the challenge of gross underreporting

and thus underestimating the problem. Those who engage in stigmatised, illegal activities often hesitate to participate in research due to fear of further stigmatisation or even possible legal repercussions. To overcome these obstacles, alternative methodologies must also be employed to study substance use and related behaviours. Non-probability sampling methods, like the snowball method or Respondent Driven Sampling (RDS), can be utilised as viable alternatives, which are particularly useful in the epidemiology of illicit drug use. These methods offer advantages such as access to hidden populations and cost-effectiveness[4]. However, it is important to acknowledge that these methods also have inherent limitations, including potential biases and challenges in generalising findings to the broader population. Nevertheless, they do provide valuable insights into the complex phenomenon of substance use. Thus, a combination of approaches – a general population household survey along with indirect methods of estimation – may help generate a more comprehensive and credible picture of substance use in the locality.

Another source of complexity is the use of different questionnaires or data collection tools across studies which can lead to variability in estimates. For example, the Alcohol Use Disorders Identification Test (AUDIT) might yield different prevalence estimates for alcohol dependence than the CAGE questionnaire, even within the same population. Sampling bias is another challenge in estimating substance use. Studies often rely on convenience samples or select populations, such as school students or hospital patients, which may not represent the broader population accurately. Additionally, certain high-risk populations, such as homeless individuals or incarcerated populations, may be underrepresented in surveys due to difficulties in access.

Ethical considerations pose further challenges in the estimation of substance use. It is essential to study substance use with sensitivity and ethical considerations. Safeguarding participant confidentiality and anonymity is paramount, particularly given the potential legal and social consequences faced by individuals involved in substance use. Interviewers must ensure anonymity and confidentiality to encourage honest reporting, but this can be difficult in settings where substance use is heavily stigmatised or criminalised. Furthermore, obtaining informed consent can be problematic in certain populations, such as minors or individuals with severe substance use disorders. Establishing trust and fostering rapport with participants are critical for successful data collection. Through innovative methodologies, epidemiologists can contribute to a deeper comprehension of substance use and inform the formulation of evidence-based interventions and policies.

Cultural contexts also play a critical role in the estimation of substance use. The acceptability and perceptions of substance use vary widely across cultures, influencing both the patterns of use and the willingness to report use. For instance, in cultures where alcohol use is socially acceptable,

prevalence estimates might be higher due to higher actual use and a greater willingness to report use. India's diverse socioeconomic and cultural landscape presents unique challenges in addressing addictive disorders. Cultural acceptance of substance use, especially alcohol and tobacco, in some communities, may report the problem accurately while, at the same time, it is discouraged in many cultures resulting in underestimation.

In addition to quantitative approaches, qualitative methods can play a vital, supplemental role in the assessment of substance use. These studies provide detailed and in-depth information about experiences, motivations, and social contexts related to substance use. While qualitative studies do not seek to provide quantitative estimates of the issue, they offer invaluable insights into the societal and cultural factors that shape substance use patterns [5]. Thus, qualitative approaches help us 'make sense of' the findings generated by the quantitative studies. Such studies can be conducted on a sub-sample of the larger, quantitative survey.

Lastly, the ever-evolving landscape of substance use poses other unique challenges. With the emergence of new substances and changing patterns of use, traditional estimation methods might not capture the true extent of the problem. For instance, the recent rise in the use of e-cigarettes and vaping, especially among youth, has prompted researchers to adapt their methodologies to accurately capture this new trend (since it is no longer enough to ask the respondents only about their 'tobacco' use). Similarly, novel, synthetic products are entering the illicit drug market; an inadequately informed researcher may miss including questions pertaining to these substances in their research protocol.

Thus, estimating substance use is a complex task that requires careful consideration of numerous methodological issues. Despite these challenges, accurate estimation is crucial for understanding the scope of the problem, informing policy and interventions, and monitoring progress over time. Researchers must continue to refine their methodologies and adopt innovative approaches to overcome these challenges and provide reasonably accurate, reliable estimates of substance use. Quite a few of these challenges apply to Indian studies as well. However, there is a decent amount of literature available which helps generate a comprehensive picture of substance use in India, as described in the next section.

## 2. Substance use in the general population

### *2.1. The first 'National Survey' on substance use in general population (2004):*

The *National Survey on Extent, Pattern and Trends of Substance Use in India (2004),* remains a pioneer work in the epidemiology of substance use [6]. The primary component of the survey, the National Household Survey, covered a nationally representative sample of around 40,697 males (12–60-year-old). The current use was defined as 'any use within last one month'. Findings

revealed that, alcohol (21.4%) was the primary substance used followed by cannabis (3.0%) and opiates (0.7%). About 26% of alcohol users were reported to be dependent, while this figure was 25.7% for cannabis and 22.3% of opiate users. In another component of the survey, the Drug Abuse Monitoring System (DAMS), among 16,492 new addiction treatment seekers (recruited across multiple treatment settings), 44% used alcohol, 26% opiates, 12% cannabis, 25% stimulants and 14% were injecting drug users. Yet another component, the Rapid Assessment Survey, recruited drug users (non-treatment seeking) from streets of 14 cities across the country and revealed heroin use in 36%, use of other opiates in 29%, cannabis use in 22% and sedatives in 4%. As much as 43% of the sample comprised of injecting drug users. Through Focused Thematic Studies, the survey also documented drug use in some special population groups such as women, prisoners, rural population and border areas of the country. As the first such exercise in determining the size of substance use problem at the national level, this report proved to be very useful in shaping up the health and welfare response of the Government. For next many years, findings of this survey formed the basis of reporting of Indian data in the World Drug Report, published annually by the United Nations Office on Drugs and Crime (UNODC). However, as a major limitation, this report could provide data only among men and only at the national level. Thus, the state level estimates of substance use, in the entire general population were still elusive.

### *2.2. The National Mental Health Survey (2016):*

National Mental Health Survey[7] has been one of the only extensive nationwide survey estimating the prevalence of all mental illnesses including substance use disorders. The survey was conducted across 12 states, interviewing 34,802 household individuals, aged above 18 years. The report provided the estimates of the prevalence of 'substance use disorders' (and not substance use *per se*), which was estimated to be 22.4% overall in the general adult Indian population. Amongst these, the prevalence of tobacco use disorder alone was highest (20.9%) followed by alcohol use disorder (4.7%), and for other drugs around 0.6%. A remarkable finding was that of wide treatment gap; it was estimated that close to 90% people with substance use disorder do not receive treatment.

While the NMHS (2016) provided valuable insights about the extent of all mental illnesses including SUDs in the country, it was also not designed to generate state level findings. Considering that health and welfare are largely state subjects in the federal governance system of India, it was deemed essential to have estimates of the magnitude of substance use at the level of various states in the country. That purpose was served with the comprehensive report, Magnitude of Substance Use in India (2019).

### *2.3. Magnitude of Substance Use in India (2019):*

The National Survey on Extent and Pattern of Substance Use in India[8] is one of the most important epidemiological work on substance use in the country. This was a 'national' survey in the true sense since it involved data collection and generation of findings from all the (then) 36 states and Union Territories. Moreover, considering the limitations of household survey approach for studying the prevalence of drug use, a combination of Household Sample Survey (HHS, among 10-75-year-old people) and Respondent Driven Sampling (RDS) with multiplier (among people with drug dependence) was employed for generating reliable data on people who use illicit drugs. In the HHS, a representative sample of 473,569 individuals from 200,111 households in 186 districts was interviewed. In addition, 72,642 individuals aged between 18-75 years who were dependent on illicit drugs were interviewed in the RDS survey. As per the standard international definition, the survey defined current use as 'any use within past 12 months'. Except tobacco, this report provided data on all the other psychoactive substances (considering that other extensive data sources are available for data on tobacco use).

The findings show that alcohol (14.6%) is the most common substance used by Indians which is far more prevalent in men (27.3%) than women (1.6%). Around one fifth of people consuming alcohol, use it in dependent pattern (2.7%) and a similar proportion in a harmful pattern (2.5%). An important finding was the wide variation in prevalence of alcohol use and alcohol use disorders across different states. After alcohol, the most prevalent substances used in India are: cannabis products (2.8%), opioids (2.1%) and sedatives (1.08%). Notably, the prevalence of opioid use is India is three times that of global and Asian average while that of cannabis use is lower. This survey also estimates that not only the overall opioid use is higher than in 2004, but among various products, heroin has surpassed opium as the most used opioid. The prevalence of substance use disorders for opioids is 0.70%, while for cannabis it is 0.66%. The highest prevalence of opioid use disorders is in the states located on the known international heroin trafficking routes (Mizoram, Manipur, Nagaland etc. in the northeast and Punjab, Haryana, Delhi in the northwest). In addition, it is estimated that there are around 8.5 lakh people who inject drugs (PWID) in India, almost all of whom inject one or the other opioid. Inhalants is the only substance category in which the prevalence of use is higher in children (1.17%) than adults (0.58%). Other substances such as Cocaine (0.1%), Amphetamine Type Stimulants (0.18%) and Hallucinogens (0.12%) are used by a small proportion of country's population.

The wide treatment gap for substance use disorders is evident through this report as well. Amongst people dependent on alcohol just about 2.6% and among those dependent on illicit drugs about 12% reported receiving any help or treatment.

The report Magnitude of Substance Use in India (2019) is the most comprehensive data set on substance use epidemiology in India and has been instrumental in shaping the response to the drug problems in the country, in the recent past. For instance, table 1 provides the list of top states in the country with respect to the estimated number of people affected by substance use disorders. Such data is important for the policy makers for resource allocation for treatment and rehabilitation programs.

*National Family Health Survey (NFHS)- 5 (2019-2021):*

Though not explicitly focused on substance use, the NFHS provides valuable data on alcohol and tobacco use in the general household population [9,10]. NFHS covers a broad range of health and demographic indicators and provide representative data at the national and state levels in men and women aged 15 years and above. The periodicity of the surveys enables the examination of trends over time, facilitating the understanding of changing patterns of substance use. The NHFS-5 reported that among men, the total prevalence of tobacco use is 38.0% which is lower in urban (28.8%) compared to rural settings (42.7%). On the other hand, the prevalence of tobacco use in women is lower, 8.9%, with the same trend of lower prevalence in urban areas (5.4% versus10.5%). Regarding alcohol, the total prevalence of alcohol consumption in women is 1.3%, in contrast to men, which is 18.8%. In the urban areas, 0.6% of women consume alcohol compared to 16.5% of men. While in rural areas, the prevalence among women is slightly more than 1.6%, as is among men, i.e., 19.9%. This indicates a slight decrease compared to NFHS-4 (2015-16), which reported higher rates of 45% among men and 7% among women. Thus, even with methodological problems like inappropriate operational definitions of 'use', the NFHS findings provide an opportunity to compare substance use pattern between urban and rural areas, between men and women and trends over time.

*1.1. Global Adult Tobacco Survey (GATS)-2 (2016-2017):*

The second round of GATS [11] was a nationwide household survey of about 74,000 individuals on tobacco use which reported that 28.6% of those aged 15 and above use tobacco, with 21% using smokeless tobacco. Among them, 24.9% are daily tobacco users, while 3.7% are occasional users. Men have a higher prevalence of tobacco use (42.4%) compared to women (14.2%). Rural areas have a higher prevalence of tobacco use (32.5%) compared to urban areas (21.2%). The prevalence of tobacco use varies significantly across different states and union territories, ranging from 64.5% in Tripura to 9.7% in Goa. Khaini, a tobacco-lime mixture, is the most commonly used tobacco product in India, with 11.2% of adults reporting its use. Bidi smoking is prevalent among 7.7% of adults. Other commonly used tobacco products include gutka (6.8%), and betel quid with tobacco

(5.8%). There are gender differences for tobacco products, with men primarily using khaini (17.9%) and bidi (14.0%), while women predominantly use smokeless tobacco products such as betel quid with tobacco (4.5%) and khaini (4.2%). The survey revealed that 10.7% of adults in India currently smoke tobacco, with higher prevalence among men (19.0%) than women (2.0%). The prevalence of smoking varies across states, with Mizoram having the highest prevalence (34.4%) and Maharashtra the lowest (3.8%). In terms of smokeless tobacco use, 21.4% of adults in India reported its current use, with higher prevalence among men (29.6%) than women (12.8%). The prevalence of smokeless tobacco use also varies across rural and urban areas, with Tripura having the highest prevalence (48.5%) and Himachal Pradesh the lowest (3.1%). It was also noted that 38.5% of smokers in India have attempted to quit smoking. However, only a small proportion sought assistance through pharmacotherapy or counseling. The majority of smokers (71.7%) attempted to quit without any formal assistance.

## Substance use in special population

Epidemiological studies conducted in the general population suffer from the limitation of missing out or inadequately covering some of the specific population groups (e.g., adolescents and women). Prevalence of substance use as well as some of the related issues in such population groups may be different from the general population. Thus, it is useful to have studies conducted exclusively among special populations. Some larger nationwide studies have reported the profile and pattern of substance use in adolescents and women without specifically estimating the prevalence of substance use.

### *1.1. Children and adolescents:*

The Global Youth Tobacco Survey (GYTS-4)[12] provides valuable insights in the context of tobacco use among school-going children in India. The 4$^{th}$ round of this nationwide survey included students from 987 schools, of which 80,772 students aged 13 to 15 comprised of the survey sample. The survey revealed that 8.5% of Indian students in this age group use tobacco, with 7.3% engaging in smoking tobacco and 4.1% using smokeless forms. Notably, a higher percentage of boys (9.6%) used tobacco than girls (7.4%). The prevalence of ever tobacco users is 18.1% in total, with boys at 19.3% and girls at 16.9%. Regarding the rural-urban divide, 19.5% of rural students reported tobacco use compared to 13.5% of urban students. The overall prevalence of tobacco users is 8.5%, with boys at 9.6% and girls at 7.4%. Regarding location, 9.4% of rural and 5.5% of urban students were current tobacco users.

Table 1: Top five states for major substance categories in terms of estimated number of people affected by substance use disorders.

| Alcohol | | Cannabis | | Opioids | |
|---|---|---|---|---|---|
| States | Estimated no. of people who need help (in lakh) | States | Estimated no. of people who need help (in lakh) | States | Estimated no. of people who need help (in lakh) |
| Uttar Pradesh | 160 | Uttar Pradesh | 28 | Uttar Pradesh | 10.7 |
| Andhra Pradesh | 47 | Punjab | 5.7 | Punjab | 7.2 |
| Tamil Nadu | 37 | Odisha | 4.9 | Haryana | 5.9 |
| Madhya Pradesh | 31 | Maharashtra | 4.6 | Maharashtra | 5.2 |
| Maharashtra | 30 | Chhattisgarh | 3.8 | Madhya Pradesh | 3.9 |
| Source: Ambekar et al., 2019[8] | | | | | |

Table 2: Major studies in the general population and their findings for common substances of use

| S. No. | Substance | National Survey (2004)[6] | Magnitude of substance use in India (2019)[8] | National Family Health Survey (2020-21)[9] | Global Adult Tobacco Survey (2016-17)[11] |
|---|---|---|---|---|---|
| 1 | Alcohol | 21% (men) | 14.6% (overall), 27.3% (men), 1.6% (women) | 18.8% (men), 1.3% (women) | |
| 2 | Tobacco | - | - | 38.0% (men), 8.9% (women) | 42.4% (men), 14.2% (women) |
| 3 | Cannabis | 3.0% (men) | 2.8% (overall), 4.9% (men), 0.6% (women) | - | - |
| 4 | Opioids | 0.7% (men) | 2.1% (overall), 3.9% (men), 0.16% (women) | - | - |

is available from the nationwide study on 4024 substance-using children, conducted under the aegis of National Commission for Protection of Child Rights (NCPCR) [13]. The study revealed that the most commonly used substances among these children were tobacco, alcohol, cannabis, and inhalants, with tobacco use being the most prevalent. Approximately 83% of the surveyed substance-using children reported tobacco use, followed by alcohol at 68%, cannabis and inhalants at 35% each, and other substances like pharmaceutical opioids, sedatives, and heroin at varying lower percentages. Notably, around 13% of the substance-using children reported engaging in injecting drug use, indicating high-risk behaviours in this vulnerable population. The age at which children-initiated substance use varied for different substances. On average, tobacco use had the earliest age of onset at 12.3 years, followed closely by inhalants at 12.4 years, cannabis use at around 13.4 years, and alcohol slightly later at 13.6 years.

The study highlighted that substance use is not limited to boys but also exists among girls. Risk factors associated with substance use among these children included familial influences, such as substance use among family members, conflicts within the family, and physical abuse. Peer influence also played a significant role, with a large percentage of children reporting peers who used substances. The findings also shed light on these children's high-risk behaviours and adverse experiences, like sexual activities in exchange for drugs. Out-of-school and street children exhibited earlier substance use initiation and experienced more dysfunction than their peers in school settings. The study revealed gaps in support systems, as many children had not sought treatment or had contact with any non-governmental organisations (NGOs).

### *1.2. Women:*

Probably the most extensive study focused exclusively on women drug users in India to date [14], a survey of 1865 women drug users in more than 100 non-governmental organisations (NGOs) nationwide supported by the United Nations office on Drugs and Crime (UNODC). The study encompassed both Non-Substance-Using Partners (NSUPs) of male substance users and Female Substance Users (FSUs) and provided valuable insights into their demographics, substance use patterns, relationships, and associated challenges. The respondents were identified using key informant and snowball sampling methods, primarily from the communities served by each NGO. The study revealed that among current women substance users, 25% used heroin, 18% used dextropropoxyphene, 11% cough syrups and 7% buprenorphine. However, the most common substances used were alcohol (87%) and tobacco (83%). FSUs as they demonstrated higher rates of lifetime use across various substances, including tobacco (79.1%), alcohol (77.4%), heroin (33.5%), dextropropoxyphene (25.9%), sleeping pills (22.4%), and cannabis (22.7%). Tobacco use usually preceded the use of other substances, except solvents. The mean age of tobacco initiation was 18.4 years, while solvent initiation occurred at around 16.5 years. More than 75% of FSUs and

60% of NSUPs experienced physical injuries due to violence, and sexual coercion was also prevalent. Access to treatment and support services was limited, with NGOs being the primary source of assistance for both groups. Knowledge about available support facilities and services, such as mental health services and de-addiction programs for women, was shallow.

## 2. Secondary data analysis

While the most common epidemiological approach involves collection of new ('primary') data, valuable information can also be obtained from analysis of secondary data. Analysis of treatment records which have been maintained over a period, can provide useful information about specific trends in the pattern and prevalence of substance use among treatment seekers. For instance, a study [15] analysing 6,608 treatment seekers at a de-addiction center in north India over three decades reported an increasing trend in numbers of people seeking treatment for substance use. Additionally, there was an increase in the proportions of opioids, and poly-drug users, as well as an increase in younger population seeking treatment for substance use. Authors commented on the changing trend of using more pharmaceutical opioids rather than natural opioids over the time. Similar trend was reported in a publication which analysed data from multiple treatment centers throughout the country (more than 25,000 patients), as a part of the Drug Abuse Monitoring System (DAMS)[16].

Another form of epidemiological research using secondary data analysis is utilizing data collected and reported by earlier studies and conducting modelling exercises. For instance, in a recent study, the authors applied statistical modelling to report on inter-state variations in current drinking and alcohol use disorders and concluded that states with highest prevalence are those in the North-East, as well as Chhattisgarh, Telangana, Himachal Pradesh, Punjab and Jharkhand [17].

## 3. Burden of addiction and availability of services

Despite the high prevalence of substance use disorders (SUDs) in India, there appears to be inadequate attention among the policy makers as well as the general population about the nature of these conditions and the need for treatment. Only 25% of individuals with drug dependence in India report having received any intervention for their condition [8]. Furthermore, the stigma surrounding addiction often results in a reluctance to seek help for the affected individuals and their families. This lack of awareness and stigma contributes to the underdiagnosis and undertreatment of addictive disorders in India [18] .

Access to evidence-based prevention and treatment services for SUDs in India is limited. The country faces a severe shortage of trained mental health professionals, with an estimated 0.3 psychiatrists per 100,000 population, compared to the global average of 1.27 [19]. Furthermore,

specialized addiction treatment services are concentrated in urban areas, leaving rural populations underserved. The National Mental Health Survey of India (2016)[7] reported that 83% of people with mental health disorders, including SUDs, did not have access to adequate treatment facilities. This disparity in access to care exacerbates the burden of addictive disorders in the country.

## 4. Conclusion

Studying the epidemiology of substance use in India is challenging given the enormous size of the country, the diversity of the population and the phenomenon itself which is regarded as a socially deviant behaviour. In spite of these challenges, in the recent past some robust studies have been conducted which provide rich information about the magnitude of substance use in India. We now know that a sizable population in India is affected by substance use disorders. While use of the conventional substances (alcohol, tobacco, cannabis) continues, newer substances (pharmaceutical products, cocaine, amphetamine type stimulants) are making their presence felt in the Indian society. While adult males are affected the most, a rising number of children, youth and women affected by drug use disorders is a concern. More importantly, data indicate that services and programmes to address substance use are not available and accessible to the millions of affected patients. The need of the hour is to follow the approach based on monitoring the situation through repeated data collection and analysis and using the evidence so generated to formulate appropriate policies and programmes.

**Take Home Message**

- Substance use in India is a complex issue with variations across different population groups, geographical regions, and substances of choice.
- Alcohol and tobacco are the most commonly used substances, followed by cannabis products, opioids, and sedatives. Notably, the prevalence of opioid use in India is three times the global and Asian average, and heroin (a more harmful opioid) is used by much more Indians than opium (a relatively less harmful opioid). The use of newer drugs like Amphetamine Type Stimulants is also increasing.
- Estimating substance use is a complex task due to a variety of methodological challenges. While general population household surveys remain popular, use of alternative methodologies such as non-probability sampling methods, and qualitative studies, adds to our understanding of shape and size of the problem.
- Despite the high prevalence of substance use disorders (SUDs) in India, there is a significant lack of awareness and stigma surrounding these conditions. This results in underdiagnosis and undertreatment, with only 25% of individuals with drug dependence reporting having received any intervention for their condition.
- Access to evidence-based prevention and treatment services for SUDs in India is limited. The country faces a severe shortage of trained mental health professionals, with specialized addiction treatment services primarily concentrated in urban areas, leaving rural populations underserved.

## References:


1. Mohan D, Chopra A, Ray R, et al. Alcohol consumption in India: a cross sectional study. In: Demers A, Room R, Bourgault C, (eds). *Surveys of drinking patterns and problems in seven developing countries.* Geneva, Switzerland: World Health Organization, 2001:103–14.
2. Machado T. Culture and Drug Abuse in Asian Settings Research for Action. *Bangalore St John's Med Coll Publ* 1994; 3.
3. Gupta VM, Sen P. Tobacco: the addictive slow poison. *Indian J Public Health* 2001; 45: 75–81.
4. World Health Organization. *Introduction to HIV/AIDS and sexually transmitted infection surveillance: Module 4: Introduction to respondent-driven sampling*. 2013.
5. Kakinami L, Conner KR. Sampling Strategies for Addiction Research. In: *Addiction Research Methods*. John Wiley & Sons, Ltd, pp. 27–42.
6. Ray R, Mondal A, Gupta K, et al. *The Extent, Pattern and Trends of Drug Abuse in India-National Survey*. New Delhi: Ministry of Social Justice and Empowerment, Govt, of India and United Nations Office on Drugs and Crime. Accessed at http://www.unodc.org/pdf/india/presentations/india_national_survey_2004.pdf (2004).
7. Gururaj G, Varghese M, Benegal V, et al. *National mental health survey of India, 2015-16: Summary*. Bengaluru: National Institute of Mental Health and Neurosciences, 2016.
8. Ambekar A, Agrawal A, Rao R, et al. *Magnitude of substance use in India*. New Delhi Ministry of Social Justice and Empowerment, Govt, of India. 2019. Accessed at https://socialjustice.nic.in/writereaddata/UploadFile/Magnitude_Substance_Use_India_REPORT.pdf accessed 15 May 2023)
9. Indian Institute for Population Sciences (IIPS). *National Family Health Survey (NFHS-4), India, 2015-16* Mumbai. Accessed at http://rchiips.org/nfhs/pdf/NFHS4/ India.pdf (2017) accessed 15 May 2023)
10. Pattnaik S, Murmu J, Agrawal R, et al. Prevalence, pattern and determinants of disabilities in India: Insights from NFHS-5 (2019-21). *Front Public Health* 2023; 11: 608.
11. TISS, MoHFW. *Global Adult Tobacco Survey GATS 2 India 2016–17*. New Delhi India, https://ntcp.nhp.gov.in/assets/document/surveys-reports-publications/Global-Adult-Tobacco-Survey-Second-Round-India-2016-2017.pdf (2017).
12. GYTS India. *Global Youth Tobacco Survey (GYTS) Fact Sheet India*. 2009, https://www.who.int/fctc/reporting/Annexoneindia.pdf. (2019, accessed 22 December 2022).

13. Tikoo V, Dhawan A, Pattanayak R, et al. *Assessment of pattern, profile and profile of substance use among children in India*. 2013. New Delhi: National Commission for Protection of Child Rights (NCPCR) and All India Institute of Medical Sciences (AIIMS). Accessed at http://wwwncpcrgovin/view_filephpfid=17 accessed 15 May 2023)

14. Murthy P. *Women and drug use in India: Substance use and women high-risk assessment study*. 2009. New Delhi: United Nations Office on Drugs and Crime. Accessed at https://nimhans.ac.in/cam/sites/default/files/Publications/41.pdf accessed 15 May 2023)

15. Basu D, Aggarwal M, Das PP, et al. Changing pattern of substance abuse in patients attending a de-addiction centre in north India (1978-2008). *Indian J Med Res* 2012; 135: 830.

16. Ray R, Chopra A. Monitoring of substance abuse in India - Initiatives & experiences. *Indian J Med Res* 2012; 135: 806.

17. Rastogi A, Manthey J, Wiemker V, et al. Alcohol consumption in India: a systematic review and modelling study for sub-national estimates of drinking patterns. *Addiction* 2022; 117: 1871–1886.

18. Panda UK, Sahoo SS, Saini R. Stigma and Substance use Disorders: A Contextual Review from an Indian Perspective. *Ann Indian Psychiatry* 2020; 4: 118.

19. World Health Organization. Mental Health Atlas 2017 Country Profile: India. Accessed at https://www.who.int/publications/m/item/mental-health-atlas-2017-country-profile-india (2017, accessed 15 May 2023).

# Epidemiology of suicidal behaviour in India

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## 1. Introduction

Suicide is an ever-increasing mental health issue of global concern with more than one in 100 deaths being attributed to suicide.[1] Though the global age-standardized rates of suicides has decreased over the last two decades (2000-2019), every year, over eight million people succumb to suicide. Additionally, more number of people attempt to end life by suicide.[1] Every suicide affects families and communities and has prolonged effects on the survivors of suicide. Suicide was the fourth leading cause of death in those belonging to 15-29 year-olds in 2019.[2] Suicide remains a global threat, occurring in all regions of the world, more prominently (almost 77% of global suicides) in the low- and middle-income nations.[2] In India, every year, more than one lakh people die by suicide, reflecting an approximate annual rate of 12%.[3] Every year, India's proportional contribution to the global suicide death rate is increasing (women & girls: 27.3% in 1990 to 36.5% in 2019; men & boys: 16.7% in 1900 to 20.9% in 2019), which is quite alarming.[1,4,5] Further, the rates of suicide could have been accentuated by the onset of the COVID-19 pandemic compared to previous years.[6]

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Understanding the epidemiological data on suicide and suicidal behaviour in the region will help identify at-risk populations and allocate resources for effective suicide prevention strategies. The present chapter will summarize the existing literature on the prevalence, risk factors, protective factors, common triggers of suicide, and common methods of suicide. The chapter also addresses the epidemiology of suicide among specific vulnerable populations and will provide an overview of the effects of COVID on suicidal behaviour in India.

## 2. Prevalence of suicide in India

Based on the recent National Crime Records Bureau report (NCRB) of 2021 India, the total number of suicides amounted to 1,64,033, reflecting an increase of 7.2 % in suicide rates compared to the suicide rate reported around 2020.[3] The increase in the suicide rates could be explained by the global effects of COVID and its aftermath on the mental health of the general population.[7,8]

For the year 2021, the highest rate of suicide in India has been reported in Andaman and Nicobar Islands (39.7 per lakh population), followed by Sikkim (39.2/lakh) and Puducherry (31.8/lakh). Of the total suicides across the nation, Maharashtra (13.5%) had contributed the highest share followed by Tamil Nadu (11.5%) and Madhya Pradesh (9.1%), and the lowest share was reported from Uttar Pradesh (3.6%).[3] The increased suicide rates in India are in line with the global scenario where an increase in rates has been reported in many countries, especially after the 2008 global economic crisis.[9] Further, the increase in suicides reflects the increase of about 6.7% global suicides.[10]

## 3. Risk factors

Various socio-demographic, psychological, and psychosocial factors have been identified as risk factors for suicide. The findings are depicted in Figure 1.

### 3.1. Socio-demographic risk factors

#### *3.1.1. Age*

The age groups 18-30 years and 30-45 years had the highest contribution to total suicides across the country (34.5% and 31.7%, respectively). This is similar to the suicide statistics when compared to the previous decade.[3,12] A marked increase (19.1%) in the rates of suicide has been observed in India among people over 60 years.[13] Among the elderly, suicide rates increase with age, with the highest being reported among those above 75.[12] Elderly suicide rates were higher, especially amid the COVID-19 pandemic.[14] Older males tend to have higher suicide rates compared to older females.[12,15]

Most Deliberate Self Harm (DSH) behaviours were reported among the younger age group (below 30).[16] The younger population in LMIC countries report higher rates of suicide attempts compared to youth from high-income countries.[17] Among those with suicide attempts, age or other socio-demographic variables could not predict subsequent suicide attempts.[18] However, females in the age group of 20-30 were observed to be more common among those with suicide attempts.[19]

### 3.1.2. Gender

The literature is inconsistent regarding gender differences in suicide rates.[12] Recent NCRB reports claim that the male-female ratio for suicide rates is 72.5:27.4, which is higher than the year 2020 (70.9:29.1).[3] The finding is similar to global reports, which also reported increased rates of suicide among males compared to females.[10] However, the finding contrasts with reports of reduced gender disparity in rates of suicide in the Asian continent.[20] But, the Suicide Death Rate (SDR) and the age-standardized suicide rate were higher among Indian females than the global average.[21] A total of 28 transgender people have been reported to be victims of suicide as per NCRB 2021.[3] Across age groups, suicide rates are comparatively higher among females in younger age groups. In contrast, it was higher among males in the middle and elderly age groups.[12] The above finding is similar to the global picture, which reports that suicide rates among males were higher compared to females except in the 15-19 age group.[10] However, a retrospective study of suicides sent for autopsy revealed that the male-to-female ratio was equal.[22] The above finding reemphasizes that the difference in male to female ratio of suicides is less pronounced in India compared to global and high-income countries.[5] Among those with suicide attempts, females were predominantly higher than males in a study done in Telangana.[19] Among those with Deliberate Self Harm (DSH) in south India, the male and female ratio was equal.[16]

### 3.1.3. Residence

The metropolitan cities Delhi, Chennai, Bengaluru, and Mumbai contributed to 35.5% of the total suicides among the megacities (having a population of 10 lakhs or more).[3] There has been an increase in the rates of suicides in all metropolitan cities except Delhi from 2020 to 2021.[3] On comparing rural and urban areas, higher rates of suicide have been reported from rural areas, and the rural-urban ratio was found to be 1.4:1.[22,23] This is similar to the findings from western literature, where the rurality and travel time to care predicted suicide risk.[24]

### 3.2. Psychosocial risk factors

Though depression and substance abuse contribute to a majority of suicidal behaviours in high-income nations, a significant proportion of suicides in India happen secondary to stressful life

events, including financial, relationship, chronic pain, and illness-related issues.[2,25] Psychosocial issues such as experiencing conflict, trauma, violence, disasters, or loss were also linked with suicidal behaviours. People exposed to discrimination, such as refugees, migrants, people identified as the third gender, and people identified as lesbian, gay, or intersex, also have elevated rates of suicidal behaviours.[2]

The majority of studies in India report proximal risk factors for suicide.[5] In India, "family problems" and "illness suffering" accounted for the most suicides, followed by relationship issues, financial issues, and poverty.[3] Similarly, in the global scenario, economic uncertainty leading to unemployment and lag in economic growth are risk factors for suicide.[26] Family problems and illness reasons were often reported more frequently during the COVID-19 pandemic.[3,27] The above causes are similar to reports in the previous decade.[12] Apart from family-related causes, financial hardships, marital problems, the break-up of relationships, and a history of physical and sexual abuse have been associated with suicidal behaviours.[28]

Females were found to be overrepresented in causes of suicide, such as marriage-related issues, specifically dowry-related issues and impotence/infertility. In megacities, family problems (34.7%) were reported to be the major cause of suicide, followed by illness (17.4%).[3]

### 3.3. Psychological risk factors

Literature reveals various psychological risk factors for suicide: history of self-harm, cluster B personality traits, impulsivity and aggression, substance abuse, co-existing depression, and anxiety, among others.[28,29] More recent literature also reveals that increased suicide rates among students could be due to decreased access to coping resources and increased maladaptive coping mechanisms such as increased internet use and gaming behavior.[30,31]

The presence of mental illness was found to increase the risk of suicide.[12,25] Among specific mental illnesses, alcohol abuse in self or spouse, personality disorders, and adjustment disorders were considered to increase the risk of suicide.[32,33,34] The above findings are reiterated in the global literature, where mental disorders confer increased suicidal risk.[35]

### 3.4. Protective factors

Various protective factors have been identified for abstaining from suicidal behaviours. Among those with suicide attempts, the reasons for living included feeling responsible, love for family and self, hope, success in career, and religiosity.[36] Among school-going adolescents, the opportunity to discuss problems with parents, having helpful and friendly classmates, and engage in a positive relationship with teachers lowered the odds of suicidal ideations.[37]

## 4. Methods of suicide

Awareness of the most common methods of suicide is crucial to develop effective suicide prevention strategies. Among South Asian countries, hanging was the most common method of suicide, followed by poisoning.[38] The NCRB report (2021) states that hanging remains the most common (57.0%) method of suicide death, followed by poison consumption (25.1%), drowning (5.1%), and fire/self-immolation (2.6%).[5] Such findings are similar to those reported in previous years, where hanging (57.8%) was the most common mode of suicide in both sexes.[12,30,39]

However, some modes of suicide have changed in the last decade. An increase in rates of suicide using modes such as consumption of poison and coming under running vehicles/trains have been noted.[3] On the contrary, trends in Indian literature (2010-2019) reveal that suicide by self-immolation has decreased, probably due to a reduction in usage of kerosene and similar combustion fuels for cooking.[5] Across the various modes for suicides, males predominated in all except suicides by fire/self-immolation.[3] There was not much difference in drowning as a means of suicide across sexes; this finding contrasts with previous years where more females died by drowning compared to males.[12]

## 5. Special suicides

### 5.1. Celebrity suicides

Every time a celebrity ends his/her life by suicide, it creates ripples in a society heavily influenced by the entertainment industry. India, a nation where the media and entertainment industries influence millions of people, has witnessed significant effects of a celebrity's suicide on the mental health and suicidal behaviour of the country's populace.[40,41] Studies have observed the direct effects of celebrity suicide in aggravating the risk of suicide attempts among the general population. [42]

Potentially harmful suicide reporting methods have been identified in the Indian media, such as reporting personal identification details, location of the deceased, reasons for suicide, and photos of the deceased, following celebrity suicide. [43] Newspapers often included front page news matters on suicide, intricate details on methods of suicide, and included details of suicide notes after a celebrity suicide when compared to the period before the suicide. [44] Global studies reiterate that such reporting methods can negatively influence suicide risk among the vulnerable.[45] On the other hand, media can play a positive role and can mitigate the risk of a contagion effect in the population following triggering events such as celebrity suicide.

The inherent risk of suicide among celebrities remains understudied and needs a systematic exploration.[46] Speculative risk factors might include the presence of psychiatric disorder, personality issues, loss of privacy, substance abuse, and unstable relationships, among various other factors. [47,48] Media have quoted depression as the most common reason for suicide among celebrities. Deceased were more likely to be young, female, unemployed, and having pre-existing mental illness. They were more likely to have chosen hanging as a mode of suicide and have left a suicide note prior to the act. [49]

One review attempted to look at the trends of celebrity suicide before (2002-2019) and after the COVID pandemic (2020-onwards). [50] Compared to the pre-COVID era, increased rates of celebrity suicides were observed during the COVID pandemic. This might be explained by the abrupt loss of employment, contract cancellations, loss of public image, etc., during the pandemic and lockdown restrictions.[47]

### 5.2. Farmer suicides

Consistent literary evidence shows that farming is associated with a greater predisposition towards suicidal behaviours compared to other occupations, given that the majority of global suicides happen in LAMICs, especially in rural and agricultural areas.[2,51] Farmer suicides have gained national attention in the recent years since every 7$^{th}$ suicide in our country is a farmers' suicide.[52] Recent NCRB data (2021) reveals that 6.6% of total suicides are reported among farmers. [3] Analysis of regional variations reveals that Maharashtra, Karnataka, Andhra Pradesh, Chhattisgarh, and Madhya Pradesh, have reported a higher prevalence of farmer suicides.[52,53] With regard to other types of suicidal behaviours among farmers, one study from rural Tamil Nadu reported that the prevalence of current suicidal ideations among farmers to be around 60%.[54]

#### *5.2.1. Risk factors for farmer suicides*

Geographical factors such as reduced amounts of groundwater storage have been linked to regions reporting mass farmer suicides (e.g.., Maharashtra).[55] Farmer suicides were more often observed in males, in the group of 21-40 years, married, and belonging to low socioeconomic status.[56] Most Indian studies reveal that indebtedness is the most commonly reported reason for suicide attempt [57] and suicide [52,53]. The proportion of unpaid loans was reportedly higher among farmer suicide victims than control households. Reduced lending of loans by banks towards the agricultural sector,[58] increased cultivation of cash crops,[59] especially, Bt Cotton has been linked with increased rates of suicide among the farmers who cultivate them. Though empirical evidence is limited and ambiguous in the case of Bt cotton causing a spike in farmer suicide rates, farmers are caught up in a globalization crisis where market forces gain precedence over farmers' combined interests.[60,61]

Crop failure, interpersonal issues, suffering from medical illness, and stressors such as getting a female member of the family married were associated with a greater risk of suicide in this group. [62] Majority of the farmers who die by suicide belonged to "backward castes," and experienced personal and familial humiliation under the hands of social oppressors.[63] Agrarian crisis due to the liberalization of trade barriers and increased competition with global markets has been linked to the increased suicide rates among farmers.[53] Further, small-scale farming, lesser experience in farming, and facing the threat of drought were linked to increased suicidal ideations.[54]

#### *5.2.2. Modes of suicide among farmers*

Pesticide poisoning, possibly because of easy access, is the most common (more than 50%) method suicide among farmers.[64] Even for suicide attempts, pesticide poisoning was the most favored mode in this group.[57]

### 5.3. COVID-19 and suicide in India

The majority of COVID-related suicides in the Indian subcontinent were from India.[65,66] Like the waves of COVID, suicides too occurred as waves across the nation since the onset of the COVID-19 pandemic and the subsequent effects of the lockdown.[67–69] Global literature asserts that the pandemic has increased the suicide risk not just during the acute phase but even during the phase of recovery and post-COVID syndromes.[70]In general, frontline healthcare workers, university students, elderly, migrants, homeless people, and those who were economically disadvantaged were at increased risk of suicide during COVID.[67,71] A recent systematic review found that being 31-50 years, male, married, employed, and with mental or physical ailments posed significant demographic risk factors for suicide during COVID-19 in India.[72,73] Presence of mental illness, substance abuse, and a positive family history of suicide increased the risk of suicide during the pandemic. [67] Exclusive COVID-19 factors related to suicide were fear of contracting infection, fear of infecting family members, worry about test results and their repercussions, quarantine or isolation concerns, migration, staying away from home and family, stigma and discrimination in society, commitment of saving the village from infection, excessive and wrongful information obtained through social media, and online schooling stress.[5,68,72,74] Hanging was the most common method of suicide, followed by jumping from high-rise buildings, poisoning, drowning, self-cutting of wrists and neck, self-immolation, and medication overdose. [68,72,75]

## 6. Suicide among specific populations

### 6.1. Suicide among women

In India, the overall rate of suicide is lesser in women than in men. However, the national suicide rate among Indian women is twice the global average, contributing to 36% of global suicides. Further, women attempt suicide earlier than men.[4,76] A recent review indicates that women aged 11-30 have a greater suicide risk than men of the same age group.[39] Further, suicide rates have also been noted to increase among women above 75 years of age which reiterates the notion that females tend to have a second peak of suicide after 65 years.[4,77] Being literate, having secondary education, being a housewife, or being unemployed placed women at a greater risk of suicidal deaths than men.[39,78] Marriage does not offer much protection from suicide compared to men;[79] on the contrary, marital conflicts and domestic violence predispose them to suicide.[76,80] Hanging remains the most common method of suicide in both men and women. [39] Followed by that method, women in India resort to pesticide ingestion and self-immolation to die by suicide. [81] History of childhood abuse and depression act as additional risk factors for suicide in women. [82]

### 6.2. Sexual minorities

Sexual minorities are those who identify as lesbian, gay, bisexual, transgender (TG), genderqueer, intersex, asexual, and others (LGBTQIA+). Various socio-cultural and political factors play a role in the discrimination and marginalization of this vulnerable population, especially in the LMICs, increasing the risk of suicide and suicide attempts.[83]

Around 31% of transgender persons in India end their lives by suicide, and over 50% of transgender persons have attempted suicide once before attaining the age 20.[84] Social stigma was reported as the most common reason for suicide among LGBTQIA+ individuals.[85] Though there is a dearth of Indian literature, global data shows that there are many risk factors for suicide and suicidal behaviours among sexual minorities, such as social neglect, lack of adequate access to education, job, housing, poverty, abuse and harassment, victimization through hate crimes, etc.[84]

### 6.3. Children and adolescents

The cumulative risk of mortality, before age 80, by suicide for a 15-year-old adolescent in India is 1.3%. [64] School[86] and college-based[87] studies reveal that the prevalence of non-suicidal self-injury (NSSI) among adolescent students was around 33%, and that for college-going students were around 31%. The most common modes of suicidal behaviour (deliberate self-harm/attempt) were ingesting rat killer poisons[88] and insecticides.[89]. Family stress was identified as the most common reason for attempting suicide or deliberate self-harm in both these studies.

The risk factors for deliberate self-harm and suicidal ideations among adolescents were younger age, lower-income group, urban domicile, female gender, academic difficulties, and high parental

expectations.[90,91] Boys develop vulnerability towards DSH earlier when compared to girls of the same age group [28], whereas girls reported more frequent suicidal ideations than boys [92,93]. Additional risk factors for suicidal behaviour among adolescents were being a victim of childhood sexual and physical abuse, witnessing domestic violence, having a difficult childhood with parental separation or divorce, and having a history of psychiatric disorders and substance abuse among family members. [94] A recent study found that cyberbullying victimization can lead to suicidal ideations more often in female adolescents than male counterparts. [95]

The risk factors for suicidal ideation in school-going students were family conflicts, a history of physical abuse, and harbouring body image distortions. [37] A study on college students in Gujarat revealed that economic hardships, and distress secondary to caste-based conflicts and discrimination, led to an increased risk of suicidal behaviours (suicide ideations and attempts). [96]

### 6.4. Healthcare professionals

Suicidal deaths among doctors in India reported as per crime records or news articles revealed that the majority were males, belonged to the 21-30 years age group, young practitioners, and were anaesthetists. Hanging was the most common method of suicide among doctors.[97,98] The other modes of suicide were self-administration of lethal injections and jumping from height.[99] The analysis of online news reporting of suicide deaths among medical students/residents/physicians revealed that the deaths were higher in the southern states of India with the exception of Kerala.[97]

Depression was cited as the most common reason for suicide among doctors, whereas academic stress was cited as the most common reason for contemplating suicide among students and residents.[97,98] Students in clinical years had a greater risk of suicidal ideation than preclinical students.[100] Long working hours, poor sleep and diet habits, high personal expectations, knowledge and access to lethal suicide methods are some of the reasons reported for the elevated risk of suicide among doctors.[99] One in four medical students had shown signs of suicidal behaviour before death, and a small proportion of them had visited a doctor before the suicide.[97] Global studies reveal that changes in medical training, inadequate health systems, and additional work burden during the COVID pandemic have increased the risk of suicide among doctors.[101] One article reviewed the pattern and reasons for nurses' suicide during the COVID-19 pandemic: fear of contracting infection, the feeling of inadequate safety from COVID, and fear of losing jobs, among others, were the common reasons for suicide. [102]

### 6.5. Suicidal behaviour and cancer patients

A recent global review indicates that suicide risk is higher among cancer patients than in the general population.[103] The review identified male gender, loneliness, low income, pain, weakness, and reduced physical capacity as risk factors for suicide among cancer patients. However, similar studies from India are scarce. The recent NCRB data (2021) reveals that suicide secondary to cancer contributed to 0.8% of the total suicides in India.[3] In palliative care settings, the prevalence of suicide increases to 3.8%, and it is often due to comorbid depression.[104] A review of cancer suicides in India (2001-2014) revealed that being male, belonging to the age group of 45-59 years, and hailing from the southern states of India were associated with an increased risk of suicide in this group.[105]

### 6.6. Suicidal behaviour and prisoners

Suicidal ideations are one of the most common concerns among prisoners. Global studies indicate that the presence of a previous history of self-harm, comorbid psychiatric illness, solitary confinement, victimization, and poor social support are the common causes of suicide among prisoners.[106] In India, custodial suicides happened more often in police custody than in prison and hanging was the most common mode of suicide in custody, followed by poisoning.[107] A review of custodial deaths in Maharashtra state (2000-2018) revealed that apart from hanging, victims had chosen self-stabbing with broken window glass and jumping from height as alternate methods.[108] Further studies are needed to explore the prison-related causes of suicide.

### Non-suicidal self-injury:

A review of epidemiological data about NSSI in LMICs reveals 12-month prevalence rates between 15.5% to 31.3%.[109] A cross-cultural study comparing NSSI among young adults from India and Belgium revealed that females were more prone to NSSI than men.[110] Earlier community-based studies in India showed that the lifetime prevalence of NSSI can be as high as 31% in young adults, which is higher than the pooled prevalence rates of 7.1% to 11.4% reported for Southeast Asia regions.[111] The most common reasons for engaging in NSSI were the "need for subjective relaxation/control/punishment." [87] The most common mode of NSSI reported in the literature was self-hitting, followed by self-cutting or carving [87,109]

## 8. Conclusion

The rates of various suicidal behaviours are increasing in India, leading to increased morbidity and mortality. Socio-demographic characteristics such as extremes of age, male gender, and socioeconomic factors such as unemployment and financial hardships play crucial roles in predisposing to and inducing suicide risk. Family conflict is the most common psychosocial risk

factor associated with suicide in India. Though the modes of suicide and suicide attempt vary widely, especially among vulnerable populations such as women, children, and sexual minorities, hanging remains the most common mode of suicide. The advent of the COVID pandemic and its associated socioeconomic impact has added to the national burden of suicide, especially among specific groups such as celebrities and healthcare professionals. The development of effective preventive strategies is the need of the hour to address the alarming rise in suicide metrics across the nation, with a particular focus on vulnerable subpopulations.

**Key messages:**

- India's proportional contribution to global suicide has increased in the recent years.
- Persons aged between 18-30 years, elderly, male, and unemployed represent high-risk subgroups for suicide.
- Family problems and illness are the most common triggers for suicidal behaviours in recent years.
- Hanging remains the most common mode of suicide and suicide attempt.
- Specific risk factors have been identified for vulnerable populations including children and adolescents, sexual minorities, farmers, prisoners, and cancer patients.
- COVID-19 pandemic has exerted adverse influence on mental health and suicidal behaviour among general population, especially healthcare professionals.

# References:


1. World Health Organization. Suicide worldwide in 2019: global health estimates. 2021.
2. WHO | Suicide data [Internet]. WHO. [cited 2020 Jan 29]. Available from: http://www.who.int/mental_health/prevention/suicide/suicideprevent/en/
3. NCRB. Report on Accidental Deaths & Suicides in India [Internet]. 2021 [cited 2022 Sep 23]. Available from: https://ncrb.gov.in/sites/default/files/ADSI-2021/adsi2021_Chapter-2-Suicides.pdf
4. India State-Level Disease Burden Initiative Suicide Collaborators. Gender differentials and state variations in suicide deaths in India: The Global Burden of Disease Study 1990-2016. Lancet Public Health. 2018 Oct;3(10): e478–89.
5. Vijayakumar L, Chandra PS, Kumar MS, Pathare S, Banerjee D, Goswami T, et al. The national suicide prevention strategy in India: context and considerations for urgent action. Lancet Psychiatry. 2022 Feb;9(2):160–8.
6. Arya V, Page A, Spittal MJ, Dandona R, Vijayakumar L, Munasinghe S, et al. Suicide in India during the first year of the COVID-19 pandemic. J Affect Disord. 2022 Jun 15; 307:215–20.
7. Brown S, Schuman DL. Suicide in the Time of COVID-19: A Perfect Storm. J Rural Health Off J Am Rural Health Assoc Natl Rural Health Care Assoc. 2021 Jan;37(1):211–4.
8. Tandon R. COVID-19 and suicide: Just the facts. Key learnings and guidance for action. Asian J Psychiatry. 2021 Jun; 60:102695.
9. Alicandro G, Malvezzi M, Gallus S, La Vecchia C, Negri E, Bertuccio P. Worldwide trends in suicide mortality from 1990 to 2015 with a focus on the global recession time frame. Int J Public Health. 2019 Jun;64(5):785–95.
10. Naghavi M, Global Burden of Disease Self-Harm Collaborators. Global, regional, and national burden of suicide mortality 1990 to 2016: systematic analysis for the Global Burden of Disease Study 2016. BMJ. 2019 Feb 6;364: l94.
11. Arensman E, Scott V, De Leo D, Pirkis J. Suicide and Suicide Prevention from a Global Perspective. Crisis. 2020 Mar;41(Suppl 1): S3–7.
12. Rane A, Nadkarni A. Suicide in India: a systematic review. Shanghai Arch Psychiatry. 2014 Apr;26(2):69–80.

13. Philip S, Issac TG, Sharda A, Shekhar A. Suicide prevention strategy in India. Lancet Psychiatry. 2022 Mar 1;9(3):192.

14. Banerjee D, Kosagisharaf JR, Sathyanarayana Rao TS. "The dual pandemic" of suicide and COVID-19: A biopsychosocial narrative of risks and prevention. Psychiatry Res. 2021 Jan; 295:113577.

15. Kaeley N, Bhushan B, Subramanyam V, Kumar S, Kabi A. Clinical and demographic characteristics of geriatric patients with acute poisoning in the state of Uttarakhand. J Fam Med Prim Care. 2019 Feb;8(2):443–8.

16. Jegaraj MKA, Mitra S, Kumar S, Selva B, Pushparaj M, Yadav B, et al. Profile of deliberate self-harm patients presenting to Emergency Department: A retrospective study. J Fam Med Prim Care. 2016;5(1):73–6.

17. Lovero KL, Dos Santos PF, Come AX, Wainberg ML, Oquendo MA. Suicide in Global Mental Health. Curr Psychiatry Rep. 2023 Jun;25(6):255–62.

18. Bhaskaran AS, Reddi VSK, Suchandra HH, Gowda GS, Muliyala KP. Predictors of future suicide attempts in individuals with high suicide risk admitted to an acute psychiatry suicide intervention unit in India. A survival analysis study. Asian J Psychiatry. 2022 Dec; 78:103270.

19. Kosaraju SKM, Vadlamani LN, Mohammed Bashir MS, Kalasapati LK, Rao GLVC, Rao GP. Risk factors for suicidal attempts among lower socioeconomic rural population of telangana region. Indian J Psychol Med. 2015;37(1):30–5.

20. Alothman D, Fogarty A. Global differences in geography, religion and other societal factors are associated with sex differences in mortality from suicide: An ecological study of 182 countries. J Affect Disord. 2020 Jan 1; 260:67–72.

21. Shidhaye R. Suicide in Indian women. Lancet Public Health. 2023 May 1;8(5): e323–4.

22. Mohanty S, Sahu G, Mohanty MK, Patnaik M. Suicide in India – A four-year retrospective study. J Forensic Leg Med. 2007 May 1;14(4):185–9.

23. Sharma BR, Gupta M, Sharma AK, Sharma S, Gupta N, Relhan N, et al. Suicides in Northern India: comparison of trends and review of literature. J Forensic Leg Med. 2007 Aug;14(6):318–26.

24. Barry R, Rehm J, de Oliveira C, Gozdyra P, Chen S, Kurdyak P. The relationship between rurality, travel time to care and death by suicide. BMC Psychiatry. 2023 May 17;23(1):345.

25. Menon V, Varadharajan N, Bascarane S, Subramanian K, Mukherjee MP, Kattimani S. Psychological autopsy: Overview of Indian evidence, best practice elements, and a semi-structured interview guide. Indian J Psychiatry. 2020;62(6):631.

26. Claveria O. Global economic uncertainty and suicide: Worldwide evidence. Soc Sci Med 1982. 2022 Jul; 305:115041.

27. Prabhakar K, Aswathanarayana A, Kumar Reddy KH. Reasons for Suicide Attempts in South India during the COVID-19 Pandemic. Clin Med Res. 2022 Mar;20(1):34–9.

28. Rappai R, V Cherian A, Lukose A, Vijayakumar L. Suicide research in India: An overview of four decades. Asian J Psychiatry. 2020 Oct; 53:102191.

29. Singh PK, Rao VR. Explaining suicide attempt with personality traits of aggression and impulsivity in a high-risk tribal population of India. PloS One. 2018;13(2): e0192969.

30. Menon V, Cherian A, Vijayakumar L. Rising incidence and changing demographics of suicide in India: Time to recalibrate prevention policies? Asian J Psychiatry. 2021 Dec 25;69.

31. Balhara YPS, Kattula D, Singh S, Chukkali S, Bhargava R. Impact of lockdown following COVID-19 on the gaming behavior of college students. Indian J Public Health. 2020 Jun;64(Supplement): S172–6.

32. Manoranjitham SD, Rajkumar AP, Thangadurai P, Prasad J, Jayakaran R, Jacob KS. Risk factors for suicide in rural south India. Br J Psychiatry. 2010 Jan;196(1):26–30.

33. Vijayakumar L, Rajkumar S. Are risk factors for suicide universal? A case-control study in India. Acta Psychiatr Scand. 1999;99(6):407–11.

34. Kumar RS, Hashim U. Characteristics of suicidal attempts among farmers in rural South India. Ind Psychiatry J. 2017;26(1):28–33.

35. Moitra M, Santomauro D, Degenhardt L, Collins PY, Whiteford H, Vos T, et al. Estimating the risk of suicide associated with mental disorders: A systematic review and meta-regression analysis. J Psychiatr Res. 2021 May; 137:242–9.

36. Beniwal RP, Shrivastava MK, Gupta V, Sharma V, Sharma S, Kumari S, et al. Why Do People Live or Die? A Retrospective Study from a Crisis Intervention Clinic in North India. Indian J Psychol Med. 2022 Jan;44(1):17–21.

37. Thakur D, Gupta A, Thakur A, Mazta SR, Sharma D. Prevalence and predictors of suicidal ideations among school going adolescents in a hilly state of India. Ind Psychiatry J. 2015;24(2):140–3.

38. Arafat SMY, Ali SAEZ, Menon V, Hussain F, Ansari DS, Baminiwatta A, et al. Suicide methods in South Asia over two decades (2001-2020). Int J Soc Psychiatry. 2021 Nov;67(7):920–34.

39. Ramesh P, Taylor PJ, McPhillips R, Raman R, Robinson C. A Scoping Review of Gender Differences in Suicide in India. Front Psychiatry. 2022; 13:884657.

40. Armstrong G, Haregu T, Arya V, Vijayakumar L, Sinyor M, Niederkrotenthaler T, et al. Suicide-related Internet search queries in India following media reports of a celebrity suicide: an interrupted time series analysis. World Psychiatry. 2021 Feb;20(1):143–4.

41. Mohandoss AA. Ideological Cause and Hero Worship Related Suicides: Indian Perspective and Changing Trends During 2001-2014: An Exploratory Study. Indian J Psychol Med. 2016;38(6):553–9.

42. Fu KW, Yip PSF. Estimating the risk for suicide following the suicide deaths of 3 Asian entertainment celebrities: a meta-analytic approach. J Clin Psychiatry. 2009 Jun;70(6):869–78.

43. Menon V, Kar SK, Ransing R, Sharma G, Pattnaik JI, Kaliamoorthy C, et al. Changing trends in quality of media reporting of suicide in the community following a celebrity suicide in India. Aust N Z J Psychiatry. 2022 Jan;56(1):81–90.

44. Harshe D, Karia S, Harshe S, Shah N, Harshe G, De Sousa A. Celebrity suicide and its effect on further media reporting and portrayal of suicide: An exploratory study. Indian J Psychiatry. 2016;58(4):443–7.

45. Domaradzki J. The Werther Effect, the Papageno Effect or No Effect? A Literature Review. Int J Environ Res Public Health. 2021 Mar 1;18(5):2396.

46. Driessens O. Expanding celebrity studies' research agenda: theoretical opportunities and methodological challenges in interviewing celebrities. Celebr Stud. 2015;6(2):192–205.

47. Kar SK, Arafat SMY, Ransing R, Menon V, Padhy SK, Sharma P, et al. Repeated celebrity suicide in India during COVID-19 crisis: An urgent call for attention. Asian J Psychiatry. 2020 Oct; 53:102382.

48. Menon V, Padhy SK, Ransing R, Kar SK, Arafat SY. Impact of Celebrity Suicide on Population Mental Health: Mediators, Media, and Mitigation of Contagion. Indian J Psychol Med. 2020 Oct 16;42(6):588–90.

49. Menon V, Kar SK, Marthoenis M, Arafat SY, Sharma G, Kaliamoorthy C, et al. Is there any link between celebrity suicide and further suicidal behaviour in India? Int J Soc Psychiatry. 2021 Aug;67(5):453–60.

50. Mamun MA, Syed NK, Griffiths MD. Indian celebrity suicides before and during the COVID-19 pandemic and their associated risk factors: Evidence from media reports. J Psychiatr Res. 2020 Dec; 131:177–9.

51. Milner A, Spittal MJ, Pirkis J, LaMontagne AD. Suicide by occupation: systematic review and meta-analysis. Br J Psychiatry J Ment Sci. 2013 Dec;203(6):409–16.

52. Behere PB, Chowdhury D, Behere AP, Yadav R. Psychosocial aspects of suicide in largest industry of farmers in Vidarbha Region of Maharashtra. Ind Psychiatry J. 2021 Oct;30(Suppl 1): S10–4.

53. Merriott D. Factors associated with the farmer suicide crisis in India. J Epidemiol Glob Health. 2016;6(4):217–27.

54. Viswanathan DJ, Veerakumar AM, Kumarasamy H. Depression, Suicidal Ideation, and Resilience among Rural Farmers in a Drought-Affected Area of Trichy District, Tamil Nadu. J Neurosci Rural Pract. 2019;10(2):238–44.

55. Chinnasamy P, Hsu MJ, Agoramoorthy G. Groundwater Storage Trends and Their Link to Farmer Suicides in Maharashtra State, India. Front Public Health. 2019; 7:246.

56. Kumar RS, Hashim U. Characteristics of suicidal attempts among farmers in rural South India. Ind Psychiatry J. 2017;26(1):28–33.

57. Mishra KK, Prabhakar JV. Factors influencing suicidal attempt among the agrarian community of central Maharashtra. Ind Psychiatry J. 2020;29(1):93–6.

58. Sadanandan A. Political economy of suicide: financial reforms, credit crunches and farmer suicides in India. J Dev Areas. 2014;287–307.

59. Kennedy J, King L. The political economy of farmers' suicides in India: indebted cash-crop farmers with marginal landholdings explain state-level variation in suicide rates. Glob Health. 2014 Mar 26; 10:16.

60. Gruère G, Sengupta D. Bt cotton and farmer suicides in India: an evidence-based assessment. J Dev Stud. 2011;47(2):316–37.

61. Thomas G, De Tavernier J. Farmer-suicide in India: debating the role of biotechnology. Life Sci Soc Policy. 2017 May 11; 13:8.

62. Bhise MC, Behere PB. Risk Factors for Farmers' Suicides in Central Rural India: Matched Case-control Psychological Autopsy Study. Indian J Psychol Med. 2016;38(6):560–6.

63. Kannuri NK, Jadhav S. Cultivating distress: cotton, caste and farmer suicides in India. Anthropol Med. 2021 Dec;28(4):558–75.

64. Patel V, Ramasundarahettige C, Vijayakumar L, Thakur JS, Gajalakshmi V, Gururaj G, et al. Suicide mortality in India: a nationally representative survey. Lancet Lond Engl. 2012 Jun 23;379(9834):2343–51.

65. Bareeqa SB, Samar SS, Javed G, Ahmed SI, Humayun SH. Covid-19-Related Suicides in Pakistan, India, and Bangladesh: Can we Rely on Reporting System? A Rapid Systematic Review. Curr Treat Options Psychiatry. 2022;9(1):41–54.

66. Kar SK, Menon V, Arafat SMY, Rai S, Kaliamoorthy C, Akter H, et al. Impact of COVID-19 pandemic related lockdown on Suicide: Analysis of newspaper reports during pre-lockdown and lockdown period in Bangladesh and India. Asian J Psychiatry. 2021 Jun; 60:102649.

67. Banerjee D, Kosagisharaf JR, Sathyanarayana Rao TS. "The dual pandemic" of suicide and COVID-19: A biopsychosocial narrative of risks and prevention. Psychiatry Res. 2021 Jan; 295:113577.

68. Sheikh NA, Vasudeva A, Tripathi R. COVID-Related suicide during the second wave of COVID-19 pandemic in India: A tip of the iceberg of mental health problems. J Fam Med Prim Care. 2022 Aug;11(8):4159–67.

69. Singh GP. Lockdown and 3 Waves of Suicide in India During the COVID-19 Pandemic. Prim Care Companion CNS Disord. 2020 Sep 10;22(5):20com02794.

70. Efstathiou V, Stefanou MI, Siafakas N, Makris M, Tsivgoulis G, Zoumpourlis V, et al. Suicidality and COVID-19: Suicidal ideation, suicidal behaviors and completed suicides amidst the COVID-19 pandemic (Review). Exp Ther Med. 2022 Jan;23(1):107.

71. Shobhana SS, Raviraj KG. Global trends of suicidal thought, suicidal ideation, and self-harm during COVID-19 pandemic: a systematic review. Egypt J Forensic Sci. 2022;12(1):28.

72. Al-Mamun F, Kaggwa MM, Hosen I, Sikder MdT, Griffiths MD, Mamun MA. Suicide related to the COVID-19 pandemic in India: A systematic review. Discov Psychol. 2023 Jan 10;3(1):2.

73. Pathare S, Vijayakumar L, Fernandes TN, Shastri M, Kapoor A, Pandit D, et al. Analysis of news media reports of suicides and attempted suicides during the COVID-19 lockdown in India. Int J Ment Health Syst. 2020 Dec 3;14(1):88.

74. Dsouza DD, Quadros S, Hyderabadwala ZJ, Mamun MA. Aggregated COVID-19 suicide incidences in India: Fear of COVID-19 infection is the prominent causative factor. Psychiatry Res. 2020 Aug; 290:113145.

75. Sripad MN, Pantoji M, Gowda GS, Ganjekar S, Reddi VSK, Math SB. Suicide in the context of COVID-19 diagnosis in India: Insights and implications from online print media reports. Psychiatry Res. 2021 Apr; 298:113799.

76. Garcia EC, Vieira PSC, de Andrade Viana RC, Mariano FC, de Brito MIB, de Araújo Feitosa Neto J, et al. Domestic violence and suicide in India. Child Abuse Negl. 2022 May; 127:105573.

77. Prasad J, Abraham VJ, Minz S, Abraham S, Joseph A, Muliyil JP, et al. Rates and factors associated with suicide in Kaniyambadi Block, Tamil Nadu, South India, 2000-2002. Int J Soc Psychiatry. 2006 Jan;52(1):65–71.

78. Badiye A, Kapoor N, Ahmed S. An empirical analysis of suicidal death trends in India: a 5-year retrospective study. J Forensic Leg Med. 2014 Oct; 27:29–34.

79. Mythri SV, Ebenezer JA. Suicide in India: Distinct Epidemiological Patterns and Implications. Indian J Psychol Med. 2016;38(6):493–8.

80. Dandona R, Gupta A, George S, Kishan S, Kumar GA. Domestic violence in Indian women: lessons from nearly 20 years of surveillance. BMC Womens Health. 2022 Apr 21;22(1):128.

81. Rawat S, Joshi PC, Khan MA, Saraswathy KN. Trends and determinants of suicide in Warangal District Telangana, India: six years retrospective study based on secondary data. Egypt J Forensic Sci. 2018;8(1):1–8.

82. Vijayakumar L. Suicide in women. Indian J Psychiatry. 2015 Jul;57(Suppl 2): S233–8.

83. Vijayakumar L, Ray S, Fernandes TN, Pathare S. A descriptive mapping review of suicide in vulnerable populations in low and middle countries. Asia-Pac Psychiatry Off J Pac Rim Coll Psychiatr. 2021 Sep;13(3): e12472.

84. Virupaksha HG, Muralidhar D, Ramakrishna J. Suicide and Suicidal Behavior among Transgender Persons. Indian J Psychol Med. 2016;38(6):505–9.

85. Kar SK, Menon V, Mukherjee S, Bascarane S, Sharma G, Pattnaik JI, et al. Suicide reporting of LGBTQI+ population in India: An analysis of online media reports of the past decade. J Public Health Oxf Engl. 2023 Mar 14;45(1): e95–103.

86. Bhola P, Manjula M, Rajappa V, Phillip M. Predictors of non-suicidal and suicidal self-injurious behaviours, among adolescents and young adults in urban India. Asian J Psychiatry. 2017; 29:123–8.

87. Kharsati N, Bhola P. Patterns of non-suicidal self-injurious behaviours among college students in India. Int J Soc Psychiatry. 2015 Feb;61(1):39–49.

88. Krishnakumar P, Geeta MG, Riyaz A. Deliberate self harm in children. Indian Pediatr. 2011 May;48(5):367–71.

89. Grover S, Sarkar S, Chakrabarti S, Malhotra S, Avasthi A. Intentional Self-harm in Children and Adolescents: A Study from Psychiatry Consultation Liaison Services of a Tertiary Care Hospital. Indian J Psychol Med. 2015;37(1):12–6.

90. Arun P, Garg R, Chavan BS. Stress and suicidal ideation among adolescents having academic difficulty. Ind Psychiatry J. 2017;26(1):64–70.

91. Sahoo MK, Biswas H, Agarwal SK. Study on risk factors in adolescents admitted with deliberate self-harm in Tata main hospital, Jamshedpur. Ind Psychiatry J. 2018;27(1):80.

92. Bhola P, Rekha DP, Sathyanarayanan V, Daniel S, Thomas T. Self-reported suicidality and its predictors among adolescents from a pre-university college in Bangalore, India. Asian J Psychiatry. 2014 Feb;7(1):38–45.

93. Kumar P, Srivastava S, Mishra PS, Sinha D. Suicidal Ideation Among Adolescents-The Role of Sexual Abuse, Depression, and Impulsive Behavior. Front Psychiatry. 2021; 12:726039.

94. Sharma BR, Gupta M, Sharma AK, Sharma S, Gupta N, Relhan N, et al. Suicides in Northern India: comparison of trends and review of literature. J Forensic Leg Med. 2007 Aug;14(6):318–26.

95. C M, T M, P D, P M. The effects of cyberbullying victimization on depression and suicidal ideation among adolescents and young adults: a three-year cohort study from India. BMC Psychiatry [Internet]. 2022 Sep 9 [cited 2023 May 12];22(1). Available from: https://pubmed.ncbi.nlm.nih.gov/36085004/

96. Nath Y, Paris J, Thombs B, Kirmayer L. Prevalence and social determinants of suicidal behaviours among college youth in India. Int J Soc Psychiatry. 2012 Jul;58(4):393–9.

97. Chahal S, Nadda A, Govil N, Gupta N, Nadda D, Goel K, et al. Suicide deaths among medical students, residents and physicians in India spanning a decade (2010-2019): An exploratory study using online news portals and Google database. Int J Soc Psychiatry. 2022 Jun;68(4):718–28.

98. Kishor M, Chandran S, Vinay HR, Ram D. Suicide among Indian doctors. Indian J Psychiatry. 2021;63(3):279–84.

99. Das N, Khar P, Karia S, Shah N. Suicide among Health Care Professionals-An Indian Perspective. Healthc Basel Switz. 2022 Feb 11;10(2):354.

100. Banerjee N, Chatterjee I. Academic stress, suicidal ideation & mental well-being among 1 st semester & 3 rd semester medical, engineering & general stream students. Res World. 2016;7(3):73.

101. Harvey SB, Epstein RM, Glozier N, Petrie K, Strudwick J, Gayed A, et al. Mental illness and suicide among physicians. Lancet Lond Engl. 2021 Sep 4;398(10303):920–30.

102. Kapilan N. Suicide cases among nurses in India due to COVID-19 and possible prevention strategies. Asian J Psychiatry. 2020 Dec; 54:102434.

103. Kazlauskiene J, Navickas A, Lesinskiene S, Bulotiene G. Risk factors for suicide in cancer patients and preventive measures: a literature review Subtitle: Cancer patient's suicides and prevention. Arch Psychiatry Psychother. 2022;24(4).

104. Latha KS, Bhat SM. Suicidal behaviour among terminally ill cancer patients in India. Indian J Psychiatry. 2005;47(2):79–83.

105. Mohandoss AA, Thavarajah R. A study on suicide among Indians living with cancer during 2001-2014. Indian J Cancer. 2016;53(3):435–40.

106. Favril L, Shaw J, Fazel S. Prevalence and risk factors for suicide attempts in prison. Clin Psychol Rev. 2022 Nov; 97:102190.

107. Bardale RV, Dixit PG. Suicide behind bars: A 10-year retrospective study. Indian J Psychiatry. 2015;57(1):81–4.

108. Kuchewar SV, Bhosle SH, Shrigiriwar MB, Padole TO. Custody-related deaths in Maharashtra state of India - Analysis of autopsies performed at a medical Teaching Institute during the period 2000-2018. J Forensic Leg Med. 2020 Feb; 70:101915.

109. Aggarwal S, Patton G, Reavley N, Sreenivasan SA, Berk M. Youth self-harm in low- and middle-income countries: Systematic review of the risk and protective factors. Int J Soc Psychiatry. 2017 Jun;63(4):359–75.

110. Gandhi A, Luyckx K, Adhikari A, Parmar D, Desousa A, Shah N, et al. non-suicidal self-injury and its association with identity formation in India and Belgium: A cross-cultural case-control study. Transcult Psychiatry. 2021 Feb;58(1):52–62.

111. Fernandez JA, Jaladin RAM, Lau PL. Nonsuicidal Self-injury in Southeast Asia: A Systematic Literature Review. Millenn Asia. 2022 Jun 21;09763996221095146.

# Geriatric mental health epidemiology

Indu PV[1]

## Introduction

In India, there is a demographic ageing happening, that is, a shift in the distribution of population towards older ages.[1] A progressive increase in life expectancy, decrease in mortality rate and decline in death rate have contributed to this. Demographic ageing is more marked in states like Kerala, Tamil Nadu, Karnataka, Maharashtra and Himachal Pradesh.[1] The older population aged 60 years or more has a growth rate three times greater than that of the general population. Currently, the elderly population constitutes more than 10 crores and is projected to reach 20% of the total population by the year 2050, when one in five persons would be an older adult. The majority of older adults are women, live in rural areas, belong to below-poverty-line socio-economic status, and there is an increase in the proportion of those aged 80 years or more, i.e., the older-old.[2] Population ageing constitutes a major challenge to geriatric mental health. The physical and mental health problems faced by this population are unique. The prevalence of psychiatric morbidity is reported to be higher in the elderly population compared to younger ones.[1]

The World Health Organization (WHO) has reported that more than 20% of older adults experience a mental or neurological disorder and these disorders account for 6.6% of the disability-adjusted life years (DALYs) in this population.[3] Among these disorders, depression and dementia were identified as the most common ones, affecting almost 5% and 7% of the world's elderly population. Other disorders like anxiety disorders (3.8%) and substance use disorders (1%) are also seen frequently in this population. Many of these mental health disorders are under-reported due to the stigma associated and are underdiagnosed by health professionals.[3] In the Indian population also, depression, dementia and mood disorders have been observed to be common among older adults. Other common psychiatric disorders in this population are reported to be anxiety disorders, drug and alcohol abuse, delirium and psychosis.[4]

In a review of Indian epidemiological studies (2010), Math et al. estimated the prevalence of mental disorders in the geriatric population to be 25-30/1000. Not much change in prevalence was observed in follow-up studies, according to this review, but a dearth of follow-up studies was

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reported.[5] Depression was found to be the most common disorder and a common cause for disability in older adults. Other disorders reported from this review were insomnia, sexual dysfunction, anxiety disorders, somatoform disorders, organic mental disorders and dementia.[5]

## Psychiatric morbidity

One of the earliest Indian studies to assess psychiatric morbidity in older adults aged 60 years or above was done in a rural community in West Bengal in 1997. This door-to-door survey reported psychiatric morbidity in 61% of the population; depression was the most common.[6] In 1970, from a general mental health survey, Dube reported the prevalence of psychiatric morbidity in older adults to be 2.23%.[7] Another comparative study done in a rural North Indian community found the prevalence of psychiatric morbidity to be 43.32% in the geriatric population, which was higher than that in the non-geriatric population (4.66%).[7] In 2014, A community survey done in Lucknow reported the prevalence rate of psychiatric morbidity in the elderly population to be 17.34%.[8] A cross-sectional community-based study from Tezpur, Assam, observed that 24% of older adults aged 60 years or above had indications of mental health problems.[9]

In the first study done to find the prevalence of mental health problems among inhabitants of old age homes, in the city of Lucknow, 57.8% were found to suffer from one or other mental health problems, the most common being depression (37.8%).[10] A more recent study conducted among the inmates of old age homes in Lucknow reported the prevalence of psychiatric illness to be 43%.[11] In a cross-sectional, comparative study done in Khammam, the prevalence of psychiatric illnesses was reported to be greater in older adults living in the community (38.3%) compared to those living in old age homes (30.0%).[12] In a hospital-based study done in Bikaner, the prevalence of mental disorders diagnosed using the International Classification of Diseases – Tenth Edition (ICD-10) criteria was found to be 29%.[13,14] At least one psychiatric diagnosis, including substance use disorder, was observed in 62% of the elderly population attending the emergency services of a tertiary hospital in North India.[15] In 2022, a cross-sectional study of elderly patients aged 65 years or above admitted to non-psychiatric wards of a tertiary care centre in Maharashtra observed that 35.5% had psychiatric disorders.[16]

## Depression

Unlike other psychiatric disorders in the elderly population, a considerable amount of research has been undertaken in India on depression in the elderly. Studies assessing psychiatric morbidity have reported depression to be the most common disorder in older adults. The prevalence of depression in this population is found to range from 8.9% to 62.16% in various studies.[17] A review of prevalence studies by Barua et al. (2011) reported the median prevalence rate of depression in the global elderly population to be 10.3% (interquartile range [IQR] = 4.7%-16.0%), while it was significantly higher in India (21.9%, IQR = 11.6%-31.1%).[18] The prevalence of depression in older adults was observed to be 52.2% in a community-based study from rural West Bengal; it was more in women (70.4%).[6] Another community-based study from Lucknow reported that neurotic

depression was seen in 31.28% of the geriatric population.[7] From South India, a study from Vellore found that the prevalence of geriatric depression was 12.7%.[19] In a study done in urban slums in Mumbai, 45.9% of the geriatric population was found to suffer from depression.[20] From a study done in rural Tamil Nadu, 42.7% of older adults were found to have depression; 22.3% had mild depression, 13.6% had moderate depression and 6.8% had severe depression.[21] More recent community-based studies have reported the prevalence of depression in older adults aged 60 years and above to be 39.1% from Kerala,[22] 72.5% from urban Mangalore,[23] 22.72% from Haryana,[24] 72% and 67.5% from rural Tamil Nadu,[25,26] and 40.7% from Jammu & Kashmir.[27] A hospital-based cross-sectional study from Pune found the prevalence of geriatric depression to be 24.2%.[28] A cross-sectional analysis of the data from the Longitudinal Ageing Study in India (LASI) conducted from 2017-2018 of 31,464 older adults from all over India found the prevalence of depression to be around 29%.[29]

### *Risk factors*

A community-based study from Andhra Pradesh reported that depression was significantly more in those of higher age, females, those from rural areas, illiterates, widows/widowers, those staying alone and those suffering from stressful life events and chronic diseases.[30] Grover et al. (2015), in a review of Indian studies, found that increasing age, female gender, being, unmarried, divorced or widowed, belonging to a rural community, lower socioeconomic status, being illiterate and unemployed were the socio-demographic factors associated with depression in elderly. The psychosocial factors associated with geriatric depression identified were loneliness, poor social support, isolation, dependency and stressful life events, among others. Lifestyle factors like substance use or smoking, irregular dietary practices and lack of exercise were also implicated.[17] In a systematic review of 51 studies from 16 states of India that reported the prevalence of geriatric depression to be 34.4%, the pooled prevalence was found to be more among females, in rural populations and in the eastern parts of India.[31] Various studies have found increasing age, female gender, low socioeconomic status, being a widow, hailing from a rural community, living alone, poor family support, and being physically dependent to be risk factors for geriatric depression.[21,22,24,25,26,27] Some studies found that older adults with sleep disorders or insomnia were found to have a higher risk of depression;[24] while others reported a negative correlation between sleeping hours and depression scores.[25] From the longitudinal study LASI, it was observed that multi-morbidity, i.e. having two or more chronic physical conditions, increased the risk for depression in older adults even after adjusting for confounding variables, especially so in older males compared to females.[29] Similar findings were observed from other studies also.[24,26] A study from Tamil Nadu found that older adults with dementia were at higher risk for depression.[26]

### *Variance in prevalence*

In the systematic review of the prevalence studies from all over India over two decades, the authors observed that the estimates varied with the geographic region, method of sampling, the

questionnaire used and the presence of dementia. Studies that employed probability sampling found lower prevalence, which could be due to lesser selection bias and greater representative nature of the study sample. Studies that excluded dementia and those with larger sample size also reported lower prevalence; the former could be due to a reduction in the number of false positive cases. When questionnaires like the Geriatric Depression Scale (GDS) and Center for Epidemiological Studies Depression (CES-D) scale were used, the prevalence was found to be higher. This could be due to the high sensitivity of screening tools like GDS. In many studies, the tools used were not validated for the local population. The difference in the sensitivity and specificity of the tools used, as well as the lack of standardization of tools, could have contributed to the heterogeneity of the findings of these prevalence studies.[31] In a literature review of the psychometric properties of the self-report measures validated for assessment of depression in the elderly population, GDS was found to be the preferred questionnaire in older adults aged 65 years or above who are cognitively normal or mildly impaired.[32]

## Dementia

A meta-analysis of 20 epidemiological studies conducted in India from 1996 to 2017 found the prevalence of dementia to be approximately 20 per 1000, with a higher prevalence observed with increasing age.[33] Using a Delphi process, eight clinical and academic experts estimated the prevalence of dementia in India among older adults aged 60 years or above as 2.8%; indicating that almost 3.9 million persons were living with dementia in India. A higher prevalence was estimated in females compared to males.[34] Studies done in the late 1990's found that the prevalence of dementia in rural communities was 3.39% in Kerala,[35] 3.5% in Tamil Nadu[36] and 1.96% in Ballabhgarh, North India.[37] An urban community-based study from Kerala reported the prevalence of dementia as 3.36%. Although the previous study from a rural community in Kerala had found vascular dementia to be the most common type, this urban study reported Alzheimer's disease to be the most common type of dementia, followed by vascular dementia.[35,38] In a single-phase, cross-sectional study conducted in 11 sites of seven low- and middle-income countries by the 10/66 Dementia Research Group, the prevalence of dementia in rural India was observed to be 0.3% (95% CI = 0.1% – 0.5%).[39] A two-phase survey conducted in Kerala reported a prevalence higher than that reported from the rest of the subcontinent – 4.86% in those aged ≥65 years, with an age-adjusted rate of 6.44%.[40] Other cross-sectional studies have found the prevalence of dementia to be 1.83% from Jammu,[41] 4.1% from Maharashtra,[42] 5.1% and 2.4% from Uttar Pradesh,[43,44] 1.6% from Himachal Pradesh[45] and 10% from Karnataka.[46] In a longitudinal study done in Kolkata, the average annual incidence rate of dementia was 72.57 per 100,000 in those aged ≥55 years. The Disability Adjusted Life Years (DALYs) due to dementia was found to be 24.19 per 100,000, in this study.[47] The LASI estimated the prevalence of dementia in those aged 60 years or above to be 7.4%; about 8.8 million older adults were estimated to live with dementia. The prevalence ranged from 5.19% in Punjab to 11.04% in Jammu & Kashmir.[48] A study of dementia

patients from a memory clinic in India reported Alzheimer's disease to be the most common type (38.3%), followed by vascular dementia (25.4%), frontotemporal dementia (18.7%), dementia with Lewy bodies (8.9%) and mixed type (8.6%).[49]

### *Mild cognitive impairment (MCI)*

One of the earliest studies on MCI in India was from Kolkata, and it reported a prevalence of 14.89% – 6.04% amnestic type and 8.85% multiple domain type.[50] The 10/66 study found the crude prevalence of amnestic MCI to be 4.3% in India.[51] The prevalence of cognitive impairment was observed to be 10% in Hyderabad city,[52] and 8.8% in Ludhiana,[53] from cross-sectional studies conducted in those aged 60 years or above. In those with non-communicable diseases, the prevalence was observed as 18.0% in Puducherry.[54] A more recent cross-sectional study from Thiruvananthapuram, Kerala, found the prevalence of MCI to be high – 18.6% (95% CI = 14.7% – 23.4%).[55]

### *Risk factors*

From a meta-analysis of 14 observational studies, comorbidities like hypertension, diabetes mellitus, dyslipidaemia, tobacco use, alcohol use, past history of stroke and family history of dementia were found to be associated with dementia.[56] Increasing age, female sex and belonging to rural settings were identified as risk factors for dementia in various studies.[35,36,37,38,56] Family history of dementia was found to be a risk factor for Alzheimer's disease, and a history of smoking and hypertension for vascular dementia.[35,38] Older age, low socioeconomic status, low educational status, being unemployed, alcohol addiction and family history were found to be risk factors, while marriage and social network were found to be protective.[42,43]

Amnestic MCI was found to be associated with male gender.[50] Increasing age, unmarried or widowed status, illiteracy, unemployment, poverty, being bedridden for six months, having higher scores of depression, greater use of medications including benzodiazepine use, history of fall, and loss of spouse were some of the risk factors for MCI identified from various studies.[52, 53,57]

The wide differences in the prevalence of dementia as well as MCI could be due to the differences in the diagnostic criteria used, the cognitive domains assessed, criteria for recruiting participants, study objectives and statistical analysis.[56,58]

## Other psychiatric disorders

Only a few studies have assessed other psychiatric disorders in older adults. The 10/66 study reported the prevalence of anxiety in the urban Indian population to be 3.0%; the prevalence of subthreshold anxiety was more than 30%. Belonging to younger age group, female sex, living in urban area and comorbid dementia were the factors identified to be associated with anxiety in Indian population.[59] In elderly people attending a geriatric clinic in North India, the prevalence of comorbid anxiety disorders was found to be 4.0%.[14] In older adults with depression, more than two-thirds of the study sample in a multi-centric study, was found to have all the symptoms of

anxiety according to the Generalized Anxiety Disorder-7 (GAD-7) Scale. Somatic symptoms were also highly prevalent in this population.[60] The National Mental Health Survey of India done in 2015-16, the current weighted prevalence of anxiety disorders was 3.31% in those aged 60 years or above; the most prevalent was specific phobias (1.72%), and the next was agoraphobia (1.6%).[61]
A community-based survey conducted in rural Lucknow reported the prevalence of mood disorders in older adults to be 7.6%, substance use disorder 4.0%, neurotic, stress-related and somatoform disorders 2.0% and psychoses 0.6%. Non-organic sleep disorders were seen in 1.7% of the sample.[44] In a multi-centric study of elderly with depression, 25.8% were having current suicidal ideas, and almost one in ten of them had attempted suicide. Depression comorbid with anxiety disorders or substance use disorders, especially alcohol dependence, was associated with suicidal ideas and attempts.[62] A cross-sectional study from Ranchi, done in older adults aged 65 years or above, found depression (16.3%), dementia (14.9%) and GAD (6.4%) to be the most common psychiatric illnesses in older adults. Alcohol dependence was observed in 4.0%, bipolar disorders in 2.5% and schizophrenia spectrum disorders in 1.5% of this population.[63]
Overall, there was a paucity of studies assessing the prevalence of psychiatric disorders other than depression and dementia in elderly population.

## Conclusion

There is a high prevalence of psychiatric morbidity, in general, among elderly population in India. As in the rest of the world, depression is the most common disorder reported among older adults in India also, followed by dementia. Studies on other psychiatric disorders are limited in number. The prevalence rates of psychiatric disorders in this population are also found to vary widely, from one region to another. Although descriptive epidemiological studies in geriatric psychiatry have increased in India, the wide variations in the prevalence reported could be due to the differences in the sampling strategies, definition of illnesses or diagnostic criteria used, screening instruments used or the informants from whom the data is collected. The generalizability of findings obtained from one geographical area to another in India is questionable, considering the unique socio-demographic and cultural factors of different regions of the country. More descriptive and analytical studies, including longitudinal studies and experimental studies, need to be undertaken to assess the risk factors, incidence, course, prognosis and outcome of interventions in psychiatric disorders in the elderly population.

**Take home messages**

- Indian population is ageing; there is an increase in psychiatric morbidity in older adults with an increase in longevity.
- Depression is the most common psychiatric disorder in older adults in India, with prevalence rates of up to 72.5% reported in various community-based, cross-sectional studies.
- The prevalence of dementia is found to increase with increasing age – up to 14.9% reported in those aged 65 years or above.
- Anxiety disorders, sleep disorders, somatoform disorders, bipolar disorders, substance use disorders and psychotic disorders are also seen in older adults.
- There is a wide variance in the prevalence of psychiatric disorders in older adults in India; the generalizability of the findings from one geographical area to another is disputed.
- Well-designed, multi-centric studies using appropriate sampling strategies, validated tools and diagnostic criteria are needed to assess the prevalence and predictors of psychiatric disorders in older adults in India.

## References


1. Rangarajan SK, Sivakumar PT, Manjunatha N, Kumar CN, Math SB. Public health perspectives of geriatric mental health. Indian J Psychol Med. 2021;43(5S):1S–7S.
2. Lodha P, De Sousa A. Geriatric mental health: The challenges for India. Geriatr Ment Health 2018; 5:16-29.
3. World Health Organization. Mental health of older adults. Geneva: World Health Organization; 2017. Downloaded from: https://www.who.int/news-room/fact-sheets/detail/mental-health-of-older-adults (26 May 2023).
4. Girdhar R, Sethi S, Vaid RP, Khurana H. Geriatric mental health problems and services in India: a burning issue. Journal of Geriatric Care and Research 2019; 6:15-9.
5. Math SB, Srinivasaraju R. Indian psychiatric epidemiological studies: learning from the past. Indian J Psychiatry 2010;52: S95-103.
6. Nandi PS, Banerjee G, Mukherjee SP, Nandi S, Nandi DN. A study of psychiatric morbidityof the elderly population of a rural community in West Bengal. Indian J Psychiatry 1997;39(2):122-9.
7. Tiwari SC. Geriatric psychiatric morbidity in rural Northern India. International Psychogeriatrics 2000;12(1): 35-48.
8. Tiwari SC, Tripathi RK, Kumar A, Kar AM, Singh R, Kohli VK, et al. Prevalence of psychiatric morbidity among urban elderlies: Lucknow elderly study. Indian J Psychiatry 2014; 56:154-60.
9. Kwan P, Ali A, Deuri SP. Psychaitric morbidity, quality of life, and perceived social support among elderly population: a community-based study. Open J Psychiatry Allied Sci 2016; 7:31-5. Available from: DOI: 10.5958/2394-2061.2016.00007.0.
10. Kumar P, Das A, Rautela U. Mental and physical morbidity in old age homes of Lucknow, India. Delhi Psychiatry Journal 2012;(15(1): 111-7.
11. Akbar S, Tiwari SC, Tripathi RK, Pandey NM, Kumar A. Prevalence of psychiatric illness among residents of old age homes in Northern India. J Neurosci Rural Pract 2018; 9:193-6.
12. Singh AP, Kumar KL, Reddy CMPK. Psychiatric morbidity in geriatric population in old age homes and community: a comparative study. Indian J Psychol Med 2012; 34:39-43.
13. World Health Organization. International Statistical Classification of Diseases and Related Health Problem: Tenth revision. World Health Organization. Geneva: World Health Organization; 2014.
14. Prakash O, Gupta LN, Singh VB, Singhal AK, Verma KK. Profile of psychiatric disorders and life events in medically ill elderly persons: experiences from geriatric clinic in Northern India. Int J Geriatr Psychiatry 2007; 22:1101-5.

15. Grover S, Natarajan V, Rani S, Reddy SC, Bhalla A, Avasthi A. Psychiatric morbidity among elderly presenting to emergency medical department: a study from tertiary hospital in North India. Geriatr Ment Health 2018; 5:49-54.
16. Khan A, Vijay P, Sowmya AV, Chaudhury S, Chaudhuri B, Saldanha D, et al. Prevalence of psychiatric morbidity in elderly hospitalized patients. Med J DY Patil Vidyapeeth 2022; 1-10. Available from: DOI: 10.4103/mjdrdypu.mjdrdypu_922_21.
17. Grover S, Malhotra N. Depression in elderly: A review of Indian research. J Geriatr Ment Health 2015; 2:4-15.
18. Barua A, Ghosh MK, Kar N, Basilio MA. Prevalence of depressive disorders in elderly. Journal of Neurosciences in Rural Practice 2010;1(2):67-73.
19. Rajkumar AP, Thangadurai P, Senthilkumar P, Gayathri K, Prince M, Jacob KS. Nature, prevalence and factors associated with depression among elderly in a rural south Indian community. International Psychogeriatrics 2009; 21:372–8.
20. Jain RK, Aras RY. Depression in geriatric population in urban slums of Mumbai. Indian J Public Health 2007;51(2):112-3. Ann Saudi Med 2011;31(6):620-4.
21. Sinha SP, Srivastava SR, Ramasamy J. Depression in an older adult rural population in India. MEDICC Review 2013;15(4):41-4.
22. Nakulan A, Sumesh TP, Kumar S, Rejani PP, Shaji KS. Prevalence and risk factors for depression among community resident older people in Kerala. Indian J Psychiatry 2015; 57:262-6.
23. Mandolikar RY, Naik P, Akram MDS, Nirgude AS. Depression among elderly: A cross-sectional study in an urban community. International Journal of Medical Science and Public Health 2017;6(2):318-22.
24. Chawla S, Gour N, Goel PK, Rohilla R. Depression and its correlates among geriatric people: A community-based study from Southern Haryana, India. Indian Journal of Community &Family Medicine 2018;4(2):49-54.
25. Kumar D, Joseph A, Thiyagarajan A, Shree S. Prevalence of depression among elderly in rural South India. Indian Journal of Public Health Research &Development 2019;10(11):92-5.
26. Bincy K, Logaraj M, Ramraj B. Depression and its associated factors among the older adults in rural Tamil Nadu, India. Clinical Epidemiology and Global Health 2021;10;100677. Available from: https://doi.org/10.1016/j.cegh.2020.100677.
27. Sahni B, Bala K, Kumar T, Narangyal A. Prevalence and determinants of geriatric depression North India: A cross-sectional study. J Family Med Prim Care 2020; 9:2332-6.
28. Gopal S, Chacko M, Sharma PA, Mitra D. Prevalence of depression among geriatric population. Indian Journal of Psychiatric Nursing 2018;15(2):42-5.

29. Ansari S, Anand A, Hossain B. Multimorbidity and depression among older adults in India: Mediating role of functional and behavioural health. PLoS ONE 2022;17(6): e0269646. Available from: https://doi.org/10.1371/journal.pone.0269646
30. Manjubhashini S, Krishnababu G, Krishnaveni A. Epidemiological study of depression among population above 60 years in Vishakhapatnam, India. International Journal of Medical Science and Public Health 2013;2(3):695-72.
31. Pilania M, Yadav V, Bairwa M, Behera P, Gupta SD, Khurana H, et al. Prevalence of depression among the elderly (60 years and above) population in India, 1997-2016: a systematic review and meta-analysis. BMC Public Health 2019; 19:832. Available from: https://doi.org/10.1186/s12889-019-7136-z.
32. Balsamo M, Cataldi F, Carlucci L, Padulo C, Fairfield B. Assessment of late-life depression via self-report measures: a review. Clinical Interventions in Aging 2018; 13:2021-44.
33. Choudhary A, Ranjan JK, Asthana HS. Prevalence of dementia in India: A systematic review and meta-analysis. Indian J Public Health 2021; 65:152-8.
34. Farina N, Rajagopalan J, Alladi S, Ibnidris A, Ferri CP, Knapp M, et al. Estimating the number of people living with dementia at different stages of the condition in India: A Delphi process. Dementia 2023;0(0):1-14. Available from: DOI: 10.1177/14713012231181627.
35. Shaji S, Promodu K, Abraham T, Roy KJ, Verghese A. An epidemiological study of dementia in a rural community in Kerala. Br J Psychiatry 1996; 168:745-9.
36. Rajkumar S, Kumar S, Thara R. Prevalence of dementia in a rural setting: a report from India. International Journal of Geriatric Psychiatry 1997; 12:702-7.
37. Chandra V, Ganguli M, Pandav R, Johnston J, Belle S, DeKosky ST. Prevalence of Alzheimer's disease and dementia in rural India – the Indo-US study. Neurology 1998; 51:1000-8.
38. Shaji S, Bose S, Verghese A. Prevalence of dementia in an urban population in Kerala, India. Br J Psychiatry 2005; 186:136-40.
39. Rodriguez JJL, Ferri CP, Acosta D, Guerra M, Huang Y, Jacob KS, et al. Prevalence of dementia in Latin America, India, and China: a population-based cross-sectional survey. Lancet 2008; 372:464-74.
40. Mathuranath PS, Cherian PJ, Mathew R, Kumar S, George A, Alexander A, et al. Dementia in Kerala, South India: prevalence and influence of age, education and gender. Int J Geriatr Psychiatry. 2010;25(3):290-7.
41. Raina SK, Razdan S, Pandita KK. Prevalence of dementia in ethnic Dogra population of Jammu district, North India: a comparison survey. Neurology Asia 2010;15(1):65-69.

42. Saldanha D, Mani MR, Srivastava K, Goyal S, Bhattacharya D. An epidemiological study of dementia under the aegis of mental health program, Maharashtra, Pune chapter. Indian J Psychiatry 2010; 52:131-9.
43. Poddar K, Kant S, Singh A, Singh TB. An epidemiological study of dementia among the habitants of eastern Uttar Pradesh, India. Ann Indian Acad Neurol 2011; 14:164-8.
44. Tiwari SC, Srivastava G, Tripathi RK, Pandey NM, Agarwal GG, Pandey S, et al. Prevalence of psychiatric morbidity amongst the community dwelling rural older adults in northern India. Indian J Med Res 2013; 138:504-14.
45. Raina SK, Raina S, Chander V, Grover A, Singh S, Bhardwaj A. Rural, and tribal elderly population of Himalayan region in northern India. North Am J Med Sci 2014; 6:172-7.
46. Rao TSS, Darshan MS, Tandon A, Raman R, Karthik KN, Saraswathi N, et al. Suttur study: An epidemiological study of psychiatric disorders in south Indian rural population. Indian J Psychiatry 2014; 56:238-45.
47. Banerjee TK, Dutta S, Das S, Ghosal M, Ray BK, Biswas A, et al. Epidemiology of dementia and its burden in the city of Kolkata, India. Int J Geriatr Psychiatry 2017;32(6):605-14.
48. Lee J, Meijer E, Langa KM, Ganguli M, Varghese M, Banerjee J, et al. Prevalence of dementia in India: national and state estimates from a nationwide study. Alzheimers Dement 2023;1-15. Available from: DOI: 10.1002/alz.12928.
49. Alladi S, Mekala S, Chadalawada SK, Jala S, Mridula R, Kaul S. Subtypes of dementia: a study from a memory clinic in India. Dement Geriatr Cogn Disord 2011; 32:32-8.
50. Das SK, Bose P, Biswas A, Dutt A, Banerjee TK, Hazra A, et al. An epidemiologic study of mild cognitive impairment in Kolkata, India. Neurology 2007;68;2019-26.
51. Sosa AL, Albanese E, Stephen BCM, Dewey M, Acosta D, Ferri CP, et al. Prevalence, distribution, and impact of mild cognitive impairment in Latin America, China, and India: a 10/66 population-based study. PLoS Medicine 2012;9(2): e1001170. Available from: doi: 10.1371/journal.pmed.1001170.
52. Konda PR, Sharma PK, Gandhi AR, Ganguly E. Correlates of cognitive impairment among Indian urban elders. J Gerontol Geriatr Res 2018;7(6):1-17. Available from: doi:10.4172/2167-7182.1000489.
53. Sengupta P, Benjamin AI, Singh Y, Grover A. Prevalence and correlates of cognitive impairment in a north Indian elderly population. WHO South-East Asia Journal of Public Health 2014;3(2):135-43.
54. Krishnamoorthy Y, Sarveswaran G, Sakthivel M, Rehman T, Majella MG, Kumar SG. Screening for mild cognitive impairment among noncommunicable disease patients attending a rural primary health center in Puducherry, South India. J Nat Sc Biol Med 2019; 10:77-81.

55. Iype T, Babu V, Sreelakshmi PR, Alapatt PJ, Rajan R, Soman B. The prevalence of mild cognitive impairment (MCI) among older population of rural Kerala: a cross-sectional study. Neurol India 2023;71(2):296-300.
56. Varkey BP, Joseph J, Haokip HR, Sharma SK, Mathews E, Ameen S, et al. The prevalence of comorbidities and associated factors among patients with dementia in the Indian setting: meta-analysis of observational studies. Indian J Psychol Med 2022;1-7. Available from: https://doi.org/10.1177/02537176221130252.
57. Paul AB, Padmanabhan DS, Suresh V, Nayagam SN, Kartha N, Paul G, et al. Analysis of neuropathological comorbid conditions in elderly patients with mild cognitive impairment in a tertiary care center in South India. J Family Med Prim Care 2022; 11:1268-74.
58. Casagrande M, Marselli G, Agostini F, Forte G, Favieri F, Guarino A. The complex burden of determining prevalence rates of mild cognitive impairment: A systematic review. Front Psychiatry 2022; 13:960648. Available from: doi: 10.3389/fpsyt.2022.960648.
59. Prina AM, Ferri CP, Guerre M, Brayne C, Prince M. Prevalence of anxiety and its correlates among older adults in Latin America, India and China: cross-cultural study. Br J Psychiatry 2011; 199:485-91.
60. Grover S, Avasthi A, Sahoo S, Lakdavala B, Nebhinani N, Dan A, et al. Indian Association of Geriatric Mental Health's multi-centric study on depression in elderly: symptom profile and influence of gender, age of onset, age at presentation, and number of episodes on symptom profile. J Geriatr Ment Health 2018; 5:35-48.
61. Sinha P, Hussain T, Boora NK, Rao GN, Varghese M, Gururaj G, et al. Prevalence of common mental disorders in older adults: Results from the National Mental Health Survey of India. Asian Journal of Psychiatry 2021; 55:102463. doi: 10.1016/j.ajp.2020.102463.
62. Grover S, Sahoo S, Avasthi A, Lakdawala B, Dan A, Nebhinani N, et al. Prevalence of suicidality and its correlates in geriatric depression: A multicentric study under the aegis of the Indian Association for Geriatric Mental Health. J Geriatr Ment Health 2019; 6:62-70.
63. Seby K, Chaudhury S, Chakraborty R. Prevalence of psychiatric and physical morbidity in an urban geriatric population. Indian J Psychiatry 2011; 53:121-7.

# Epidemiology of Personality Disorders

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## Introduction

Mental health professionals have long recognized that people with personality disorders are seen in significant numbers in clinics, have an increased use of medical services, and frequently encounter the criminal justice system.(1) Personality disorders are linked to increased rates of marital separation and divorce, unemployment, decreased productivity, and a lower quality of life for both the individual and their family. Individuals with personality disorders are at an increased risk of morbidity due to higher prevalence of axis 1 psychiatric disorders and medical co-morbidities; as well as an increased risk of mortality due to suicide, homicide, and accidents. Additionally, the presence of a personality disorder often complicates the treatment of these comorbid psychiatric or medical conditions, making it more challenging, lengthier, or less effective. (2) This difficulty may arise due to various reasons, including a failure to recognize the underlying personality disorder.

The definition of personality disorders given by the International Classification of Diseases (ICD-10) states that 'personality disorders' comprise of deeply ingrained and enduring behavioural patterns, manifesting themselves as inflexible responses to a broad range of personal and social situations. (3) ICD-10 classified personality disorders into 9 specific personality disorders and was more or less in sync with the model adopted by DSM-IV, which defined 11 discreet personality disorders. This categorical classificatory system received criticism for being too complex, having extensive overlap, being difficult to use and not taking into account the wide variations in levels of personality disturbance and the associated impairment. (4,5) Subsequently, DSM-5 tried to transition to a dimensional model, which was not accepted; nonetheless, it was included in DSM-5 as an 'Alternative Model of Personality Disorders'.(6) Finally, the ICD-11 has adopted a dimensional approach to the classification of personality disorders with measure of severity

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and trait domain specifiers. The model does not retain traditional personality types, except for a borderline specifier.(7)

Ever since the Diagnostic and Statistical Manual (DSM-III) introduced a separate diagnostic axis (Axis II) for personality disorders in 1980, there has been a substantial surge in scholarly interest towards the description and classification of these disorders in the West. This academic curiosity has gradually begun to permeate other regions of the world, including the LMICs, albeit the literature from these regions remains comparatively limited. (8)

## Assessment methodology: relevance to epidemiology

When interpreting the results of epidemiological studies, it is important to pay attention to several methodological considerations, including the diagnostic classification used, assessment tools employed, sampling techniques utilized, and the influence of cultural factors. Until the early 1990s, the epidemiological data on personality disorders was mostly limited to special settings or biological relatives of individuals affected by psychopathology, and there were very few community surveys. Additionally, most of the early studies did not employ explicit diagnostic criteria or structured clinical interviews. Thus, the estimates from the non-clinical population were mostly based on informed speculation. A general understanding was that some personality disorders like borderline personality disorder were common in the population.(9)

Personality disorder can be assessed in several ways, including self-report, checklists and structured clinical interview, however, diagnosing personality disorder faces challenges concerning reliability and validity. The reliability of the personality disorder diagnoses, when assessed simply based on clinical interview is lower than Axis I psychiatry diagnoses. Moreover, there is low reliability when comparing different personality disorder instruments, especially between self-report instruments and semi-structured interviews. The variability in prevalence rates of personality disorders is linked to a significant risk of bias when relying on self-rated diagnostic assessments rather than expert-rated assessments. (10) Generally, the structured clinical interview is regarded as more robust than self-report questionnaires as the latter tend to overreport personality pathology compared with a more detailed structured clinical evaluation. As a result, while cost-effective, self-report instruments are typically considered suitable only for screening purposes for personality disorders. (11,12) On the other hand, diagnostic interviews demand clinical expertise, extensive training, and consume more time.(13)

## Global rates

### *Community prevalence*

Several studies have been conducted over the past three decades to examine the prevalence of personality disorders in the community. The most extensive data come from epidemiological surveys in the United States of America, followed by Europe and have used DSM–III, DSM–III–R or DSM–IV criteria. The prevalence rates of personality disorders are mostly observed to be in the range of 9.1% to 11.1%, as shown in Table 1.(14–21)

In 2009, World Health Organization (WHO) published the cross-national prevalence of PDs as obtained from the World Mental Health Survey (WMH Survey) spanning 13 countries.(23) It reported a prevalence of 6.1% for 'any PD'.

In 2020, Winsper et al conducted a meta-analysis on the global prevalence of personality disorders. They included a total of 46 studies from 21 countries. The global pooled prevalence was 7.8%. The pooled prevalence rates were higher in higher income countries. It was reported to be higher when two stage assessments were conducted. Interviews conducted by trained graduates or psychologists yielded significantly higher prevalence rates than those conducted by experienced clinicians. The plausible reasons considered for the lower prevalence in the LMICs include variations in behavioural norms across countries, difference in social control mechanisms and its impact on anti-social behaviours, and the lack of cultural adaptation of assessment tools. (24)

| **Study**<br>**Country** | **Diagnostic classification**<br>**Sample size**<br>**Assessment method** | **Overall prevalence** |
|---|---|---|
| Reich et al. (1989)<br>*(The Iowa study)*<br>United States | DSM-III<br>235<br>Personality Disorder Questionnaire (PDQ) | 11.1% |
| Lenzenweger et al. (1997)<br>*Longitudinal Study of Personality Disorder (LSPD)*<br>United States | DSM-III-R<br>2000<br>International Personality Disorder Examination (IPDE) | 11% |
| Samuels et al (2002)<br>*The Baltimore Study*<br>Baltimore, United States | DSM-IV<br>742<br>IPDE | 9% |
| Lenzenweger et al. (2007)<br>*National Comorbidity Survey-Replication (NCS-R)* United States | DSM-IV<br>5692<br>IPDE | 9.1% |
| Grant et al. (2004), Stinson et al. (2008) Pulay et al. (2009)<br>*National Epidemiologic Survey on Alcohol and Related Disorders (NESARC II)* United States | DSM-IV<br>43093<br>Alcohol Use Disorders and Associated Disabilities Interview Schedule-IV (AUDADIS-IV) | Any PD - not mentioned.<br>Dependent (0.5%) to Obsessive-compulsive (7.9%) |
| Togerson et al. (2001)<br>Oslo, Norway | DSM-III-R<br>2053<br>Structured Interview for DSM-III-R Personality (SIDP-R) | 13.4% |
| Coid et al. (2006)<br>*(The National Survey of Psychiatric Morbidity, Phase 2)* Great Britain | DSM-IV<br>626<br>Structured Clinical Interview for DSM–IV Axis II disorders (SCID-II) | 4.4% |
| Lindal et al. (2009)<br>Iceland | DSM-IV & ICD-10<br>805<br>DSM-IV and ICD-10 Personality Disorder Questionnaire (DIP-Q) | 11% & 12% respectively |
| Jackson et al. (2000) (22)<br>*Australian National Survey of Mental Health and Well Being (ANSMHWB)*<br>Australia | ICD-10<br>10641<br>IPDE | 6.5% |
| Huang et al (2009) (23)<br>WHO Mental Health Survey<br>13 countries | DSM-IV<br>21162<br>IPDE | 6.1% |

### *Clinical settings*

Understanding the frequency of personality disorders among individuals seeking clinical help is highly valuable for mental health professionals. It is well established that the prevalence of PDs in clinical population far exceeds the general population. In a recent meta-analysis, Beckwith et al found widely varying prevalence rates with estimates in Europe ranging from 40% to 92%, while in the USA, the estimates were more consistent, at around 45% to 51%. The prevalence rates differed significantly in two Asian studies, with one reporting a rate of 1.07% in India and another indicating a rate of 60% in Pakistan. The most commonly diagnosed categories were anxious/avoidant and borderline personality disorders followed by obsessive–compulsive personality disorder and personality disorder not otherwise specified.(25) The high variability in the estimates can be attributed to multiple factors including poor diagnostic reliability, especially when based on one interview, sampling methods, different study instruments, differences in help seeking patterns of people with various personality disorders, presence of Axis 1 diagnosis, use of informants and cultural differences. (26)

In the preliminary trials conducted to compare the ICD-10 and ICD-11 prevalence of personality disorder in 3 different clinical samples, the prevalence of generic personality disorder was 33.8% using the ICD-10 diagnosis compared with 40.4% using ICD-11 with 103 (14.3%) discordant assessments. The discordant assessments were primarily between no personality disorder using ICD-10 and the mild personality disorder group in ICD-11. The ICD-10 diagnoses and the domain traits in ICD-11 showed predictable overlap, however, the interpretation is still inconclusive. (27)

### *Prison population*

One setting requiring a special mention is the prison. Research indicates that personality disorders are commonly observed among incarcerated individuals. Certain personality disorders tend to be more prevalent among prisoners. Antisocial personality disorder (ASPD) is a commonly diagnosed disorder in this population. According to Fazel et al., approximately one in two male prisoners and about one in five female prisoners are diagnosed with ASPD.(28) Other disorders, such as borderline personality disorder (BPD) and narcissistic personality disorder (NPD), are also relatively common. High prevalence of personality disorders in prisoners can be attributed to various factors, including a history of childhood abuse, neglect, trauma, substance abuse, and

social disadvantage. These factors are often associated with both the development of personality disorders and criminal behaviour.

### *Individual PDs*

The prevalence data of individual personality disorders exhibit greater variation than the overall prevalence rates. Some personality disorders, such as schizoid PD, schizotypal PD, and narcissistic PD, have been subject to epidemiological studies that have demonstrated a prevalence close to zero. These findings, along with other factors like lack of evidence for distinct categories, arbitrary diagnostic thresholds, extensive overlap among categories, and insufficient clinical utility, have led researchers to question the categorical classification of these disorders. (29)

In the community, the prevalence of individual personality disorder ranges from about 0.5% to 2%. In clinical populations, cluster A personality disorders and borderline personality disorders are common in the inpatient setting (paranoid: 10-30%; schizoid: 16%; schizotypal: 2-20%, borderline: 20%); while a broader range of personality disorders are represented in the outpatient settings (paranoid: 2-20%; antisocial: 3-30%; borderline: 6%; histrionic: 10-15%: narcissistic: 6%; avoidant: 6%; obsessive compulsive: 10-20%). (30)

### *Determinants:*

Gender differences

Men and women are historically and commonly perceived to possess different temperament traits and the research has supported the same.(31) There is a common perception that women tend to be more emotional, and neurotic compared to men, but they are also seen as more agreeable. On the other hand, male gender is often associated with more assertive behaviour. (32) The assumption is made that the gender disparities observed in personality traits within the general population are also reflected in the sex distribution of personality disorders. (33) Certain PDs are believed to be more common in females (such as borderline, histrionic, and dependent), while others are suggested to be more prevalent in males (such as antisocial and paranoid). (34)

The hypothesized differences have however not been studied enough and the results on sex differences in the prevalence of personality disorders are inconsistent and influenced by the study population and potential diagnostic biases of the clinician due to gender or social stereotypes. (35) Some studies have observed a higher overall prevalence of PDs among males, whereas others have not observed any difference.(36) In general, Cluster A and Cluster B PDs have been reported to

be more prevalent in men. (18,36,37) However, in WMH surveys, while the overall prevalence of personality disorders and that of cluster A PDs was significantly higher in males; counterintuitively, the prevalence of Cluster C PDs was higher in males, and no gender difference was found for cluster B PDs.

For individual disorders, gender-related studies are primarily focused on two specific disorders, namely, antisocial personality disorder (ASPD) and borderline personality disorder (BPD). (35) ASPD has been found to much more common in men (M: F= 3:1) and borderline disorder in women. Obsessive compulsive personality disorder occurs almost twice as commonly in men as in women. For all other disorders, research on the sex preponderance is inconclusive, though some studies suggest that schizoid, schizotypal and narcissistic PD are slightly more common in men and histrionic and dependent PDs are slightly more common in women. (35)

While most epidemiological data is focussed on the binary gender division, it is appropriate to note the possibility of higher prevalence of personality disorders in transgender and gender-diverse people, especially among those seeking clinical help for gender dysphoria. (38)

Age

As with most of the findings from personality disorders epidemiology, findings on the age patterns are not consistent. In clinical populations, persons with borderline, antisocial and possibly schizotypal histrionic and narcissistic PDs tend to be younger whereas those with schizoid and obsessive PDs tend to be older.(39) This in part can also be explained by the longitudinal course of personality disorders.

Contrary to the prevailing notion that personality disorders are inherently chronic and intractable, research on the longitudinal course presents a different perspective. The prevalence rates of personality disorders mentioned earlier are essentially of the younger age groups, providing a cross-sectional snapshot. Studies suggest that personality disorders may attenuate, re-emerge, or appear de novo according to the cluster and the social context. (40) Clinical presentation of these disorders may change over time. A few studies have focused on the longitudinal course of PDs: the Children in the Community Study (CICS), the Longitudinal Study of Personality Disorders (LSPD), the McLean Study of Adult Development (MSAD), and the Collaborative Longitudinal Personality Disorders Study (CLPS). (41–44)

The CICS focused on the stability of personality disorder traits and found that levels of personality pathology decreased by 48% between adolescence (age 14–16) and early adulthood. In the LSPD, researchers found that personality disorder dimensions (e.g., affective instability) exhibited significant levels of stability, while personality disorder features (e.g., self-injurious behaviour, stress/paranoia) declined over time. (42) The CLPS, which was conducted over a span of 10 years, found that at two years of follow-up, 33% (schizotypal PD) to 55% (obsessive-compulsive PD) of individuals diagnosed with personality disorders achieved a period of remission based on a two-month standard. Furthermore, 23% (schizotypal) to 38% (obsessive-compulsive) experienced a 12-month remission. Borderline PD, commonly considered as the most morbid of all, showed an 85% remission rate at 10-year follow up (all criteria declined at the same rate). Only about 12% of remitted borderline PD patients relapsed over the 10-year follow-up period. The remission however did not translate into good social functioning. (42,45) Even, MSAD showed that 88% of patients experienced a remission within 10 years and only about 6% of the borderline patients had a recurrence of the disorder.

Other socio-demographic variables

Subjects with personality disorders are more often unmarried, separated or divorced, even though the true association of PD with marital status is still not determined. There is a negative association observed between presence of any personality disorder and education and socioeconomic status. This is true for most individual PDs, except for OCPD, which has been found to be associated with higher education in some studies.(16,46)

Culture

Social, religious, and family values with different traditions and practices tend to influence individual personality development and formation. Additionally, experiencing emotions, emotional control, and regulation of emotions is dependent on the social and cultural milieu which differs across countries, e.g., Latin Americans and Southern Europeans tend to express emotions more intensely while Asians (China) express themselves in a more reserved manner, with dependence and shyness being common qualities. (47) These differences in behaviour norms are expected to affect the formation and manifestation of personality as well as PD traits. The dimensions mainly considered in cross-cultural studies on personality and PDs are individualism versus collectivism, dependence versus independence, and idiocentrism vs. allocentrism. (48) Western societies and affluent countries are commonly characterized as individualistic cultures.

The higher occurrence of obsessive-compulsive personality disorder (PD) in modern societies could be connected to individualism. Collectivistic cultures exhibit lower crime rates and a lower prevalence of antisocial personality disorder compared to individualistic cultures. Importantly, in collectivistic cultures, dependency is not viewed as a symptom of a disorder. (47)

Empirical evidence is required to resolve the ongoing debate between cultural relativism and cultural universalism regarding the role of culture in the development of personality disorders. Importantly, cultural differences affect how we assess personality disorders, making it challenging to use the same standardized scales across different cultures. This means we need to consider cultural context and develop culturally sensitive approaches to ensure accurate assessments.

Co-morbid psychiatric diagnosis

The co-existence of personality disorders with other psychiatric diseases is common and it complicates the course of the disease. Common comorbid conditions include mood disorder, anxiety disorders, substance use disorders and eating disorders. Comorbidity is associated with an increased risk of suicidality. The risk of having at least one comorbid PD is high across all three mood disorders, namely, major depressive disorders, bipolar disorder, and dysthymic disorder. (49) Similarly, increased rates of PD are seen across all anxiety disorders with cluster C PDs being reported more commonly than cluster A and cluster B PDs. (50) A strong correlation was observed between substance use disorders and a variety of PDs in all 3 waves of the NESARC study. (51)

## Epidemiology of personality disorders in the Indian context

Personality disorders are frequently under-recognized in clinical practice, particularly in low- and middle-income countries (LMICs), where resources are limited and disorders like psychosis often receive higher priority. In India, while overall, mental health epidemiological studies have started to gain pace, the National Mental Health Survey, and the World Mental Health (WMH) Surveys did not provide data on personality disorders. The current literature from India is limited and focussed more on the clinical samples.

### *Community Studies*

In 1998, Reddy and Chandrashekar conducted a meta-analysis by examining 13 epidemiological studies conducted across various regions of India. (52) Within these studies, the prevalence of personality disorders was assessed in seven of them, revealing a range of 0% to 2.8% with a

weighted prevalence rate of 0.6%. Notably, a significant association was found between the diagnosis of personality disorder and the male gender.

In 2019, Shenoy et al. conducted a study to assess the prevalence of borderline personality disorder and its association with bipolar spectrum disorder (BSD) and binge eating disorder (BED) in college students in Karnataka. They used the McLead Screening Instrument for Borderline Personality Disorder (MSI-BPD) and found a prevalence of 15.2%, with equal distribution across both genders. (53) They also found a significantly higher proportion of BSD and BED amongst those with borderline personality disorder. It is important to note that a diagnostic instrument was not used in the study.

The prevalence rates of personality disorders in LMICs are often observed to be lower than in high-income countries, however, comparisons of data are impeded by methodological limitations within the surveys. Most of the studies conducted in LMICs have neglected co-morbidity and dual diagnosis. Furthermore, these studies have relied on screening instruments with low sensitivity and single informants, thus systematically leading to an underestimation of the true prevalence rates. (54)

### *Clinical studies*

Early studies (that did not employ diagnostic instruments or operationalized criteria) on clinical samples from India reported prevalence rates of 0.3–1.6%. (55–58) However, the rates were higher in special populations such as university students, criminals, patients with substance use disorders, and patients who had attempted suicide. (8)

In more recent years, Gupta et al. did a large retrospective study (n = 16,118) with records spanning from 1996 to 2006 in a tertiary centre in Chandigarh (PGI). They found that only 1.07% of the patients had received a diagnosis of PD, and the most commonly diagnosed PDs were anxious avoidant (44%), and emotionally unstable personality disorders. (25.4%) The low rate of diagnosis could be due to focus on axis I diagnosis rather than PD-specific assessment in busy clinical practice and a reluctance to give a diagnosis commonly perceived as stigmatising even by mental health professionals. These findings reiterate the need for formal assessment of personality pathology in usual clinical practices. (59)

Studies employing comprehensive protocols for assessment (which were, however, not standardized for use in the Indian population) have yielded high rates of personality pathology in patients with anxiety disorders, such as social phobia, and mood disorders (37.5% in patients with bipolar disorder and 40.8% in those with major depressive disorder) (60,61). The study on mood disorders used a self-report format for assessing personality disorders, which is known to overestimate the prevalence of these disorders. (8)

According to the International Pilot Study of Personality Disorders (IPSPD) conducted in Bangalore, the clinical sample exhibited high rates of certain personality disorders. Specifically, schizotypal personality disorder was diagnosed in 19.1% of the cases, borderline personality disorder in 14.7% based on the DSM-III-R system, and emotionally unstable personality disorder in 8.6% according to the ICD-10 system. (62) However, the study utilized an enriched sample of subjects referred to the research team with the possibility of having a personality pathology.

Banerjee and Mitra compared 50 teenage girl outpatients with academic difficulties with normal controls. (63) According to the ICD-10, about 30% of the index group had emotionally unstable personality disorder (impulsive type), 6% had dependent personality disorder, and 6% had other personality disorders. The authors did not report whether they used the IPDE screen or the interview for diagnosing personality disorders.

Maanasa et al. conducted a cross-sectional study in Tamil Nadu involving 116 patients admitted to a general psychiatry unit. The diagnosis was made using SCID-II, and the prevalence of personality disorder among the participants was 21.55%. Avoidant personality disorder was the most common type (7.7%), followed by anti-social personality disorder (5.17%) and borderline personality disorder (3.45%). The highest proportion of personality disorders (35.7%) was observed in individuals diagnosed with major depressive disorder, while those with multiple psychiatric illnesses had a prevalence of 31.6%. Almost 18.9% of individuals with psychotic disorders and mood disorders with psychotic features had personality disorders. Factors associated with a higher prevalence included male gender, lower education, higher socioeconomic status, and separation from a spouse. (64)

As previously mentioned, personality disorders are associated with increased morbidity, which is reflected in their emergency department attendance. Personality disorders act as an independent risk factor for ED attendance and contribute to poorer outcomes. (65) Sen et al. studied 120

emergency department attendees of a private multi-speciality hospital in Kolkata, using IPDE to diagnose personality disorders. 24.74% of the study population fulfilled the criteria for a PD. (66) These results are like those found in the United States. (67,68)

The findings from the aforementioned studies confirm that the utilization of structured instruments leads to more consistent prevalence rates across various environments.

*Studies in relation to self-harm*

As early as 1981, Gupta et al studied a series of 100 cases of attempted suicide who were hospitalized in medical or psychiatric wards of the two hospitals of Lucknow city during a 2-year period using the DSM-II guidelines. Evidence of abnormal personality patterns was noticed in 58% of the subjects.

There is a significant discrepancy in the reported prevalence of personality disorders in individuals with a history of self-harm, from a low of 7% reported by Chandrasekaran in 2003 to a high of 64% cited by Nath in 2008. (69,70) This discrepancy is most likely attributed to the methodological differences between the studies. Nath and colleagues used the International Personality Disorder Examination (IPDE) to evaluate both inpatients and outpatients across two age brackets (15–24 years and 45–74 years) with history of self-harm at any point. (70) They found that 62.1% of the older demographic group and 58.5% of the younger demographic group had a personality disorder. Among the younger group, emotionally unstable personality disorder (28.6%) and anankastic personality disorder (11.7%) were most prevalent. In the older group also, anankastic personality disorder (34.5%) and emotionally unstable personality disorder (13.8%) were the most common, however, the proportions varied. All the patients were interviewed, despite some initial hesitation due to legal concerns related to healthcare and the interviews were faster than usual diagnostic sessions (about one hour), suggesting a possible tendency towards affirmative responses. Interestingly, only 5% of the young patients and none of the older ones had multiple personality disorder diagnoses, despite the high occurrence of personality disorders.

In contrast, Chandrasekaran and his team evaluated 341 survivors (93% of all survivors) one year following their first suicide attempt at a general hospital. (69) Only 7% of the participants were diagnosed with a personality disorder according to the ICD-10 IPDE. The inclusion of only first-time attempt cases might have led to a lower diagnosis rate for emotionally unstable personality

disorder, and consequently of any personality disorder. The study employed two interviewers and a consensus diagnosis, possibly leading to a more stringent diagnostic process. The authors referred to a study by Latha et al. that reported a similar 12% prevalence rate for personality disorders in those attempting self-harm. (71) However, the latter study made the diagnosis without a standardized tool, making a direct comparison difficult. Another study that used a semi-structured interview to assess the presence of borderline personality disorder in suicide attempt patients reported a significantly higher rate of 18.3% for this diagnosis. (72)

Kulkarni et al conducted a case-control cross-sectional hospital-based study to assess the prevalence and pattern of comorbidity of mental disorders in first time suicide attempters in comparison to age and gender matched controls. They found that 91% of the cases had at least one axis-I and/or axis-II diagnosis. The personality assessment was done using 2 stage assessment with IPDE, ICD-10 module. They found that 52% of the cases and 24% of the controls had personality disorders. Most common cluster of personality disorder was cluster-B (impulsive) followed by cluster A (schizoid) and cluster-C (anankastic) among the patients who attempted suicide. Among subjects of personality disorders, 34.62% had more than one personality disorder diagnoses and 53.93 % had a co-morbid axis-1 disorder. (73) The findings from the study report a higher prevalence compared to the previous studies from India; the authors haven't mentioned the exact time of personality assessment and the presence of comorbid axis-1 disorder could have contributed to the higher prevalence.

Vishnuvardhan et al also studied the prevalence of psychiatric morbidity in people with history of attempted suicide. They used DSM-IV diagnosis and SCID-II for the assessment of personality disorders and found that only 9% of the cases had a personality disorder - borderline (5%) followed by dependent (3%) and antisocial (1%). High rate of axis-1 disorders, apprehensions due to suicide-associated stigma, fear of legal consequences could be reasons for the lower prevalence found in this study. (74)

### *Studies in relation to substance use*

Kishore et al studied comorbidities in individuals with substance dependence in 1994. They used a Hindi translation of SCID-II and found that 53.8% of opioid dependent and 30.8% of alcohol dependent individuals had personality disorders. Within personality disorders, ASPD was found to be the most common (23.9%) in the opioid dependent population.

Vohra and colleagues conducted interviews with 30 first-time attendees with alcohol dependence at a tertiary care facility. They used SCID-I and SCID-II for the diagnosis, and 76% were identified to have an axis I disorder and 40% an axis II disorder. Cluster B personality disorders were present in 58.3% of cases with PDs.(75)

Kumar and colleagues conducted a cross-sectional evaluation of 37 patients with alcohol dependence at an outpatient clinic in North India using SCID-I and SCID-II, based on DSM-IV TR. They found only 2 patients with axis-II disorders, one antisocial personality disorder and one paranoid personality disorder. (76)

Due to the high prevalence of anti-social traits in patients with substance use disorder, ASPD in particular has been included in studies assessing broader psychiatric co-morbidities in these patients. In 1989, Satija et al reported high prevalence of psychopathic personality disorder in patients with opiate addiction. (77) Other recent studies using Present State Examination (PSE) and Mini-International Neuropsychiatric Interview (MINI) have reported a prevalence of 21% and 5%, respectively, for ASPD. (78,79)

### *Studies in relation to medical conditions*

In 2016, Sarkar and colleagues identified a connection between Personality Disorders (PDs) and other concurrent psychiatric issues commonly observed in cases of severe acne. Out of 65 patients studied, 29.2% exhibited PDs. Specific diagnoses included obsessive-compulsive personality disorder (13.8%), anxious (avoidant) personality disorder (9.2%), borderline personality disorder (BPD) (3%), and mixed PD (3%). All individuals diagnosed with PDs also had co-occurring axis I disorders such as anxiety and depression. (80)

## Conclusions

The field of personality disorder epidemiology in India is still at an early stage. From a point where there were virtually no articles targeting personality disorders until the 1980s, we now see a slow but steady increase. Yet, the primary focus remains on clinical epidemiology.

Despite the paucity of rigorous studies, the growing familiarity with the field and its methodological subtleties is promising for the future. There's a need for more comprehensive studies on the epidemiology of personality disorders including its determinants and course and outcome.

Finally, as the introduction of ICD-11 addresses the limitations of previous diagnostic systems, it calls for the creation of fresh epidemiological data in the ongoing effort to enhance our understanding, knowledge, and management of abnormal personality traits and disorders.

**Take home message**

1. Epidemiological data on personality disorders have to be carefully interpreted, with particular focus on assessment methodology and diagnostic criteria.
2. The structured clinical interviews are regarded as more robust methods of diagnosing personality disorders and generate more uniform data.
3. Globally, most research data come from clinical populations, a trend that is even more pronounced in the Indian context.
4. The global community prevalence rates of personality disorders are mostly observed to be in the range of 9.1% to 11.1% and there is wide variability in the prevalence rates found in the clinical populations.

## Bibliography


1. Nakao K, Gunderson JG, Phillips KA, Tanaka N, Yorifuji K, Takaishi J, Nishimura T. Functional impairment in personality disorders. Journal of personality disorders. 1992 Mar;6(1):24-33.
2. Samuels J. Personality disorders: epidemiology and public health issues. International Review of Psychiatry. 2011 Jun 1;23(3):223-33.
3. International Classification of Diseases, Eleventh Revision (ICD-11), World Health Organization (WHO) 2019/2021 https://icd.who.int/browse11.
4. Crawford MJ, Koldobsky N, Mulder R, Tyrer P. Classifying personality disorder according to severity. Journal of personality disorders. 2011 Jun;25(3):321-30.
5. Mulder R. The evolving nosology of personality disorder and its clinical utility. World Psychiatry. 2021 Oct;20(3):361.
6. Bach B, Tracy M. Clinical utility of the alternative model of personality disorders: A 10th year anniversary review. Personality Disorders: Theory, Research, and Treatment. 2022 Jul;13(4):369.
7. Mulder RT. ICD-11 personality disorders: utility and implications of the new model. Frontiers in psychiatry. 2021 May 10; 12:655548.
8. Sharan P. An overview of Indian research in personality disorders. Indian Journal of Psychiatry. 2010 Jan;52(Suppl1): S250.
9. Lenzenweger MF. Epidemiology of personality disorders. Psychiatric Clinics of North America. 2008 Sep 1;31(3):395-403.
10. Volkert J, Gablonski TC, Rabung S. Prevalence of personality disorders in the general adult population in Western countries: systematic review and meta-analysis. The British Journal of Psychiatry. 2018 Dec;213(6):709-15.
11. Zimmerman M. Diagnosing personality disorders: A review of issues and research methods. Archives of general psychiatry. 1994 Mar 1;51(3):225-45.
12. Tyrer P, Coombs N, Ibrahimi F, Mathilakath A, Bajaj P, Ranger M, Rao B, Din R. Critical developments in the assessment of personality disorder. The British Journal of Psychiatry. 2007 May;190(S49): s51-9.
13. Tyrer P, Coombs N, Ibrahimi F, Mathilakath A, Bajaj P, Ranger M, Rao B, Din R. Critical developments in the assessment of personality disorder. The British Journal of Psychiatry. 2007 May;190(S49): s51-9.
14. Reich J, Yates W, Nduaguba M. Prevalence of DSM-III personality disorders in the community. Social Psychiatry and Psychiatric Epidemiology. 1989 Jan; 24:12-6.

15. Lenzenweger MF, Loranger AW, Korfine L, Neff C. Detecting personality disorders in a nonclinical population: Application of a 2-stage procedure for case identification. Archives of general psychiatry. 1997 Apr 1;54(4):345-51.
16. Grant BF, Stinson FS, Dawson DA, Chou SP, Ruan WJ, Pickering RP. Co-occurrence of 12-month alcohol and drug use disorders and personalitydisorders in the United States: results from the National Epidemiologic Survey on Alcohol and RelatedConditions. Archives of general psychiatry. 2004 Apr 1;61(4):361-8.
17. Grant BF, Chou SP, Goldstein RB, Huang B, Stinson FS, Saha TD, Smith SM, Dawson DA, Pulay AJ, Pickering RP, Ruan WJ. Prevalence, correlates, disability, and comorbidity of DSM-IV borderline personality disorder: results from the Wave 2 National Epidemiologic Survey on Alcohol and Related Conditions. Journal of clinical psychiatry. 2008 Apr 23;69(4):533
18. Samuels J, Eaton WW, Bienvenu OJ, Brown CH, Costa PT, Nestadt G. Prevalence and correlates of personality disorders in a community sample. The British journal of psychiatry. 2002 Jun;180(6):536-42.
19. Lenzenweger MF, Lane MC, Loranger AW, Kessler RC. DSM-IV personality disorders in the National Comorbidity Survey Replication. Biological psychiatry. 2007 Sep 15;62(6):553-64.
20. Stinson FS, Dawson DA, Goldstein RB, Chou SP, Huang B, Smith SM, Ruan WJ, Pulay AJ, Saha TD, Pickering RP, Grant BF. Prevalence, correlates, disability, and comorbidity of DSM-IV narcissistic personality disorder: results from the wave 2 national epidemiologic survey on alcohol and related conditions. Journal of Clinical Psychiatry. 2008 Jul 1;69(7):1033-45.
21. Stinson FS, Dawson DA, Goldstein RB, Chou SP, Huang B, Smith SM, Ruan WJ, Pulay AJ, Saha TD, Pickering RP, Grant BF. Prevalence, correlates, disability, and comorbidity of DSM-IV narcissistic personality disorder: results from the wave 2 national epidemiologic survey on alcohol and related conditions. Journal of Clinical Psychiatry. 2008 Jul 1;69(7):1033-45.
22. Jackson HJ, Burgess PM. Personality disorders in the community: a report from the Australian National Survey of Mental Health and Wellbeing. Social psychiatry and psychiatric epidemiology. 2000 Dec; 35:531-8.
23. Huang Y, Kotov R, De Girolamo G, Preti A, Angermeyer M, Benjet C, Demyttenaere K, De Graaf R, Gureje O, Karam AN, Lee S. DSM–IV personality disorders in the WHO World Mental Health Surveys. The British Journal of Psychiatry. 2009 Jul;195(1):46-53.

24. Winsper C, Bilgin A, Thompson A, Marwaha S, Chanen AM, Singh SP, Wang A, Furtado V. The prevalence of personality disorders in the community: a global systematic review and meta-analysis. The British Journal of Psychiatry. 2020 Feb;216(2):69-78.
25. Beckwith H, Moran PF, Reilly J. Personality disorder prevalence in psychiatric outpatients: a systematic literature review. Personality and mental health. 2014 May;8(2):91-101.
26. Zimmerman M, Chelminski I, Young D. The frequency of personality disorders in psychiatric patients. Psychiatric Clinics of North America. 2008 Sep 1;31(3):405-20.
27. Tyrer P, Crawford M, Sanatinia R, Tyrer H, Cooper S, Muller-Pollard C, Christodoulou P, Zauter-Tutt M, Miloseska-Reid K, Loebenberg G, Guo B. Preliminary studies of the ICD-11 classification of personality disorder in practice. Personality and Mental Health. 2014 Oct;8(4):254-63.
28. Fazel S, Danesh J. Serious mental disorder in 23 000 prisoners: a systematic review of 62 surveys. The lancet. 2002 Feb 16;359(9306):545-50.
29. Bach B, First MB. Application of the ICD-11 classification of personality disorders. BMC psychiatry. 2018 Dec; 18:1-4.
30. Alarcon RD, Palmer BA. Personality disorders: Epidemiology and clinical course. In: Geddes JR, Andreasen NC, Goodwin GM, editors. New Oxford Textbook of Psychiatry. 3rd ed. Oxford: Oxford University Press; 2020. p. 1218-1228.
31. Weisberg YJ, DeYoung CG, Hirsh JB. Gender differences in personality across the ten aspects of the Big Five. Frontiers in psychology. 2011 Aug 1; 2:178.
32. Costa Jr PT, Terracciano A, McCrae RR. Gender differences in personality traits across cultures: robust and surprising findings. Journal of personality and social psychology. 2001 Aug;81(2):322.
33. Paris J. Gender differences in personality traits and disorders. Current Psychiatry Reports. 2004 Jan;6(1):71-4.
34. Corbitt EM, Widiger TA. Sex differences among the personality disorders: An exploration of the data. Clinical Psychology: Science and Practice. 1995;2(3):225.
35. Barbara SH, Ute H. Sex Differences in Personality Disorders. Current Psychiatry Reports. 2018 Dec 1;20(12).
36. Torgersen S, Kringlen E, Cramer V. The prevalence of personality disorders in a community sample. Archives of general psychiatry. 2001 Jun 1;58(6):590-6.
37. Coid J, Yang MI, Tyrer P, Roberts A, Ullrich S. Prevalence and correlates of personality disorder in Great Britain. The British journal of psychiatry. 2006 May;188(5):423-31.
38. Furlong Y, Janca A. Epidemiology of personality disorders in individuals with gender dysphoria. Current Opinion in Psychiatry. 2022 Jan 1;35(1):78-82.

39. Torgersen S. Prevalence, Sociodemographics, and functional impairment. In: Hales RE, Yudofsky SC, Roberts LW, editors. The American Psychiatric Publishing textbook of psychiatry. Washington, DC: American Psychiatric Publishing, Inc.; 2014. p. 109-129.
40. Amad A, Geoffroy PA, Vaiva G, Thomas P. Personality and personality disorders in the elderly: diagnostic, course and management. L'encephale. 2012 Oct 24;39(5):374-82.
41. Cohen P, Crawford TN, Johnson JG, Kasen S. The children in the community study of developmental course of personality disorder. Journal of personality disorders. 2005 Oct 1;19(5):466-86.
42. Skodol AE, Gunderson JG, Shea MT, McGlashan TH, Morey LC, Sanislow CA, Bender DS, Grilo CM, Zanarini MC, Yen S, Pagano ME. The collaborative longitudinal personality disorders study (CLPS): Overview and implications. Journal of personality disorders. 2005 Oct 1;19(5):487-504.
43. Zanarini MC, Frankenburg FR, Hennen J, Reich DB, Silk KR. The McLean Study of Adult Development (MSAD): Overview and implications of the first six years of prospective follow-up. Journal of personality disorders. 2005 Oct 1;19(5):505-23.
44. Lenzenweger MF. The longitudinal study of personality disorders: History, design considerations, and initial findings. Journal of Personality Disorders. 2006 Dec;20(6):645-70.
45. Gunderson JG, Stout RL, McGlashan TH, Shea MT, Morey LC, Grilo CM, Zanarini MC, Yen S, Markowitz JC, Sanislow C, Ansell E. Ten-year course of borderline personality disorder: psychopathology and function from the Collaborative Longitudinal Personality Disorders study. Archives of general psychiatry. 2011 Aug 1;68(8):827-37.
46. Torgersen S, Kringlen E, Cramer V. The prevalence of personality disorders in a community sample. Archives of general psychiatry. 2001 Jun 1;58(6):590-6.
47. Gawda B. Cross-cultural studies on the prevalence of personality disorders. Current Issues in Personality Psychology. 2018 Jan 1;6(4):318-29.
48. Ziegenbein M, Calliess IT, Sieberer M, Machleidt W. Personality disorders in a cross-cultural perspective: Impact of culture and migration on diagnosis and etiological aspects. Current Psychiatry Reviews. 2008 Feb 1;4(1):39-47.
49. Friborg O, Martinsen EW, Martinussen M, Kaiser S, Øvergård KT, Rosenvinge JH. Comorbidity of personality disorders in mood disorders: a meta-analytic review of 122 studies from 1988 to 2010. Journal of affective disorders. 2014 Jan 1; 152:1-1.
50. Friborg O, Martinussen M, Kaiser S, Øvergård KT, Rosenvinge JH. Comorbidity of personality disorders in anxiety disorders: A meta-analysis of 30 years of research. Journal of affective disorders. 2013 Feb 20;145(2):143-55.

51. Hasin D, Kilcoyne B. Comorbidity of psychiatric and substance use disorders in the United States: current issues and findings from the NESARC. Current opinion in psychiatry. 2012 May;25(3):165.
52. Reddy VM, Chandrashekar CR. Prevalence of mental and behavioural disorders in India: A meta-analysis. Indian journal of psychiatry. 1998 Apr;40(2):149.
53. Shenoy SK, Praharaj SK. Borderline personality disorder and its association with bipolar spectrum and binge eating disorder in college students from South India. Asian journal of psychiatry. 2019 Aug 1; 44:20-4.
54. Math SB, Srinivasaraju R. Indian Psychiatric epidemiological studies: Learning from the past. Indian journal of psychiatry. 2010 Jan;52(Suppl1): S95.
55. Davis RB, Gupta NC, Davis AB. The First Ten Years-Some Phenomena of a Private Psychiatric Hospital {Including a comparison between the results of Insulin Covin and Trifluoperazine treatment of Schizophrenia. Indian Journal of Psychiatry. 1965 Oct 1;7(4):231-42.
56. Marfatia JC. A survey of 2000 private adult mental patients. Indian Journal of Psychiatry. 1973 Jul 1;15(3):279-89.
57. Teja JS. Mental illness and the family in America and India. International Journal of Social Psychiatry. 1978 Sep;24(3):225-31.
58. Wig NN, Varma VK, Khanna BC. Diagnostic characteristics of a general hospital psychiatric adult outpatients' clinic. Indian Journal of Psychiatry. 1978 Jul 1;20(3):262-6.
59. Gupta S, Mattoo SK. Personality disorders: Prevalence and demography at a psychiatric outpatient in North India. International Journal of Social Psychiatry. 2012 Mar;58(2):146-52.
60. Naidu H, Issac S. Personality disorders-diagnoses or alibi? Indian J Psychiatry. 1999; 41:64
61. Chatterjee S, Sunitha TA, Velayudhan A, Khanna S. An investigation into the psychobiology of social phobia: personality domains and serotonergic function. Acta Psychiatrica Scandinavica. 1997 Jun;95(6):544-50.
62. Loranger AW, Janca A, Sartorius N. The ICD-I0 International Personality Disorder Examination (IPDE) Cambridge: Cambridge University Press; 1997. Assessment and Diagnosis of Personality Disorders.
63. Banerjee KR, Mitra T. Decending academic performance in adolescent female students: Role of personality and social support. Indian J Psychiatry. 2007; 49:44.
64. Maanasa TJ, Sivabackiya, Srinavasan B, S Ismail, OT SS, Kailash S. A cross sectional study on prevalence and pattern of personality disorders in psychiatric inpatients of a tertiary care hospital. International Archives of Integrated Medicine. 2016 May 1;3(5).
65. Hamilton JE, Desai PV, Hoot NR, Gearing RE, Jeong S, Meyer TD, Soares JC, Begley CE. Factors associated with the likelihood of hospitalization following emergency department

visits for behavioral health conditions. Academic Emergency Medicine. 2016 Nov;23(11):1257-66.

66. Sen P, Barnicot K, Podder P, Dasgupta I, Gormley M. Exploring the prevalence of personality disorder and the feasibility of using the SAPAS as a screening tool for personality disorder in an emergency department in India. Medicine, Science and the Law. 2022 Jan;62(1):8-16.
67. Wagner JA, Pietrzak RH, Petry NM. Psychiatric disorders are associated with hospital care utilization in persons with hypertension: results from the National Epidemiologic Survey on alcohol and related conditions. Social psychiatry and psychiatric epidemiology. 2008 Nov; 43:878-88.
68. Stewart SH. Alcoholics in acute medical settings have increased risk for other drug, mood, and personality disorders. The International Journal of Psychiatry in Medicine. 2007 Mar;37(1):59-67.
69. Chandrasekaran R, Gnanaseelan J, Sahai A, Swaminathan RP, Perme B. Psychiatric and personality disorders in survivors following their first suicide attempt. Indian journal of psychiatry. 2003 Apr;45(2):45.
70. Nath S, Patra DK, Biswas S, Mallick AK, Bandyopadhyay GK, Ghosh S. Comparative study of personality disorder associated with deliberate self-harm in two different age groups (15–24 years and 45–74 years). Indian journal of psychiatry. 2008 Jul;50(3):177.
71. Latha KS, Bhat SM, D'souza P. Suicide attempters in a general hospital unit in India: their socio-demographic and clinical profile—emphasis on cross-cultural aspects. Acta Psychiatrica Scandinavica. 1996 Jul;94(1):26-30.
72. Nair S, Patil B, Pinto C. A study of borderline personality disorder in suicide attempters. Indian J Psychiatry. 1997; 39:55.
73. Kulkarni RR, Rao KN, Begum S. Comorbidity of psychiatric and personality disorders in first suicide attempters: a case-control study. Asian Journal of Psychiatry. 2013 Oct 1;6(5):410-6.
74. Vishnuvardhan G, Saddichha S. Psychiatric comorbidity and gender differences among suicide attempters in Bangalore, India. Gen Hosp Psychiatry. 2012 Jul-Aug;34(4):410-4.
75. Vohra AK, Yadav BS, Khurana H. A study of psychiatric comorbidity in alcohol dependence. Indian journal of psychiatry. 2003 Oct;45(4):247.
76. Kumar V, Dalal PK, Trivedi JK, Kumar P. A Study of Psychiatric Comorbidity in Alcohol Dependence. Delhi Psychiatry J. 2010 Oct;13(2):291-293.
77. Satija DC, Sharma DK, Gaur A, Nathawat SS. Prognostic significance of psychopathology in the abstinence from opiate addiction. Indian Journal of Psychiatry. 1989 Apr;31(2):157.

78. Singh NH, Sharma SG, Pasweth AM. Psychiatric co-morbidity among alcohol dependants. Indian Journal of Psychiatry. 2005 Oct;47(4):222.
79. Kanwar P, Sharma RC, Sharma DD, Kanwar N. A study of psychiatric co-morbidity among alcohol dependents. Int J Res Med Sci. 2017 Oct; 5:4490-6.
80. Sarkar S, Patra P, Mridha K, Ghosh SK, Mukhopadhyay A, Thakurta RG. Personality disorders and its association with anxiety and depression among patients of severe acne: A cross-sectional study from Eastern India. Indian journal of psychiatry. 2016 Oct;58(4):378.

# Psychiatric epidemiology in India – The way forward

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## INTRODUCTION

Mental health, according to the World Health Organization (WHO), is a state of mental well-being that allows people to cope with life's stressors, realize their strengths, learn and work well, and contribute to their community. (1) When applied to the study of mental illness, epidemiological methods form the basis of psychiatric epidemiology. From 1947 to 1960, the primary focus of psychiatric research was on the psychological underpinnings of individual dysfunction. The second wave of psychiatric research in India, which lasted from 1960 to 1972, was distinguished by its emphasis on public health. The late 1980s saw an increase in the number of epidemiological studies pertaining to mental illness, many of which focused on specific illnesses, populations, and geographical areas.

The focus of epidemiological studies is on the whole population rather than any one person. For public health officials making decisions regarding disease prevention, treatment, and social costs, the data it provides is invaluable. Epidemiology is the study of the frequency of disease occurrence in a population, the dynamics of disease incidence rates over time, and the causes behind those rates. It paints a picture of the ailment in terms of its hallmarks, related morbidity and mortality, and the disorder's natural history.

Exciting new developments are being made in the field of psychiatric epidemiology in India. If this trend keeps up, not only will our knowledge of mental disorders in India grow, but so will the possibilities for bettering the lives of people living with mental illness and those who care for them.

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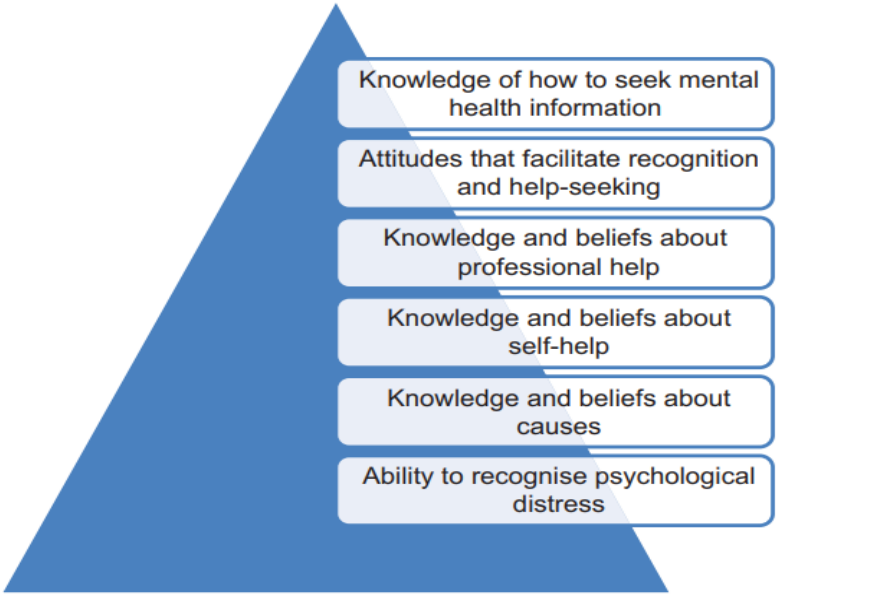
At any given time, approximately 10% of India's population is affected by mental illnesses. Approximately 1% to 2% of this population suffers from extremely severe illnesses, while the remainder have less severe disorders that may require treatment, nonetheless. (2)

In India, mental illnesses are a major contributor to the burden of non-fatal diseases. Increasingly, health policies around the world include mental health among their top priorities. In 2017, 14% of India's total population, or 197.3 million people, were affected by mental illness. (3)

**Mental health awareness:**

"Accessing, understanding, and using the information to promote and maintain good health" is how health literacy has been described. Mental health literacy is a similar notion that is increasingly being recognised as a significant indicator of awareness and knowledge about mental health issues.

Figure1. Components of mental health awareness (4)




The fundamental constituents of mental health literacy encompass the capacity to identify, comprehend, and hold convictions regarding the origins and self-assistance of mental health issues, the promotion of expert intervention, the identification and solicitation of aid, and the acquisition of mental health-related information. Many initiatives have been launched in different parts of the world to combat the prejudice and bias that contribute to social exclusion caused by stigma.

Insufficient understanding of mental disorders presents a formidable obstacle to the provision of mental healthcare services. The interrelatedness of awareness and health literacy is a well-established phenomenon in the scientific literature. The presence of stigma and discrimination can be attributed to a lack of knowledge and misinformation. Mental health awareness programmes have demonstrated a beneficial effect on altering individuals' perceptions of mental illnesses, resulting in positive changes. (4)

## Prevalence of mental disorders

There are a number of reviews of psychiatric epidemiological studies in India that provide a fairly accurate picture of the overall prevalence of mental disorders. One of these is a meta-analytic review, a sophisticated statistical method for aggregating research data from multiple studies. Table 1 summarises the outcomes of these evaluations.

A quick look at Table 1 reveals that approximately 65 to 100 people per thousand residing in any part of India suffer from a mental illness at any given time. (2)

The India State-Level Disease Burden Initiative created the study and conclusions on mental illnesses given in this article as a component of the Global Burden of Diseases 2017 (GBD 2017). The Indian Council of Medical Research's Health Ministry Screening Committee and the Public Health Foundation of India's ethics committee have given their approval to the work of this initiative.

Mental illnesses included in GBD 2017 are attention-deficit hyperactivity disorder (ADHD), conduct disorder, autism spectrum disorders, bipolar disorder, schizophrenia, eating disorders, idiopathic developmental intellectual disability (IDID), and other mental illnesses. In GBD, suicide is categorised under injuries. (3)

The prevalence rates of major mental disorders that primarily occur during adulthood were examined. The crude prevalence for depressive disorders and anxiety disorders was found to be 3.3% (with a range of 3.1–3.6 for depressive disorders and 3.0–3.5 for anxiety disorders). However, bipolar disorders had a prevalence rate of 0.6% (with a range of 0.5–0.7), and schizophrenia had a prevalence rate of 0.3% (with a range of 0.2–0.3). According to data from 2017, the estimated number of individuals in India who experienced depressive disorders was 45.7 million (42.4–49.8). The prevalence rates of various mental disorders that primarily manifest during childhood and adolescence were examined. The crude prevalence rate for IDID was found to be 4.5%, while conduct disorder, ADHD, and autism spectrum disorders had prevalence rates of 0.8%, 0.4%, and 0.4%, respectively. (3)

According to epidemiological research conducted in India, the lifetime prevalence of obsessive-compulsive disorder (OCD) was determined to be 0.6%. The rate observed in this study is significantly lower when juxtaposed with the 2-3% rate documented in studies conducted in Europe and North America. Nonetheless, a comparable minimal percentage within the range of 0.5-0.9% was noted in research conducted in Taiwan. (12)

The prevalence of Alcohol Use Disorders (AUDs) was estimated to be 12.5% (95% CI: 9 to 17.3%) based on data collected from 21 studies conducted in various states of India. The studies included a total of 73997 community-based respondents. (13)

The prevalence of cannabis use in the population of the country is estimated to be 2.8%. In comparison, the reported usage of opioids is 2.1%, with heroin being the most commonly used at 1.14%, followed by pharmaceutical opioids at 0.96% and opium at 0.52%. India has three times the global average prevalence of opioid use. (14)

According to estimates, the prevalence of dementia among individuals aged 60 years and older in India is 7.4%. There are approximately 8.8 million individuals aged 60 years and older in India who are affected by dementia. Research findings indicate that the incidence of dementia is higher in the female population as compared to males and in rural regions as opposed to urban areas. (15)

## Prevalence of psychiatry disorders in other countries

In comparison to the World Mental Health (WMH) survey results obtained from other Western regions, the 12-month prevalence rate of common mental disorders in India is relatively low at 5.52%. The WMH survey conducted in the United States revealed a 12-month prevalence that was approximately five times greater than that

*Table 1: Some reviews of psychiatric epidemiological studies in India*

| Authors | Type of review | The number of studies included | Overall prevalence rates of mental disorders/1000 population |
|---|---|---|---|
| Reddy & chandrashekar,1998(5) | Meta-analytic | 13 | 58.2 per 1000 population |
| Ganguli,2000 (6) | Open, non- systematic | 15 | 73 per 1000 population |
| Madhav,2001 (7) | Open, non-systematic | 10 | 65.4 per 1000 population |
| Gururaj & Isaac, 2004(8) | Open, non-systematic | 20 | 9.5–370per 1000 population |
| Gururaj et al, 2005(9) | Based on studies &reviews | 21 | 65 per 1000 population |
| Math et al, 2007(10), Math &Srinivas Raju 2010 (11) | Systematic review | 16 | 9.5 -102.8 per 1000 population |

found in India. Similarly, the European Union reported a prevalence that was 2-4 times higher, while South American countries reported a prevalence that was 2-3 times higher. Nevertheless, the occurrence rate in India is relatively similar to the results of WMH surveys conducted in other Asian nations (China: 7.1%, Japan: 7.4%).

The survey conducted in Nigeria, which falls under the African region, revealed a 12-month prevalence rate of 3.3%, which was comparatively lower than that of India. (16)

The Substance Abuse and Mental Health Services Administration (SAMHSA) presented data from the 2021 National Survey on Drug Use and Health (NSDUH). According to estimates, over 20% of adults in the United States are affected by a mental illness. According to recent statistics, the United States had an approximate count of 57.8 million adults aged 18 or older who were diagnosed with Any Mental Illness (AMI) in the year 2021. This figure denotes 22.8% of the entire adult population in the United States. The prevalence of AMI was found to be comparatively greater among the female population (27.2%) in contrast to the male population (18.1%). (17)

**Prevalence of common mental disorders in older adults:**

As per the United Nations Population Fund (2020), the proportion of individuals aged 60 years and older in the worldwide populace is presently 12.3%, and it is anticipated to increase to nearly 22% by the year 2050.

According to the Government of India (2016), the Indian Census 2011 reported a total of 104 million individuals aged 60 years or older, representing 8.6% of the population. This figure marks an increase from the previous decade, during which the proportion of older adults was 7.5%. The prevalence of non-communicable diseases, particularly mental disorders, is on the rise as the population ages.

The study involved outreach to 39,532 participants, of whom 88.0% (n = 34,802) were successfully interviewed. The study found that the percentage of individuals aged 60 years or older was 16.1%, with a sample size of 5,590. Compared to the younger population, the older adults exhibited a higher prevalence of any psychiatric morbidity, both in terms of their weighted lifetime (15.1%) and current (10.9%) rates.

The prevalence of depressive disorders was found to be higher among older adults, with a lifetime prevalence of 6.93% and a current prevalence of 3.53%, as compared to younger adults, who had a lifetime prevalence of 4.96% and a current prevalence of 2.54%. The prevalence of anxiety disorders did not vary significantly across different age cohorts. Among older adults, the anxiety disorder that was most commonly observed was specific phobias, with a prevalence rate of 1.72%,

followed by agoraphobia at 1.6%. The prevalence of Common Mental Disorders (CMD) among the elderly population was found to be higher among females, individuals residing in urban metropolitan areas, those who were unemployed, not currently married, and those with lower household income. (18)

**Prevalence of Suicide in India:**

The World Health Organisation (WHO) has established a set of sustainable development goals and has expounded upon the ramifications of mental disorders and suicide in relation to these objectives. In 2015, the suicide rate in India was recorded at 15.7 per 100,000 individuals, surpassing both the regional average of 12.9 and the global average of 10.6. (19) The worldwide aggregate of fatalities resulting from suicide has exhibited a decline since the year 2000, having decreased from nearly 800,000 to slightly over 700,000 in 2019. In 2019, the suicide rate for males was observed to be over two times higher than that for females, with a rate of 12.6 per 100,000 in contrast to 5.7 per 100,000, respectively. (20) According to recent data, suicide stands as the leading cause of mortality among individuals aged 15 to 29 in India. (21) There exists a significant unmet demand among the populace that has yet to be addressed.

In less-developed countries, there exists a significant treatment gap, which is quantified by the absolute disparity between the prevalence of mental illnesses and the proportion of individuals who receive treatment. This treatment gap ranges from 76% to 85%. Insufficient resources have been identified as a significant factor contributing to the extensive treatment gap. India faces deficiencies in both its infrastructure and human resources. Although there have been advancements in several health indicators, India's contribution to the worldwide burden of disease remains disproportionate. The health metrics of our nation exhibit a less favourable standing when compared to other countries with similar economic status, as well as the neighbouring regions of India. A significant segment of the populace experiences impoverishment due to elevated out-of-pocket healthcare expenses and endures the unfavourable outcomes of substandard care quality. The utilisation of non-specialist community health workers for the administration of effective treatments in low-resource settings has been suggested as a viable task-shifting approach. (4)

**Disability and DALY:**

In 2017, mental disorders accounted for 4.7% (3.7–5.6) of the total disability-adjusted life years (DALYs) in India, which is an increase from 2.5% (2.0–3.1) in 1990. According to the findings of a study conducted in 2017, the highest proportion of Disability Adjusted Life Years (DALYs) attributed to mental disorders was caused by depressive disorders, accounting for 33.8% (29.5–38.5) of the total. Anxiety disorders followed closely behind, contributing to 19.0% (15.9–22.4) of

the DALYs. Other mental disorders that contributed to the DALYs included idiopathic developmental intellectual disability (IDID) at 10.8% (6.3-15.9), schizophrenia at 9.8% (7.7-12.4), bipolar disorder at 6.9% (4.9-9.6), conduct disorder at 5.9% (4.0-8.1), autism spectrum disorders at 3.2% (2.7-3.8), eating disorders at 2.2% (1.7-2.8), and attention-deficit hyperactivity disorder (ADHD) at 0.3% (0.2-0.5). The remaining 8.0% (6.1–10.1) of the DALYs were attributed to other mental disorders. (3).

### Cost Of Treatment & Its Burden on Families:

According to reports, the average monthly expenditure incurred by family members for the care of an individual with current Depressive Disorders (DD) was INR 1500, equivalent to approximately USD 23.0 per month. This amount encompasses expenses related to treatment, consultation, and transportation. The economic burden on families due to depression is significant, as it is associated with disability and the cost of care. According to Chisholm et al., the estimated cost of care for depression and anxiety, including healthcare and patient/family expenses, is INR 700 per month, which is equivalent to approximately 10 US dollars. (22)

The findings suggest that NMHS may have underestimated the true cost of care associated with managing developmental disabilities (DD) among adult individuals in India, particularly with regards to the expenses incurred by families. Notwithstanding its constraints, the NMHS study discloses that the expenses incurred for the treatment of developmental disabilities (DD) amount to almost 16% of the household income (with the median monthly household income of the surveyed NMHS households being INR 9000 (~137 US$)). This could potentially have a catastrophic impact on the family. (23)

The median monthly expenses associated with healthcare for common mental disorders (CMD) and treatment-related costs were estimated to be approximately ₹1500 per month. The estimated treatment gap for CMD was found to be approximately 80.4%. (24)

## DISCUSSION

In recent times, India has witnessed a transition from conducting small-scale surveys to conducting large-scale surveys that comprehensively investigate public health issues or diseases of significance. Nonetheless, a comprehensive survey on mental health issues in India has not been conducted, with the exception of the World Mental Health Survey that was carried out a decade ago. The NMHS aims to address this disparity by examining epidemiological features and trends nearly a decade after the fact. The study conducted by NMHS went beyond mere prevalence estimates and encompassed an analysis of the existing treatment gap, healthcare-seeking

behaviour, and service utilisation patterns. Additionally, the study also evaluated the mental health systems in the surveyed states of India. The survey conducted a comprehensive analysis of nearly all mental health issues that are of significance to public health, including substance use disorders. The successful execution of a nationwide survey on a large scale necessitated effective coordination and networking among professionals and administrators to ensure the timely implementation of multiple activities. (25)

Notwithstanding the efforts made by the government, there have been documented instances of inadequate implementation of mental health services in India. This is evidenced by a high treatment gap for mental disorders, suboptimal evidence-based treatment, and gender-based disparities in access to treatment.

Conducting epidemiological studies incurs significant costs and requires a substantial investment of time. It is imperative to sensitise sponsoring agencies to make contributions to the field of psychiatric epidemiology. The limited availability of resources such as qualified personnel, financial support, time constraints, and practical challenges in the field have prompted researchers to exercise caution before undertaking psychiatric epidemiological investigations. This phenomenon is reflected in the relatively low number of publications in this area over the past decade. Failure to address these concerns may impede progress in this particular domain. (26)

The National Mental Health Programme was initiated by India in 1982 and subsequently relaunched as the District Mental Health Programme in 1996. In 2014, the National Mental Health Policy was implemented, followed by the replacement of the Mental Healthcare Act of 1987 with a rights-based Mental Healthcare Act in 2017.

The National Health Mission and the National Adolescent Health Programme encompass a child health programme that comprises elements aimed at tackling the mental health concerns of children and adolescents. The Ayushman Bharat (Healthy India) programme, which was introduced in 2018, has the objective of offering all-encompassing primary healthcare and health insurance coverage for non-communicable ailments, including mental health disorders. This initiative has the potential to mitigate the negative impact of mental health disorders on the population. (26)

India is currently experiencing a deficit in mental health personnel, with a ratio of two mental health workers and 0.3 psychiatrists per 100,000 individuals. This figure is significantly lower than the worldwide average. (27)

Furthermore, the prejudiced disposition of healthcare providers towards individuals with mental illness and hindrances on the demand side, including the low perceived necessity for treatment, limited understanding of mental disorders, and social stigma associated with mental health conditions, represent obstacles that require attention.

The reduction of stigma and discrimination, the promotion of inclusion, and the raising of awareness are crucial components of the role that communities and families play in addressing mental health. Community-based interventions possess the capacity to mitigate the treatment disparity for mental illnesses in India. The implementation of mental health programmes within school settings has been shown to have a positive impact on the mental well-being of children.

**Future directions**

Given the higher prevalence of mental illnesses in urban regions and the ongoing trend of urbanisation, it is imperative that the urban health component of the National Health Mission incorporate a well-defined and integrated mental health component to facilitate the effective delivery of services. The implementation of life skills techniques for mental health promotion, early detection, and awareness programmes in workplaces and educational institutions can effectively address common mental disorders such as depression, anxiety, stress reduction, alcohol use, and tobacco use. It is recommended that these initiatives be promoted at all levels.

The strengthening of the research foundation in the field of mental health should prioritise attention in the following domains. Important mental health questions should be integrated into ongoing national surveys such as the National Family and Health Survey, the Non-Communicable Diseases (NCD) risk factor survey, the National Sample Survey Organisation (NSSO), and others.

It is imperative to establish a clear demarcation of the effects of mental and substance use disorders in primary healthcare settings through the utilisation of consistent and standardised methodologies. This entails comprehending the treatment gap at both macro and micro levels, taking into account the perspectives of both demand and supply. It is imperative to investigate techniques for identifying risk and protective factors that contribute to the onset, recovery, and prognosis of diverse mental illnesses.

Conducting research is imperative to comprehending cultural attitudes and convictions regarding mental health in order to enhance the utilisation of mental health services.

**"The field of psychiatry research and epidemiology necessitates the active participation of all stakeholders, including public, private, and non-governmental organisations, particularly in**

**developing nations such as India. It is imperative to promote the publication of all research endeavours in order to obtain Indian data that can be used to draw scientifically sound conclusions."**

Take home Points:

- Mental health should be highlighted in National health mission and steps should be taken to improve physical, psychological, spiritual and social well-being of individuals than treating disease.
- Government should involve all stake holders public and private to improve epidemiological studies and to formulate mental health policies.
- Steps should be taken to utilize ground field staff of various National health programmes in improving mental health literacy and reduction of stigma to take treatment.
- Research should be encouraged and made part of curriculum at undergraduate level to deliver what is needed to the society.

**References:**


1. World Health Organization. (2004). Promoting mental health: concepts, emerging evidence, practice: summary report / a report from the World Health Organization, Department of Mental Health and Substance Abuse in collaboration with the Victorian Health Promotion Foundation and the University of Melbourne. World Health Organization

2. Epidemiology of mental disorders in India. Unit -2, 2017. Sharan, Pratap, Prashanth R. IGNOU.Indira Gandhi National National Open University, 2017

3. India State-Level Disease Burden Initiative Mental Disorders Collaborators. The burden of mental disorders across the states of India: The Global Burden of Disease Study 1990-2017. Lancet Psychiatry. 2020 Feb;7(2):148-161. doi: 10.1016/S2215-0366(19)30475-4. Epub 2019 Dec 23. PMID: 31879245; PMCID: PMC7029418.

4. Srivastava K, Chatterjee K, Bhat PS. Mental health awareness: The Indian scenario. Ind Psychiatry J. 2016 Jul-Dec;25(2):131-134. doi: 10.4103/ipj.ipj_45_17. PMID: 28659690; PMCID: PMC5479084.

5. Reddy VM, Chandrashekar CR. Prevalence of mental and behavioural disorders in India: a meta-analysis. Indian J Psychiatry. 1998 Apr;40(2):149-57. PMID: 21494462; PMCID: PMC2965838.

6. Ganguli HC. Epidemiological findings on prevalence of mental disorders in India. Indian J Psychiatry. 2000 Jan;42(1):14-20. PMID: 21407903; PMCID: PMC2956997.

7. Chauhan SK, Dhar M. Prevalence and Predictors of Mental Health Disorder Among the Adolescent Living in the Slums of Lucknow, India: A Cross-Sectional Study. Community Ment Health J. 2020 Apr;56(3):383-392. doi: 10.1007/s10597-019-00452-2. Epub 2019 Sep 17. PMID: 31531783.

8. Gururaj, G., & Isaac, M. (2004). Psychiatric Epidemiology in India: Moving beyond Numbers. In S. P. Agarwal (Ed.), *Mental Health An Indian Perspective 1946-2003* (pp. 37-61). Elsevier.

9. Srinath S, Girimaji SC, Gururaj G, Seshadri S, Subbakrishna DK, Bhola P, Kumar N. Epidemiological study of child & adolescent psychiatric disorders in urban & rural areas of Bangalore, India. Indian J Med Res. 2005 Jul;122(1):67-79. PMID: 16106093.

10. Math SB, Chandrashekar CR, Bhugra D. Psychiatric epidemiology in India. Indian J Med Res. 2007 Sep;126(3):183-92. PMID: 18037711

11. Math SB, Srinivasaraju R. Indian Psychiatric epidemiological studies: Learning from the past. Indian J Psychiatry. 2010 Jan;52(Suppl 1): S95-S103. doi: 10.4103/0019-5545.69220. PMID: 21836725; PMCID: PMC3146182.

12. Reddy YC, Rao NP, Khanna S. An overview of Indian research in obsessive compulsive disorder. Indian J Psychiatry. 2010 Jan;52(Suppl 1): S200-9. doi: 10.4103/0019-5545.69233. PMID: 21836679; PMCID: PMC3146215.

13. Joseph J, Varghese A, Vijay VR, Grover S, Sharma S, Dhandapani M, Khakha DC, Arya S, Mahendia N, Varkey BP, Kishore K. The prevalence of alcohol use disorders using alcohol use disorders identification test (AUDIT) in the Indian setting: - a systematic review and meta-analysis. J Ethn Subst Abuse. 2022 Apr 11:1-19. doi: 10.1080/15332640.2022.2056105. Epub ahead of print. PMID: 35404781.

14. Singh OP. Substance use in India - Policy implications. Indian J Psychiatry. 2020 Mar-Apr;62(2):111. doi: 10.4103/psychiatry.IndianJPsychiatry_207_20. Epub 2020 Mar 17. PMID: 32382167; PMCID: PMC7197827.

15. Lee J, Meijer E, Langa KM, Ganguli M, Varghese M, Banerjee J, Khobragade P, Angrisani M, Kurup R, Chakrabarti SS, Gambhir IS, Koul PA, Goswami D, Talukdar A, Mohanty RR, Yadati RS, Padmaja M, Sankhe L, Rajguru C, Gupta M, Kumar G, Dhar M, Chatterjee P, Singhal S, Bansal R, Bajpai S, Desai G, Rao AR, Sivakumar PT, Muliyala KP, Bhatankar S, Chattopadhyay A, Govil D, Pedgaonkar S, Sekher TV, Bloom DE, Crimmins EM, Dey AB. Prevalence of dementia in India: National and state estimates from a nationwide study. Alzheimers Dement. 2023 Jan 13. doi: 10.1002/alz.12928. Epub ahead of print. PMID: 36637034.

16. Sagar R, Pattanayak RD, Chandrasekaran R, Chaudhury PK, Deswal BS, Lenin Singh RK, Malhotra S, Nizamie SH, Panchal BN, Sudhakar TP, Trivedi JK, Varghese M, Prasad J, Chatterji S. Twelve-month prevalence and treatment gap for common mental disorders: Findings from a large-scale epidemiological survey in India. Indian J Psychiatry. 2017 Jan-Mar;59(1):46-55. doi: 10.4103/psychiatry.IndianJPsychiatry_333_16. PMID: 28529360; PMCID: PMC5419012.

17. Key substance uses and mental health indicators in the United States: Results from the 2019 National Survey on Drug Use and Health (HHS Publication No. PEP20-07-01-001, NSDUH Series H-55) (2020)

18. Sinha P, Hussain T, Boora NK, Rao GN, Varghese M, Gururaj G, Benegal V; NMHS India Collaborators Group. Prevalence of Common mental disorders in older adults: Results from the National Mental Health Survey of India. Asian J Psychiatr. 2021 Jan; 55:102463. doi: 10.1016/j.ajp.2020.102463. Epub 2020 Nov 2. PMID: 33212298.

19. World Health Organization. World Health Statistics 2016. Geneva 27, Switzerland: World Health Organization; 2016.

20. World Health Organization. World health statistics 2022: monitoring health for the SDGs, sustainable development goals.

21. Patel V, Ramasundarahettige C, Vijayakumar L, Thakur JS, Gajalakshmi V, Gururaj G, Suraweera W, Jha P; Million Death Study Collaborators. Suicide mortality in India: a nationally representative survey. Lancet. 2012 Jun 23;379(9834):2343-51. doi: 10.1016/S0140-6736(12)60606-0. PMID: 22726517; PMCID: PMC4247159.

22. Arvind, Banavaram & Gururaj, Gopalkrishna & Loganathan, Santosh & Amudhan, Senthil & Varghese, Mathew & Benegal, Vivek & Rao, Girish & Kokane, Arun & Ram, Daya & Dalal, Pronob & Singh, Lenin & Singh, Lokesh & Sharma, Pradeep & Saha, Pradeep & Mehta, Ritambhara & Gopalkrishna, Dr & Ramasubramanian, Chellamuthu & Shibukumar, Tm & Roopesh, Bangalore. (2019). Prevalence and socioeconomic impact of depressive disorders in India: multisite population-based cross-sectional study. BMJ Open. 9. 27250. 10.1136/bmjopen-2018-027250.

23. Chisholm D, Sekar K, Kumar KK, Saeed K, James S, Mubbashar M, Murthy RS. Integration of mental health care into primary care. Demonstration cost-outcome study in India and Pakistan. Br J Psychiatry. 2000 Jun; 176:581-8. doi: 10.1192/bjp.176.6.581. PMID: 10974966.

24. Jayasankar P, Manjunatha N, Rao GN, Gururaj G, Varghese M, Benegal V; NMHS India National Collaborator Group. Epidemiology of common mental disorders: Results from "National Mental Health Survey" of India, 2016. Indian J Psychiatry. 2022 Jan-Feb;64(1):13-19. doi: 10.4103/indianjpsychiatry.indianjpsychiatry_865_21. Epub 2022 Jan 21. PMID: 35400745; PMCID: PMC8992756.

25. Pradeep BS, Gururaj G, Varghese M, Benegal V, Rao GN, Sukumar GM, Amudhan S, Arvind B, Girimaji S, K T, P M, Vijayasagar KJ, Bhaskarapillai B, Thirthalli J, Loganathan S, Kumar N, Sudhir P, Sathyanarayana VA, Pathak K, Singh LK, Mehta RY, Ram D, T M S, Kokane A, R K LS, B S C, Sharma P, C R, P K D, Saha PK, Deuri SP, Giri AK, Kavishvar AB, Sinha VK, Thavody J, Chatterji R, Akoijam BS, Das S, Kashyap A, R V S, M S, S K S, Agarwal V, Misra R. National Mental Health Survey of India, 2016 - Rationale, design and methods. PLoS One. 2018 Oct 25;13(10): e0205096. doi: 10.1371/journal.pone.0205096. PMID: 30359382; PMCID: PMC6201882.

26. Chandrashekar, Channapatna & Bada Math, Suresh. (2006). Psychosomatic disorders in developing countries: Current issues and future challenges. Current opinion in psychiatry. 19. 201-6. 10.1097/01.yco.0000214349.46411.6a.

27. National Mental Health Survey of India, 2015-16: Mental Health Systems. NIMHANS. ISBN :81-86479-00-X.2016

# Psychiatric Epidemiology in India – problems and Pitfalls

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## Introduction

Psychiatric epidemiology is the study of the distribution and determinants of mental illness frequency in human beings, with the fundamental aim of understanding and controlling the occurrence of mental illness. It deals with essential components such as distribution and frequency, determinants of a disease/disorder, human population, and methods employed to control illness.[1]

Before the 1970s, none of the studies from India evaluated the prevalence of various psychiatric disorders in the community setting. The first psychiatric epidemiological study was carried out by Dube (1970). The authors used purposive sampling, and the study participants underwent two-stage screening. The cases were defined by using a self-designed definition *(i.e., a case is defined as a manifest disturbance of mental functioning specific enough in clinical character to be consistently recognized as conforming to defined patterns that can be classified broadly into one of the standard categories of psychiatric illness)*. Specific diagnoses were made using self-defined features rather than standard classification. This study reported the prevalence of psychiatric morbidity (both active and inactive cases) to be 23.8 per thousand and that of active psychiatric morbidity to be 18 per thousand. After this initiative, many epidemiological studies have been published in India. Most of these epidemiological studies have been cross-sectional.[2]

There has been wide variation in the prevalence and incidence of various psychiatric disorders across different studies conducted in India. A data review showed that the prevalence varies from 9.5 to 102.8 per 1000 population. [2,3] Two meta-analyses have also been done for the existing data on the prevalence of mental disorders in India. The first metanalysis included 13 epidemiological studies involving door-to-door surveys, with a total sample size of 33,572 persons, showing total morbidity as 58.2 per 1000 population. Further, this meta-analysis showed that prevalence rates were higher for neuroses (20.7), affective disorders (12.3), alcohol/drug addiction (6.9), and

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intellectual disability (6.9).[4] The second meta-analysis included 15 studies and reported the national prevalence for all mental disorders to be 70.5 and 73.0 per 1000 population for rural and urban areas, respectively.[5]

One clearly obvious thing from the existing literature is a wide variation in the prevalence of psychiatric disorders across different studies. When one attempts to understand the wide variation in the prevalence of various psychiatric disorders, it becomes apparent that there could be many reasons for the same. The significant problems with the existing studies can be understood as follows:

**Inherent nature of the mental disorders:**

Mental disorders constitute a wide spectrum of conditions ranging from sub-clinical states to severe disorders. Some mental health problems can attain the disorder/disease/syndrome level, which is usually considered easy to recognize, define, diagnose, and treat. Hence, they can be called 'Visible Mental Health Problems in a community. These visible mental health problems are again classified into Major and Minor mental disorders. Major mental disorders are easy to recognize and commonly seen in mental hospitals. However, minor mental disorders are common in the community. Another group of mental health problems remains at the sub-clinical/non-clinical/sub-syndromal level and is usually related to an individual's behavior. They are difficult to recognize, define and diagnose. Hence, they are called 'Invisible Mental Health Problems.' Psychiatric epidemiological studies have ignored this category because of the difficulty in defining and identifying the case. It has also been argued by many researchers not to pathologize the problems faced by individuals.[1]

**Initial Assessment by Lay Interviewers:** Most epidemiological studies have used a two-stage assessment method, with the initial screening assessment done by lay interviewers, who necessarily do not have the experience to diagnose mental illness and understand the concepts of clinical significance and medical necessity. Due to this these factors could have influenced the identifications of cases and healthy controls, and this could have contributed to the wide variation in the prevalence of mental disorders across different studies.[3]

**Definition of a Case:** The definition of a case in various epidemiological studies has remained challenging because various definitions of mental disorders fail to provide a clear demarcation between normality and psychopathology. Similarly, understanding the concepts of 'clinical significance' and 'medical necessity' has remained challenging, and researchers have operationalized them differently. Due to this, some subjective bias may creep into defining a case

and the resultant variation in the prevalence of various psychiatric disorders across different studies.[3]

**Limitation of studies to one geographical location:** The older epidemiological studies have been limited to more than one geographic area, with none of the studies assessing the patients across the different centers and geographical locations. Further, most of the studies have been done in either West Bengal or Uttar Pradesh. It is well known that there is a difference in the socio-economic status and various cultural issues across different states in the country. Hence, it is impossible to generalize the existing studies' findings.[3]

**Variation in the screening instruments used:** As mentioned earlier, many epidemiological studies have used a two-phase sampling technique. The first step involved using a screening instrument to detect persons with potential psychiatric disorders, and the second step involved confirmation of the diagnosis by a psychiatrist using a self-designed or structured interview schedule (Table-1). Some instruments used for screening and confirmation of diagnosis have not been validated. Understanding that highly sensitive instruments are more useful in epidemiological studies to avoid false negatives is essential. On the other hand, the diagnostic instruments are expected to be more specific so that these do not pick up false positive cases.[3]

**Inclusion of only positive cases for the second stage assessment:** Most epidemiological studies have relied upon two-stage screening methods. In almost all the studies, the psychiatrists further assessed the persons detected to be screen positive during the second stage to confirm the diagnosis. However, when one tries to understand the sensitivity and specificity of any test, it is usually suggested that, if not all, a proportion of those detected to be negative should have also been evaluated further to confirm that they were free of psychopathology.[6]

**Informant-based assessment:** Most studies have relied on the key informants to assess psychopathology rather than the direct interview with the sufferer during the initial screening step. Further, the majority of the studies have relied upon a single informant. Usually, the head of the family, the housewife, or any other responsible family member, provides information about the whole family. Due to this, there has been a lot of responder bias in reporting information, especially about minor mental disorders.[3]

**Sampling Technique:** Almost all epidemiological studies have used the house-to-house survey method to estimate the prevalence of psychiatric disorders. However, it is essential to note that house-to-house surveys cannot include persons hospitalized due to illness, homeless persons, wandering mentally ill, and persons not available for reasons such as occupation. Over the years, sampling techniques have improved, with some studies using the systematic or stratified sampling

method. Recent studies have improved the sampling technique to stratified multi-stage cluster sampling.[3]

**Use of high-risk population:** Some epidemiological studies have assessed special populations such as migrants, slum dwellers, and tribal communities to assess the prevalence of mental disorders. These studies, in general, have reported a higher prevalence of mental disorders, which could be due to higher stress levels in this subgroup of persons.[1]

**Lack of adaptation of instruments used in epidemiological studies:** Another critical aspect of epidemiological studies is the appropriate adaptation of the instrument for use in the local population. It is suggested that the tool be appropriately translated into the local language and adapted and/or designed for the particular study setting and population using standard World Health Organization methodology for translation and adaptation. Also, the details of translation and adaptation should be included under the study methodology to enable the readers to appraise the findings.[6]

**Limitations of the studies to only certain areas of the country:** Most of the earlier studies were conducted in one geographical area, with most of the studies conducted in West Bengal and Uttar Pradesh. This has been one of the major limitations of the earlier studies. However, fortunately, in recent times, this limitation has been overcome by the National Mental Health Survey.[3]

**Lack of data on Disability:** Mental disorders are often associated with significant disability. However, most studies have not evaluated the disability associated with various mental disorders.

**Lack of data on Caregiver Burden:** Many clinic-based studies have reported high caregiver burden associated with disorders like schizophrenia, bipolar disorder, obsessive-compulsive disorder, depression, and substance dependence. However, epidemiological studies have failed to evaluate this critical outcome. As many patients with mental disorders either do not seek treatment or go to other faith healers, the caregiver burden for these patients may be different from that reported in clinic-based studies. Hence there is a need to evaluate this outcome in future epidemiological studies.

**Stigma, treatment gap, and pathways to care:** It is well known that the treatment of mental disorders is influenced by various psychosocial factors such as stigma and pathways to care. Similarly, there is limited information on the treatment gap for various disorders. Understanding these variables at the community level can help design intervention programs to improve access to mental health services and organize mental health services at the primary care level.

**Cost of treatment:** There needs to be more data from epidemiological studies concerning the cost of treatment.

**Under-reporting of information:** In contrast to the clinic setting, where most patients come voluntarily for help and disclose all the sensitive information about their illness and treatment received, in epidemiological studies, many of the participants are unlikely to disclose the sensitive information. Due to this, various aspects of treatment, stigma, and discrimination are often under-reported. This becomes a significant problem when the lay personnel do the initial screening. [7-9]

**Lack of information on the incidence of mental disorders:** As mentioned earlier, almost all epidemiological studies have been cross-sectional and provide information about the prevalence of various psychiatric disorders, but these provide no information about the incidence of various mental disorders in the country. There are only two incidence studies [Nandi et al., 1976 and Nandi et al., 1978] conducted in India. [10,11]

**Table-1: Epidemiological Studies Done in India**

| Author | Sample size | Centre | Location | Sample technique | Sampling | Assessment tools | Definition of case | Prevalence / 1000 |
|---|---|---|---|---|---|---|---|---|
| Dube, 1970[2] | 29,248 | Agra | Mixed (Rural and Urban) | Purposive | H-H | DCP | Self-designed | 18 |
| Elangar et al., 1971[12] | 1,393 | Hoogly | Rural | Purposive | H-H | CHM and DCP | WHO definition of mental health (1960) | 27 |
| Sethi et al., 1972[13] | 2,691 | Lucknow | Rural | Purposive | H-H | CHQ and CHM | Self-designed | 39.4 |
| Verghese et al, 1973[14] | 1,887 | Vellore | Urban | | SRS | MHIS and DCP | ICD-8 | 66.5 |
| Sethi et al., 1974[15] | 4,481 | Lucknow | Rural | | 3 SPS | PSQ and DCP | DSM-II | 67.0 |
| The Core et al., 1975[16] | 1,977 | Lucknow | Urban | | H-H | PHQ and DCP | Self-designed | 81.6 |
| Nandi et al., 1975[17] | 1,060 | West Bengal | Rural | | H-H | HSQ and CRS | ICD-8R | 102.8 |
| Nandi et al., 1979[18] | 3,718 | West Bengal | Rural | | H-H | HS, SESS, CDS and CRS | Self-designed | 102 |
| Shah et al., 1980[19] | 2,712 | Ahmedabad | Urban | | H-H | MHSQ and DCP | Self-designed | 47.2 |
| Mehta et al, 1985[20] | 5,941 | Vellore | Rural | | SS | IPSS and DCP | Self-designed | 14.5 |
| Sachdeva et al, 1986[21] | 1,989 | Faridkot | Rural | | H-H | HS, SESS and CDS | ICD-9 | 22.12 |
| Premarajan et al, 1993[22] | 1,115 | Pondichery | Urban | | RS | IPSS and DCP | ICD-9R | 99.4 |
| Shaji et al, 1995[23] | 5,284 | Erankulam | Rural | | H-H | IPSS, SESS, CRS and DCP | ICD-10 | 14.57 |
| Sharma et al., 2001[24] | 4,022 | Goa | Mixed (Rural and Urban) | | SRS | RPES and DCP | ICD-9 | 60.2 |
| Malhotra et al., 2002[25] | 963 | Chandigarh | Urban | | SRS | RBS, CPMS, MISIC, VSMS and GDT | ICD-10 | 63.3 |
| Anita et al., 2003[26] | 800 | Rohtak | Mixed | | SyRS | Hindi version of the CPMS and DISC | ICD-10 | 165 |
| Srinath et al., 2005[27] | 2,064 | Bangalore | Mixed | | SRS | SC, CBC, CBQ, FTN, DISC, SIS, PIS, BKT, SLDB, CGAS and PEP | ICD-10 DCR | 125 |

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|---|---|---|---|---|---|---|---|---|
| Malhotra et al., 2014[28] | 20,281 | India | Mixed | | SR and MA | | | 64.6 |
| Sathyanarayana Rao et al, 2014[29] | 3,033 | Suttur, Karnataka | Rural | Exploratory study | DDS | MINI PLUS and MINI Kid | ICD-10 and DSM-IV TR | 244 |
| Murthy RS et al., 2017[30] (MoHFW, GOI) | 34,802 | 12 states | Mixed | | Multi-stage, SRCST | MINI and MINI Kid | ICD-10 DCR | 105.6 (current) |
| Rajesh et al., 2017[31 | 24,371 | 08 districts of different states | Mixed | | SMSCS | CIDI and SCAN | ICD-10 DCR | 55.2 |

H-H – House to house survey; DCP - Diagnosis confirmed by a psychiatrist; CHM - Case history method; CHQ - Case History Questionnaire; SRS - Stratified random sampling; MHIS - Mental health item sheet; SPS - Stage probability sampling; PSQ - Psychiatric screening questionnaire; PHQ - Psychiatric health questionnaire; HSQ - Household schedule Questionnaire schedule; CRS - Case record schedule; HS - Household schedule; SESS - Socio-economic status schedule; CDS - Case detection schedule; MHSQ - Mental health screening questionnaire; SS - Systemic sampling; IPSS - Indian Psychiatric Survey Schedule; RS - Random sampling; SRS - Stratified random sampling; RPES - Rapid psychiatric examination schedule; RBS - Rutter-B Scale; CPMS - Childhood Psychopathology Measurement Schedule; MISIC – Malins intelligence scale for Indian children; VSMS – Vineland social maturity scale; GDT - Gessel's drawing test; SyRS - Systematic random sampling; DISC - Diagnostic interview schedule for children; SC - Screening checklist; CBC - Child behavior checklist; CBQ - Children's behavior questionnaire; FTN - Felt treatment needs; SIS - Structured interview schedule; PIS - Parent interview schedule; BKT - Binet kamat test; SLDB - Specific learning disability (SLD) battery; CGAS - Children's global assessment scale; PEP - Physical examination proforma; SR - Systematic review; MA - Meta-analysis; DDS - Door-to-door survey; MINI – Mini-international neuropsychiatric interview; MINI PLUS - Mini-international neuropsychiatric interview Plus; MINI Kid - Mini-international neuropsychiatric interview Kid; SRCST - Stratified random cluster sampling technique; SMSCS - Stratified multi-stage cluster sampling; CIDI - Composite International Diagnostic Interview; SCAN - Schedules for Clinical Assessment in Neuropsychiatry; WHO – World health organisation; ICD – International classification of diseases; DSM – Diagnostic and statistical manual of mental disorders

**National Mental Health Survey (NMHS)**

Considering the limitations of the existing epidemiological studies, the Ministry of Health and Family Welfare (MoHFW), Government of India (GOI), commissioned the National Mental Health Survey (NMHS) in the year 2014–15 with broad objectives of estimating the prevalence and burden of mental disorders in a representative population of India, identifying the current treatment gap, existing patterns of health care seeking and service utilization patterns, along with an understanding of the impact and disability due to mental disorders in India and assessing mental health care resources and facilities in the surveyed Indian states for planning and strengthening mental health services in India.[32]

**The NMHS was commissioned based on the recommendations of the** Joint Parliamentary Committee, Frequent questions by the Parliamentarian, Judicial directives, concerns of the policymakers, professional's needs, and questions from the media. The MoHFW, GOI, commissioned the NMHS during the year **2014–15** to be implemented by the National Institute of Mental Health and Neurosciences (NIMHANS), Bengaluru. The survey has been planned to be conducted in three phases, with the first phase involving the collection of data from 12 states in the country.

The study involved a multi-stage, stratified, random cluster sampling technique based on Probability Proportion to Size (MSRS-PPS*).* Multi-stage sampling was adopted (District, Taluka, Village / Ward/ HH) in each state, and each selected state of India constituted the sampling frame. Sample size calculation was also done prior to the initiation of the study, and a pilot study was done before the primary survey to understand the feasibility of the study.

The study was based on systematic random sampling and was based on the use of Mini International Neuropsychiatric Interview (MINI) and MINI-Kid for adolescents. Additional questionnaires were used for tobacco use and to screen for Epilepsy, Intellectual Disability (ID), and autism spectrum disorders (ASD). The study also involved the use of questionnaires on health care utilization, assessment of disability, and socio-economic impact of illness were used in the study. The health treatment and care-seeking module was used to assess the information on the duration of illness, whether currently on treatment with a formal / trained health care provider, source of treatment (formal, informal, and community care), duration between the onset of symptoms and consultation with a formal health care provider and the number of treatment providers seen. Information on the latest/most recent treatment provider, whether working in a public facility, distance to be travelled to seek care, duration of treatment, and the approximate money spent for treatment were also documented. Disability was assessed using the Sheehan Disability Scale (SDS), which is a composite of three self- or interviewer-rated items involving three significant domains (work, social life, and family life) of an individual's life. Seven questions were used to understand the socio-economic impact of illness, and these included subjective reporting of overall difficulties, the duration of these difficulties in the past 30 days, its impact on the carrying out of daily routine activities either for

the respondent or other family members and the number of days the respondent missed family, social or leisure activities because of illness.[32]

Besides collecting the quantitative data, qualitative research methods like focus group discussions (FGDs) and key informant interviews (KIIs) were used to supplement and complement the quantitative data obtained from surveys.[32]

To facilitate uniform data collection, an operational guidelines document was developed as a companion step-by-step guide to the NMHS master protocol as a manual on "how to do" the survey across the different study sites. All the instruments were translated into the local languages, and translated MINI instruments were checked for social and cultural appropriateness, back translated, and then appropriate changes made for the final versions. All the data collectors were trained before the collection of the data, and the whole data collection process was closely monitored.[33]

When one looks at the whole study design of the NMHS, it is evident that it has attempted to overcome the majority of the limitations of the previous epidemiological studies. It also demonstrated a wide variation in the prevalence of various psychiatric and substance use disorders across different states.

However, the NMHS still has some pitfalls. The quality of the data sources could influence the collated data. Further, the study did not evaluate the comorbidity between mental and physical morbidities. The study also excluded children less than 13 years due to a lack of experienced teams to investigate child mental health issues. The survey did not include the homeless, mentally ill, and institutionalized populations. Further, the absence of a national registry of service providers in the country and the poorly regulated private sector posed challenges in the compilation of information. State-specific heterogeneity in certain factors (health status, health systems, culture, socio-economic situation, development indices, and other macro-level determinants) could have influenced national-level estimates of mental disorders. [22,23]

## Conclusion

Psychiatric epidemiology lags behind other branches of epidemiology due to difficulties encountered in conceptualizing, defining a case and diagnosing, sampling technique, lack of trained manpower, poor knowledge, data collection from a single informant, systematic under-reporting, stigma, lack of adequate funding and low priority of mental health in the health policy. Despite the above challenges, there have been endeavours into descriptive psychiatric epidemiological studies, but advances concerning cost-effective, analytical, and prospective

experimental, epidemiological studies have been minimal. [27,28] The recent NMHS has attempted to overcome some of the limitations of the earlier studies. However, there is still a long way to go to understand the epidemiology of various mental disorders in the country.

**References:**


1. Math SB, Srinivasaraju R. Indian Psychiatric epidemiological studies: Learning from the past. Indian J Psychiatry 2010;52: S95-103.
2. Dube KC. A study of prevalence and biosocial variables in mental illness in a rural and an urban community in Uttar Pradesh--India. Acta Psychiatr Scand. 1970; 46:327-59.
3. Math SB, Chandrashekar CR, Bhugra D. Psychiatric epidemiology in India. Indian Journal of Medical Research. 2007; 126:183-92.
4. Reddy MV, Chandrasekar CR. Prevalence of mental and behavioural disorders in India: A meta-analysis. Indian J Psychiatry 1998; 40:149-57.
5. Ganguli HC. Epidemiological finding on the prevalence of mental disorders in India. Indian J Psychiatry 2000; 42:14-20.
6. Ali GC, Ryan G, De Silva MJ. Validated screening tools for common mental disorders in low- and middle-income countries: a systematic review. PloS one. 2016;11(6): e0156939.
7. Jorm F. Mental health literacy, public knowledge and beliefs about mental disorders. Br J Psychiatry 2000; 177:396-401.
8. Padmavati R, Rajkumar S, Srinivasan TN. Schizophrenic patients who were never treated: A study in an Indian urban community. Psychol Med 1998; 28:1113-7.
9. Srinivasan TN, Rajkumar S. Initiating care for untreated schizophrenia patients and results of one-year follow-up. Int J Soc Psychiatry 2001; 47:73-80.
10. Nandi DN, Banerjee G, Mukherjee SP, Ghosh A, Nandi PS, Nandi S. Psychiatric morbidity of a rural Indian community: Changes over a 20-year interval. Br J Psychiatry 2000; 176:351-6.
11. Nandi DN, Ajmany S, Ganguli H, Banerjee G, Boral GC, Sarkar S. The incidence of mental disorders in one-year community in West Bengal. Indian J Psychiatry 1976; 18:79-87.
12. Elnager MN, Maitra P, Rao MN. Mental health in an Indian rural community. Br J Psychiatry 1971; 118:499-503.
13. Sethi BB, Gupta SC, Mahendru RK, Kumari P. A psychiatric survey of 500 rural families. Indian J Psychiatry 1972; 14:183-96.
14. Verghese A, Beig A, Senseman LA, Sundar Rao PS, Benjamin V. A social and psychiatric study of a representative group of families in Vellore town. Indian J Med Res 1973; 61:608-20.
15. Sethi BB, Gupta SC, Mahendru RK, Kumari P. Mental Health and urban life: A study of 850 families Br J Psychiatry 1974;124:243-6.
16. Thacore VR, Gupta SC, Suriya M. Psychiatric Morbidity in North Indian Community. Br J Psychiatry 1975; 126:364-9.
17. Nandi DN, Ajmany S, Ganguly H, Banerjee G, Boral GC, Ghosh A, et al. Psychiatric disorders in a rural community in West Bengal: An epidemiological study. Indian J Psychiatry 1975; 17:87-99.
18. Nandi DN, Banerjee G, Boral GC, Ganguli H, Ajmany S, Ghosh A, et al. Socio-economic status and prevalence of mental disorders in certain rural communities in India. Acta Psychiatr Scand 1979; 59:276-93.

19. Shah AV, Goswami UA, Maniar RC, Hariwala DC, Sinha BK. Prevalence of psychiatric disorders in Ahmedabad: An epidemiological study. Indian J Psychiatry 1980; 22:384-8.
20. Mehta P, Joseph A, Verghese A. An epidemiological study of psychiatric disorders in a rural area in Tamil Nadu. Indian J Psychiatry 1985; 27:153-8.
21. Sachdeva JS, Singh S, Sidhu BS, Goyal RKD, Singh J. An epidemiological study of psychiatric disorders in rural Faridkot (Punjab). Indian J Psychiatry 1986; 28:317-23.
22. Premrajan KC, Danabalan M, Chandrasekhar R, Srinivasa DK. Prevalence of psychiatric morbidity in an urban community of Pondicherry. Indian J Psychiatry 1993; 35:99-102.
23. Shaji S, Verghese A, Promodu K, George B, Shibu VP. Prevalence of priority psychiatric disorders in a rural area of Kerala. Indian J Psychiatry 1995; 37:91-6.
24. Sharma S, Singh MM. Prevalence of mental disorders: An epidemiological study In Goa. Indian J Psychiatry 2001; 43:118-26.
25. Malhotra S, Kohli A, Arun P. Prevalence of psychiatric disorders in school children in Chandigarh, India. Indian J Med Res. 2002; 116:21-8.
26. Anita DR, Vohra AK, Subash S, Khurana H. Prevalence of psychiatric morbidity among 6- to 14-year-old children. Anxiety. 2003;12(2.86):2-86.
27. Srinath S, Girimaji SC, Gururaj G, Seshadri S, Subbakrishna DK, Bhola P, et al. Epidemiological study of child and adolescent psychiatric disorders in urban and rural areas of Bangalore, India. Indian J Med Res 2005; 122:67-79.
28. Malhotra S, Patra BN. Prevalence of child and adolescent psychiatric disorders in India: a systematic review and meta-analysis. Child and adolescent psychiatry and mental health. 2014; 8:1-9.
29. Rao TS, Darshan MS, Tandon A, Raman R, Karthik KN, Saraswathi N, Das K, Harsha GT, Krishna VS, Ashok NC. Suttur study: An epidemiological study of psychiatric disorders in South Indian rural population. Indian journal of psychiatry. 2014; 56:238.
30. Murthy RS. National mental health survey of India 2015–2016. Indian journal of psychiatry. 2017; 59:21.
31. Sagar R, Pattanayak RD, Chandrasekaran R, Chaudhury PK, Deswal BS, Singh RL, Malhotra S, Nizamie SH, Panchal BN, Sudhakar TP, Trivedi JK. Twelve-month prevalence and treatment gap for common mental disorders: Findings from a large-scale epidemiological survey in India. Indian journal of psychiatry. 2017; 59:46.
32. Pradeep BS, Gururaj G, Varghese M, Benegal V, Rao GN, Sukumar GM, et al. National mental health survey of India, 2016-rationale, design and methods. PloS one. 2018;13.
33. Gururaj G, Varghese M, Benegal V, et al. National Mental Health Survey of India, 2015-16: Prevalence, patterns and outcomes. Bengaluru, National Institute of Mental Health and Neurosciences, NIMHANS Publication No. 129, 2016.