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Psychiatry

PREVALENCE AND REMISSION CHARACTERISTICS OF SELECT MENTAL ILLNESS AND SUBSTANCE USE DISORDERS IN INDIA

KEY WORDS: Remission rate
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ABSTRACT

BACKGROUND: There are very few literature evidence studying the remission rates among mental illness and substance use disorders (MISUD) in India. Knowledge of the remission and its characteristics can help to draw better policies for mental health care delivery in India.

METHOD: Using the Global Burden of Diseases, 2016 approach and employing the DisMod-MR – 2.1.6 mathematical modelling, prevalence, incidence and remission rates of 4 substance use disorders (alcohol, opioid, cocaine and cannabis), schizophrenia, major depressive disorder, bipolar disorder, anxiety disorders and conduct disorder were studied.

RESULTS: Within the mathematical model confines the prevalence, incidence characteristics of MISUDs based on age and gender are presented. The remission rate per person year ranged from 0.015 to 1.46 for different MISUD. Gender had significant on the model for anxiety disorders, conduct disorders, opioid and alcohol use disorder. The effect of age on the model are described in detail

CONCLUSIONS: The outcome of the study indicates the remission rates of MISUDs are highly variable. Remission rates significantly varies between age and gender. Based on these inputs, customized and targeted MISUDs therapies may be designed for better remission. The study also underlines the need for further large scale research efforts required for studying and reporting natural history of MISUDs from India.

BACKGROUND:

Mental illness and substance use disorder (MISUD) includes a spectrum of heterogeneous, multifactorial diseases with diverse presentations, occurrence patterns and treatments.^[1] Resultantly, the outcome of MISUDs are often complex. The outcome are often described as episodic, response, partial remission, full remission, recovery, relapse, and recurrence.^[2] The definitions for each of these are delineated separately for each disorder. Remission is often described to be achieved when the subject does not meet the criteria for the disorder and as in partial remission when the criteria is not met though in presence of minimal symptoms.^[2] Epidemiological estimation of remission is reportedly preferred for diseases that are chronic and variably progressive in nature, with MISUDs confirming to this standard, broad outline.^[3] Most of the studies in MISUD follow the natural history and or effect of various treatment, describe the failures of treatment or that emphasize on the progression of the disorders. Studies often include genetic predisposition, demographic, environmental, social and psychological factors that causes progression of the disorders.^[2] Interestingly remission is the least studied concept in MISUD. However, understanding remission rates for these conditions are crucial. Remission data of chronic episodic diseases could provide deeper insights on the standard of care, provide clue to point of care, primary care services and etiologic research too.^[2]

Global Burden of Diseases (GBD) is a unique attempt to systematically analyze the huge volume of published peer-reviewed data, including mental health. With the proven power of mathematical modelling and consideration of various parameters using the power of rapid computation, this project is widely used to combine and provide more meaningful insights of data from several small scale studies.^[4-15]

The recently concluded National Mental Health Survey of India revealed a deep insights of the prevalence, incidence, burden of mental illness, availability of resources and treatment gap in several parts of India.^[11] Together with ever increasing body of MISUDs literature from India, more knowledge is continuously and incrementally emerging in the field of MISUD. However, less pertinent data is available in the dimensions of remission.^[16] This manuscript intends to address this lacunae. This observational study intends to estimate the prevalence, incidence of select common MISUDs in India in 2016 and calculate the remission rates

for the conditions using the GBD approach as well as to study the effect of age and gender on the remission.

MATERIALS AND METHODS:

From the Indian Mental Health Survey, we identified that the most common MISUD in India were schizophrenia, bipolar disorders, major depressive disorder, conduct disorders, anxiety and substance (alcohol dependence, cannabis, cocaine and opioid) use disorders.^[1] This present study reports of the projected estimates for these disorders only for the year 2016.

The GBD study (<http://www.healthdata.org/data-visualization/gbd-compare>) employs a standardized, analytical combined approach for various basic epidemiological and demographical parameters published in peer reviewed literature from 1980. The standard minimum inclusion criteria set of definition for MISUDs have been described previously elsewhere^[15] and the same set of definition were used for this study. All relevant publications from the past till 2016 have been used to collect the data, data extracted, optimized and enriched using established mathematical models described in details elsewhere.^[15]

All collected data were combined using the Bayesian meta-regression tool DisMod-MR 2.1.16. This system encompass a series of alternative approach, as described in details earlier.^[15] The present study was performed for India at national level and estimates for 2016 are presented. Detailed results from GBD 2016 by type of MISUDs can be explored for basic combined burden parameters in dynamic data visualizations at <https://vizhub.healthdata.org/gbd-compare/>

In case of non-availability of data GBD applies a non-linear mixed effect model that employs the relationship between key covariates of the diseases and its associated rates, spatio-temporal regression, and Gaussian Process regression. GBD makes such predictions in cases where there are no or little observed data by borrowing strength from past data or with that of the pertinent neighboring countries that have empirical data.^[4-14] All previous published pertinent data from several sources as described in detail at <http://ghdx.healthdata.org/about-ghdx/data-type-definitions>. A number of data points from several past years were identified and the collected data were used in this study from several sources studies. The combined data can be visualized at [https:// vizhub.](https://vizhub.healthdata.org/gbd-compare/)

healthdata.org/gbd-compare/. All computations in GBD were done 1000 times, every time drawing from the distribution of the sampling error of data inputs, the uncertainty of data corrections for measurement errors, the uncertainty in coefficients from model fit (DisMod-MR 2.1), and uncertainty bounds for a quantity of interest were defined by the 25th and 975th value of the ordered 1000 estimate values, expressed as the 95% uncertainty interval (UI).^[4-14]

The select MISUDs for India in 2016 were applied and modeled using DisMod-MR 2.1, (Disease Modeling Meta-Regression Tool-2, Free tool, Jan Barendregt, Department of Public Health of Erasmus University, Netherlands, Available from www.epigear.com) accounting for the visualizing the post-adjusted incidence, prevalence, mortality, and remission data. From the further specialized tool at <http://www.healthdata.org/data-visualization/epi-viz>, the details of the remission were collected after adjusting for all covariates, outliers and input data variations. The details of the model assumptions, priori, beta and the model flow chart can be accessed elsewhere.^[15]

Prevalence were the estimate number of patients in each MISUDs while the incidence (expressed as a rate) for this study purpose refers to the number of new cases per person-year. It is often approximated by taking the number of new cases in a year divided by the mid-year population of India as estimated by the population figures based on World Population Prospects: 2015 Revision, from the United Nations Population Division, and the WHO Human Mortality Database [696993828 males and 652,723,112 females]. For the purpose of this study, remission (expressed as a rate) is the number of cases that resolve or are cured per person-year. Person-year refers to the estimate of the actual time-at-risk in years that all persons contributed to a diseases, specific MISUD while rate is the number of new cases of MISUD during a period of time, (2016 in this study), divided by the person-time-at-risk.

The GBD defines remission as no longer fulfilling the diagnostic criteria for the disorder. Remission was reported as defined as an annual hazard rate to recover from the disease, with person-time with disease in the denominator. The time factor was not stated while previous reports of a disease free state of 2-years (1-year period for major depressive disorder). Remission and incidence were capped between ages 4 and 17 years for conduct disorder.

Often, these data are rarely available therefore where number of remitted cases were reported, the remission rate was calculated:

$$\text{Weighted remission rate (\%)} = \sum \left[a * \frac{-\ln(1-b)}{c} \right] / \sum a$$

where a is sample size, b is remission proportion and c is follow-up (years) where sufficient data were reported.^[17] We employed the "country final" option which represents estimate for India (blue) and "global final" (green) to compare. Global final is the final estimate fit to all the world's data after accounting for all covariates. Remission estimates from prospective general population cohort studies with a naturalistic (non-interventional) follow-up of cases until they no longer fulfilled diagnostic criteria were used and was set to predetermined prior information based on literature.

GBD Epidemiological visualization applies a log rate model of disease prevalence, incidence, remission, and case-fatality rates and fits models with a randomized Markov-Chain Monte Carlo algorithm. This model accounts for all possible outcomes and its probabilities, then incrementally performing risk analysis. The model accounts for the fixed and random factors.^[4-14,17] The statistical calculation model of GBD exhibits the significant effects both in co-efficient and exponentiated co-efficient, that can be considered as odds ratio. From the interactive map option, age-standardized rates of incidence and remission with 95% UI for either genders for all MISUDs listed were obtained. Using the plot option, the age-group for the remission rates for MISUDs of either gender were obtained and presented.

From the prevalence and incidence numbers derived for the Indian MISUDs for 2016, assuming that all other parameters remain

same, the average treatment duration was derived using the formula^[18]

$$\text{Average duration of disease} = \frac{\text{Prevalence}}{\text{Incidence}}$$

RESULTS:

In all there were 8 major data sources – 7 surveys and one mixed estimation type of study that provided 1389 data points. Details of schizophrenia were acquired from 2 studies which were in the 1988-89 and 1978-93 time period while details for conduct disorder was only from a single major study performed in 2016. The other MISUDs had several data points. All the details are listed in Supplementary file-1. The definitions employed, procedural details and data processing algorithm for the study are reported in detail elsewhere.^[15]

In 2016, 111.71 million Indians (8.33%) suffered from the 9 MISUDs combined, among the 1.34 billion population. Of this MIUDs, those suffering with anxiety disorders and alcohol use disorders were more prevalent. Among males, alcohol use disorders predominated while among females it is the anxiety disorders that predominated. The lowest was the cocaine use disorders both in males and females. (Table-1) The incidence rate of age-standardized Indians in 2016 accounting for the number of new cases per person-year are listed in Table-2. Major depressive disorders emerged as the highest rate among both the genders followed by anxiety disorders. Schizophrenia, bipolar disorders and cocaine use disorders had the least incidence rate. On applying the population, in 2016, an estimated 35486047 males and 37066840 females, together 72552887 (5.4 %) of the population had been diagnosed with MISUDs between them.

For schizophrenia and bipolar mood disorders, in males and females prevalence rate (per 100,000) was observed to be increasing till 5th decade of life after which it reduces. In major depressive disorder the prevalence rates progressively increased with age in both gender. For the anxiety disorder, prevalence rates was highest in 45 to 49 years in males and females after which it reduces. Conduct disorder prevalence rates were significant only till 25 years after which there is no or negligible prevalence rate (below three decimals) reported in GBD 2016. (Table-3)

Alcohol use disorder prevalence rates was highest in 30 to 34 years age group among males and females after which it decreased. For opioid disorder, highest prevalence rate for males was in 30 to 34 years age group while for females it is 25 to 29 years age group. Cocaine use disorder was more prevalent in 3rd decade of life in both gender while 20 to 24 years age group showed highest prevalence rates for cannabis use disorder (table-4)

Age standardized, remission expressed as a rate, refers to the number of cases that resolve or are cured per person-year, for the year 2016 are given in table-5. Major depressive disorders showed high remission rate followed by conduct disorders while schizophrenia and bipolar disorders show the least rate. Among substances, Alcohol use disorder rates were the highest followed by opioid while other remained the least. The model showed that gender was a significant covariate for alcohol and opioid use disorders, anxiety disorders and conduct disorders. The fixed effect values of the x-covariates in this model (which means that data points are adjusted to the reference value if a systematic bias is detected) which are in log space (as DisMod uses an offset lognormal model) as well as the exponentiated values which for an x-covariates can be interpreted as an odds ratios.^[17] The beta and the exponentiated beta are given in Table-5 along with 95% UI. The random effects were not observed for any of the MISUDs studied.

The effect of age on the remission rate were studied in detail. Each MISUD had a distinct age based remission as evidenced in the figures 1, 2. Except for schizophrenia and major depressive disorders, age appears to be influencing the remission characteristics.

As seen in Figure-1, in males, for alcohol dependence, the remission rate appears to increase till age of 40 years after which it

decreases. Among cannabis use disorder patients, remission increases till early 20s after which it is not steady and again peaks by 60 years, after which it decreases by 80 and the again increases. For cocaine use disorders, the remission rates increases till 20 years after which it slowly reduces while for opioid disorder, the remission rate peaks by age of early 40 after which it declines. For conduct disorders, the remission rate slowly increases from 20 years. For Major depressive disorder, the remission rate is nearly stable around 1.5 cases per person-year. There is a similar trend between the global and Indian trends. For schizophrenia, the global trend is higher than Indians but is nearly constant across age group. For females, the trend is the same as the males but with slightly different remission rates. (Figure-2). For all MISUDs except conduct disorder, the remission rate was well below the upper limit and priori, indicating the cure rate were below the inputs as cited in the model inputs.^[15] For the conduct disorder, the remission rate was well above the upper limit indicating higher remission than global parameters. The model beta and the exponentiated beta, (equivalent to odds ratio) are given in Table-5. The random and fixed effects for any other covariates emerged significant for any of the MISUDs studied.

In males, the average duration of disease was highest with schizophrenia (16.924 years) followed by bipolar disorders (10.41 years) while least was with major depressive disorder (0.65 years). Females followed the duration trend but with difference. For Schizophrenia, bipolar disorder and anxiety disorder, females had a longer average duration than the males while for other males had longer duration of diseases/disorder. (Table-6)

DISCUSSION:

Given the diverse nature of outcome of MISUDs, the goal of any related therapy would be to shun substances in substance use disorders and return to wellness for other disorders.^[19] It is a common fact that for serious chronic disorders patients are often under continuous medical observation and outcomes are often documented. In chronic episodic disorders, the existing health monitoring systems only partially capture the outcome, as when a remission occurs. In remission states, patients do not report or seek medical help and thus remain out of medical surveillance. Remission focused studies offer a chance to introspect the standard of care, clinical evidence of treatment and efficiency of the medical system. Such studies require a standardized, prospective approach of long term nature to capture remission rates.^[3] Analysis of such data would help to define the temporal criteria (period of time without an exacerbation of symptoms) for remission.^[16] Studies fulfilling such criteria are rare and existing one are often reported to be filled with logistical and methodological challenges.^[3,16] Mathematical methods have evolved to effectively convert cross-sectional survey data to prospective studies data to identify the remission rates.^[3,15]

Global Burden of Diseases approach have been effectively used in the past to describe the epidemiology of the considered MISUDs.^[4-15] The prevalence of MISUDs is in tune with the projection in literature^[11] as the same data has been taken for the calculation of GBD. Though the remission rate, a different rate of priori taken as seen in table-5, the resultant remission rates for schizophrenia, bipolar disorders and opioid use disorders obtained at the end of the study were lesser than this rate, indicating poor remission indicating well below the global parameters.^[15] (Table-5) The diagnosis of remission was based on not meeting criteria for the disorders (excluding craving) while there might be elements of remnants of the disorders that is not severe enough to be called as the MISUDs but still is not normal.^[4-14,17] The definitions employed for the various studies are ambiguous and needs to be standardized.^[17] Clinical studies with therapeutic interventions quote clinical remission in the range of 30% and above for 1-year period while complete remission is nearly unachievable in severe cases of schizophrenia, depressive disorders, bipolar disorders, anxiety and conduct disorders. While near normalcy can be achieved in substance use disorders, the rate of relapse might be high.^[19-21] In addition, "somatization" and non-availability of mental health professionals are other issues in primary care setting often leading to misdiagnosis and thus mismanagement.^[16]

Spontaneous remission, regression of less severe cases to non-symptomatic state with pharmacotherapies and psychotherapies are often left behind from the watch of the existing medical system.^[2,16] A large proportion of such borderline cases, if kept out of the monitoring system, may cumulatively lead to larger burden of MISUDs in future.^[11] The lower remission rate even in achievable conditions like substance abuse disorders indicate that adequate steps needs to be taken on priority basis. The present results clearly highlights that India needs better model of mental health care delivery system than existing model as it fails to detect substantial remission or document the extent of the success.

For alcohol dependence, the remission rate appears to be rapidly increasing till age of 40 years after which it decreases. The reason for this phenomenon, especially increasing co-morbidity with chronic alcohol use leading to early, preventable mortality might be one of the reason for the sudden drop in remission rate. Institution of proper, early interventions might ensure that patients quit alcohol.^[4] For cannabis use disorder patients, remission rates increases till early 20s after which it plateau to peak again by 7th decade of life. This indicates that early treatment would be beneficial while latter treatment needs continuous follow-up.^[7] The other substance use disorders such as cocaine and opioid also exhibit such age dependent phenomenon. These may be closely related to age of initiation, strong cultural and societal reasons.^[10,12,14] Harnessing the age related remission rates might yield better clinical results. For conduct disorders, the remission rate slowly increases from age of 20 years after which it rapidly increases. This could be attributed to the high differential mortality, by virtue of its effect in removing the cases with poor outcomes.^[2,8] However, depression and alcoholic use disorder that also high differential mortality rates, does not show this trend. The phenomenon of need of better remission in older age group in conduct disorders needs to be examined in length. The relatively high remission rates in conduct disorder indicates that the chance of spontaneous remissions could be high or responds to treatment very well or that they might initially respond well and often episodic in nature. For major depressive disorder^[9], the remission rate is nearly stable around 1.5 cases per person-year, which is indicative that either there are several remissions over the person-year or there is remission achieved, nearly in all the newly diagnosed cases, increasing the remission rates or there is a shorter duration of rate of recovery. Results from table-5 further add strength to this opine. With increasing age about 5th decade, alcohol dependence disorder, anxiety disorders and cannabis/cocaine/opioid use disorder show decreasing remission rates with age. This shows that with age, either due to disease progression or increase of comorbidities makes the remission rates lower and in agreement with previous literature and prevalence rate trend observed in table-3,4.^[21] All MISUDs except schizophrenia, trend of remission rates between the global and Indian trends were similar.^[2] For schizophrenia, the global trend is higher than Indians but is nearly constant across age group. These findings are consistent, at least in trend with reported medical literature.^[21]

The table-6, reflects a hypothetical average length of the MISUDs on presumption that all other factors are same. The table-6 proceeds to reflect the fact of progression and is in agreement of the time reported for cure in literature.^[2, 4-14, 19-21] The difference in length of treatment between genders add strength to the influence of gender on treatment of MISUDs.

It is reported that remission along with it brings understanding of stigma, self-stigma, loss to regular medical follow-up, medication discontinuation in patients and reduction in quality of life.^[22] Though the extent of impact of these factors varies with MISUDs and dependent on several other factors, they cannot be taken lightly as these may trigger or predispose to other forms of disorders or even relapse. With a substantial number of Indian MISUD population not having access to mental health facility, proper employment, source of income or covered by health insurance, the low rate of remission will increase the burden.^[23,24] Harnessing the digital model of continuous, human-free monitoring using the power of technology via biofeedback mechanism and using smart phones or such ubiquitous devices

may provide vital clue for remission and long term follow-up. Though sounding improbable, the prototypes has shown promising results.^[25]

In 2013, an analysis of the existing mental health literatures (1998-2008) on mental health revealed that most of the data pertaining to remission comes from high-income (according to World Bank criteria) nations and other nations suffer from non-availability of data.^[17] They report that low prioritization of research in mental disorders, variations in study methodology impairing accuracy of epidemiological measures including case definitions, sampling, reporting and methodological barriers. They also underlined the difficulty of researchers, especially for publishing in peer-reviewed mental health journals. Language difficulties and less training prevented researchers in accessing overseas journals while poor reach and non-indexing hampered regional or national publications in non high-income group of countries.^[17] The GBD 2016 study credited the Indian medical system for sharing voluminous data that led to changes in several parameters and outcome.^[15] In spite of these valiant efforts, still only one of the Indian psychiatric articles found place in the data input for this study. Changes in Indian MISUDs research mindset and publication focus re-orientation, as advocated earlier is the need of the hour.^[26,27]

The present study could suffer from biases emanating from poor data representiveness index.^[13] Though the DisMod II MR system has inbuilt mechanism to counteract this, the effectiveness of which is unknown. The present study relies on less number of previous publication studies/surveys for data points, especially for schizophrenia and conduct disorders. Hence several data inputs and estimates in many instances were imputed through modelling, there by the final estimates may reflect a broad range of uncertainty. Hence the results of this study needs to be interpreted with caution.^[4-14] Spontaneous remissions, those Indian who are not covered by existing medical care, especially when the treatment gap is reportedly large is a cause of concern as these may alter the projected remission trends of MISUDs.^[16] The present exercise to describe the prevalence remission characteristics cannot be considered futile as it has been successful in underlining the present state of Indian MISUD literature evidence and or poor mental health documentation. GBD evokes a valiant effort to predict the remission rates, an important tool for assessment of treatment as well as the outcome of MISUD care delivery. Future studies, especially at subnational level, as predicted in recent reports will highlight the more in to the prevalence, remission and MISUD care across India.^[15]

CONCLUSION

A robust estimate of the prevalence and remission characteristics, influence of age and gender of MISUD has been presented. Till several detailed prospective study of longer duration emerges from across India to clarify the natural history of MISUD or effectiveness of treated cases of MISUDs, the results of this study would help the policy framers and clinicians to plan their community level strategy to combat mental illness and achieve the goal of wellness for their patients.

Table – 1: Estimated Prevalence of Mental Illness and Substance Use Disorder among Indians in 2016 by Gender

Disease/illness/ Disorder	Male	Female	Combined
Schizophrenia	1676940 (1473122-1892090)	1484707 (1305344-1671050)	3161647 (2780283-3560714)
Alcohol use disorders	12434540 (11100557-13909597)	3097927 (2604173-3637049)	15532467 (13850862-17509709)
Opioid use disorders	2330282 (1998730-2718234)	1518004 (1266138-1805523)	3848286 (3286317-4522467)
Cocaine use disorders	226105.6 (196767.9-263506.2)	92176.22 (77585.26-111053.7)	318281.8 (275432.8-373717.2)
Cannabis use disorders	2321867 (1912788-2810207)	625916.6 (519509.1-745525.8)	2947783 (2451300-3530394)
Major depressive disorder	12769985 (11603523-14129929)	17248730 (15696713-19012122)	30018715 (27286094-33141872)
Bipolar disorder	3238572 (2790178-3735621)	3444150 (2975207-3963383)	6682721 (5767543-7701344)
Anxiety disorders	18055217 (16913733-19258482)	24612112 (22978487-26218703)	42667329 (40064415-45370924)
Conduct disorder	6581384 (5688616-7582831)	3109216 (2489906-3791094)	9690600 (8219947-11210706)

Table-2: Estimated Incidence rate of Mental Illness and Substance Use Disorder among Age-standardized Indians in 2016 by Gender

Disease/illness/ Disorder	Male			Female		
	Rate	Lower	Upper	Rate	Lower	Upper
Schizophrenia	0.00014	0.00012	0.00015	0.00012	0.00011	0.00014
Alcohol use disorders	0.0094	0.0083	0.011	0.0027	0.0023	0.0031
Opioid use disorders	0.00031	0.00026	0.000036	0.00028	0.00025	0.00033
Cocaine use disorders	0.000033	0.000028	0.000039	0.000018	0.000015	0.000021
Cannabis use disorders	0.00049	0.0004	0.00059	0.00017	0.00014	0.00021
Major depressive disorder	0.032	0.029	0.035	0.046	0.041	0.05
Bipolar disorder	0.00044	0.00038	0.0005	0.0005	0.00044	0.00057
Anxiety disorders	0.0053	0.0049	0.0056	0.0055	0.0052	0.0059
Conduct disorder	0.0028	0.0023	0.0033	0.0015	0.0012	0.0019

Table-3: Prevalence rate of Mental Illness per 100,000 Indians by age and gender in 2016

Age	Schizophrenia		Major depressive disorder		Bipolar disorder		Anxiety disorder		Conduct disorder	
	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females
10 to 14	5 [3-8]	4 [2-7]	518 [359-719]	705 [492-981]	168 [117-226]	202 [141-270]	2471 [2154-2859]	3519 [3083-4073]	4200 [3410-5149]	2390 [1791-3109]
15 to 19	45 [31-62]	40 [27-55]	1347 [1007-1722]	1858 [1412-2350]	572 [419-753]	679 [498-891]	2885 [2576-3242]	4171 [3737-4682]	3418 [2804-4096]	1787 [1371-2315]
20 to 24	173 [123-228]	156 [111-203]	1842 [1418-2398]	2514 [1916-3265]	644 [502-798]	741 [577-919]	2760 [2408-3155]	4006 [3512-4539]	649 [553-757]	237 [190-293]
25 to 29	310 [237-393]	286 [220-365]	1825 [1465-2241]	2603 [2087-3202]	641 [511-798]	721 [575-898]	2843 [2484-3237]	4108 [3589-4692]	Capped in Model	
30 to 34	410 [334-492]	383 [310-458]	1991 [1544-2520]	2875 [2220-3618]	651 [526-802]	726 [584-892]	3101 [2814-3423]	4482 [4016-4996]		
35 to 39	471 [393-555]	442 [369-519]	2529 [2064-3045]	3552 [2918-4242]	674 [545-820]	751 [611-917]	3425 [3102-3772]	5036 [4554-5526]		

40 to 44	500 [427-575]	470 [404-540]	2949 [2337-3585]	4083 [3266-4955]	701 [554-862]	783 [621-960]	3710 [3301-4150]	5577 [5011-6142]
45 to 49	509 [443-581]	478 [415-547]	3149 [2676-3647]	4409 [3751-5080]	710 [567-861]	793 [638-961]	3765 [3383-4187]	5704 [5153-6315]
50 to 54	501 [438-574]	471 [412-539]	3329 [2875-3802]	4729 [4089-5427]	698 [564-853]	780 [635-956]	3682 [3355-4042]	5504 [5026-6021]
55 to 59	480 [422-545]	450 [396-510]	3531 [2934-4176]	5016 [4185-5930]	666 [543-814]	748 [617-916]	3543 [3217-3913]	5077 [4639-5557]
60 to 64	442 [388-499]	414 [365-466]	3764 [3132-4470]	5460 [4575-6456]	617 [514-744]	699 [583-841]	3363 [2961-3840]	4594 [4122-5116]
65 to 69	375 [331-423]	352 [309-397]	4171 [3656-4791]	6041 [5334-6874]	554 [456-677]	630 [516-768]	3211 [2835-3667]	4341 [3834-4892]
70 to 74	290 [255-327]	273 [240-310]	4514 [3906-5203]	6551 [5773-7464]	483 [396-587]	548 [450-665]	3062 [2757-3423]	4288 [3850-4811]
75 to 79	203 [176-231]	193 [167-220]	4894 [4021-5840]	7045 [5935-8269]	412 [339-497]	465 [385-559]	2935 [2669-3240]	4375 [3977-4823]
80 plus	107 [90-126]	102 [86-121]	4653 [3870-5498]	6470 [5487-7557]	327 [266-400]	363 [297-441]	2617 [2345-2939]	4339 [3935-4822]

Table-4: Prevalence rate of Substance use disorder per 100,000 Indians by age and gender in 2016

	Alcohol use disorder		Opioid use disorder		Cocaine use disorder		Cannabis use disorder	
	Males	Females	Males	Females	Males	Females	Males	Females
10 to 14	69 [41-111]	32 [18-54]	0	0	0	0	39 [10-76]	7 [1-17]
15 to 19	736 [530-980]	277 [185-396]	97 [75-126]	82 [61-110]	34 [22-50]	16 [9-25]	622 [387-914]	157 [104-234]
20 to 24	2107 [1564-2761]	664 [446-938]	520 [403-662]	426 [322-565]	56 [44-72]	28 [21-37]	1022 [748-1352]	312 [229-412]
25 to 29	3084 [2515-3765]	791 [588-1062]	837 [678-1036]	626 [495-798]	58 [47-73]	29 [22-37]	762 [560-1028]	228 [167-305]
30 to 34	3547 [2870-4335]	829 [590-1152]	890 [709-1084]	578 [437-727]	52 [40-66]	24 [18-32]	518 [390-676]	149 [111-194]
35 to 39	3427 [2823-4084]	821 [621-1081]	705 [563-857]	433 [335-547]	47 [38-59]	20 [15-26]	384 [284-502]	113 [82-153]
40 to 44	3210 [2480-4001]	809 [554-1168]	461 [364-577]	292 [227-369]	44 [36-55]	18 [13-23]	291 [214-376]	87 [63-115]
45 to 49	2978 [2448-3580]	793 [603-1035]	327 [261-407]	218 [173-279]	42 [34-52]	16 [12-21]	240 [182-313]	74 [56-94]
50 to 54	2728 [2074-3407]	763 [540-1014]	270 [211-330]	188 [145-240]	41 [33-50]	15 [11-19]	165 [128-213]	49 [37-65]
55 to 59	2465 [2007-2998]	690 [532-879]	257 [207-312]	185 [148-229]	42 [34-50]	15 [11-19]	104 [79-135]	36 [27-46]
60 to 64	2215 [1693-2791]	597 [411-825]	260 [226-298]	189 [158-225]	44 [37-51]	15 [12-18]	67 [54-83]	31 [24-38]
65 to 69	1986 [1592-2443]	469 [346-604]	247 [213-284]	170 [141-204]	42 [35-49]	14 [11-18]	52 [41-65]	28 [21-35]
70 to 74	1717 [1348-2181]	360 [258-493]	218 [187-251]	132 [111-156]	37 [31-43]	13 [10-16]	44 [36-55]	24 [18-31]
75 to 79	1369 [1116-1677]	322 [240-416]	195 [168-225]	106 [89-126]	32 [27-38]	11 [9-14]	40 [31-49]	22 [16-28]
80 plus	1101 [887-1350]	344 [270-433]	170 [145-199]	86 [71-104]	27 [23-32]	10 [7-12]	33 [26-41]	18 [13-23]

Table-5: Remission (expressed as rate) of Mental Illness and Substance Use Disorder among Age-standardized Indians in 2016 by Gender and model effects

Disease /Illness/ Disorder	Upper limit of remission rate set in the model*	Remission Rate-Number of cases that resolve or are cured per person-year		Fixed effect					
				Beta			Exponentiated Beta		
		Male	Female	Value	Lower	Higher	Value	Lower	Higher
Schizophrenia	0.04	0.015 (0.013-0.017)	0.015 (0.012-0.017)						
Alcohol use disorders	0.6	0.43(0.39-0.47)	0.5 (0.47-0.54)	-0.52	-1.19	0.12	0.59	0.3	1.13
Opioid use disorders	0.2	0.051(0.045-0.058)	0.073 (0.064-0.083)	-0.98	-1.94	0.59	0.38	0.14	1.81
Cocaine use disorders	0.2	0.091(0.08-0.1)	0.11 (0.096-0.12)						
Cannabis use disorders	0.2	0.099(0.089-0.11)	0.12 (0.11-0.13)						
Major depressive disorder\$	1.45	1.46 (1.41-1.5)	1.46 (1.41 -1.5)						
Bipolar disorder	0.05	0.036 (0.032-0.041)	0.036 (0.032-0.04)						
Anxiety disorders	0.2	0.17(0.16-0.18)	0.12 (0.11 -0.12)	0.72	-0.91	1.91	2.05	-4	6.78
Conduct disorder	0.05	1.26 (1.21-1.31)	1.26 (1.21-1.31)	-0.56	-1.57	0.34	0.57	0.21	1.41

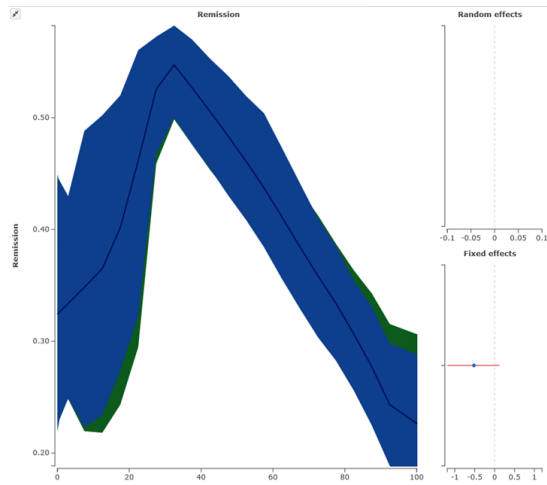
*based on available literature as cited in 15, supplementary appendix, pages 400-466; Remission rate is for 2-years; \$ Remission rate for 1-year

Table-6: Average duration of Mental Illness and Substance Use Disorder among Age-standardized Indians in 2016 by Gender

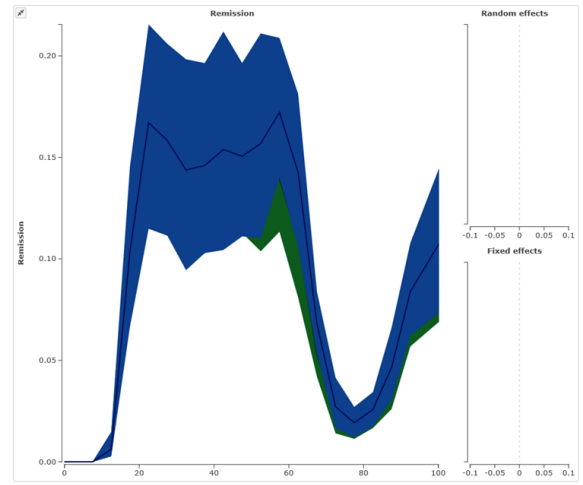
Disease/illness/ Disorder	Males		Females		Average Duration of Disease In years	
	Incidence	Prevalence	Incidence	Prevalence	Males	Females
Schizophrenia	99089	1676940	83708	1484707	16.924	17.737

Alcohol use disorders	6548981	12434540	1736381	3097927	1.899	1.784
Opioid use disorders	226889	2330282	193072	1518004	10.271	7.862
Cocaine use disorders	23724	226106	11752	92176	9.531	7.843
Cannabis use disorders	379639	2321867	121160	625917	6.116	5.166
Major depressive disorder	19650968	12769985	26895925	17248730	0.650	0.641
Bipolar disorder	311098	3238572	328272	3444150	10.410	10.492
Anxiety disorders	3636691	18055217	3619593	24612112	4.965	6.800
Conduct disorder	2216608	6581384	1084227	3109216	2.969	2.868

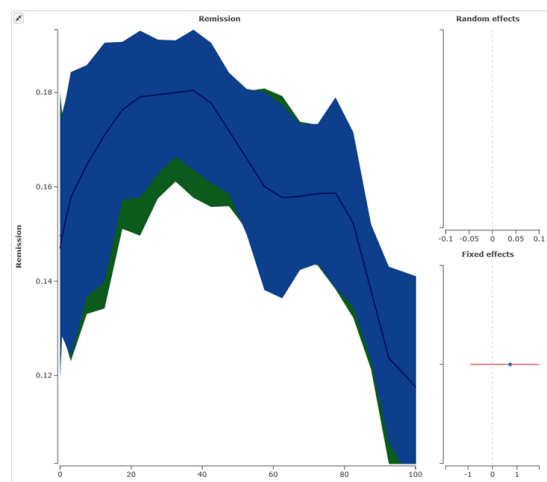
In Males – Alcohol Dependence



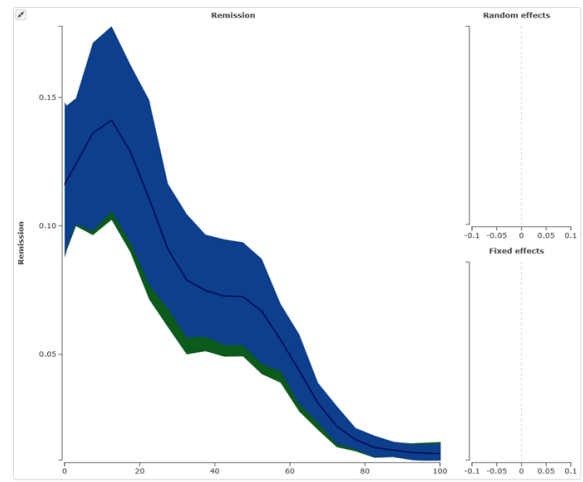
In Males – Cannabis use disorder



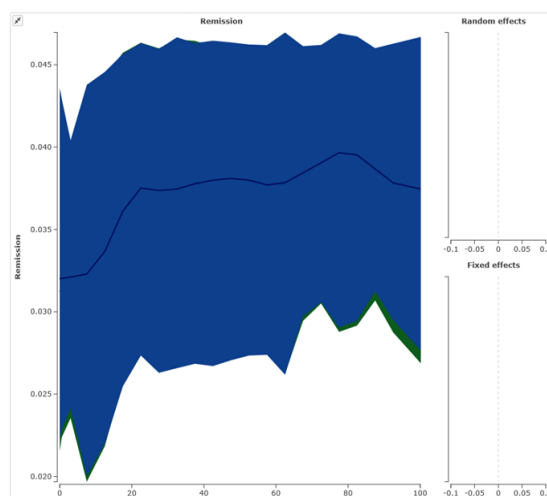
In Males – Anxiety Disorder Cases



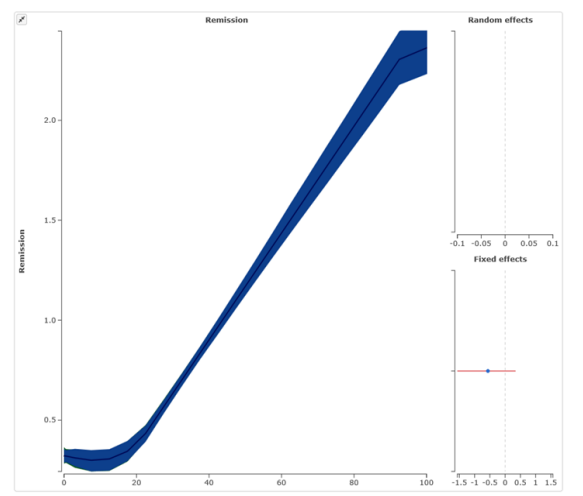
In Males – Cocaine Use disorder



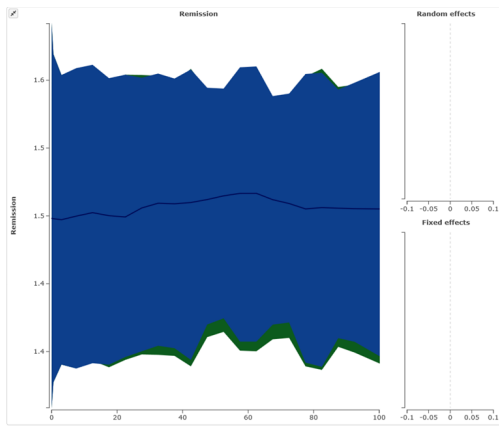
In Males – Bipolar disorder cases



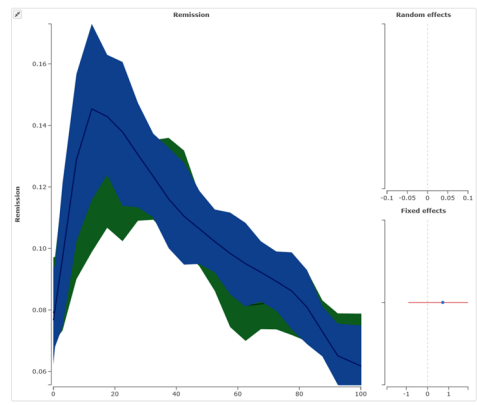
In Males – Conduct Disorder



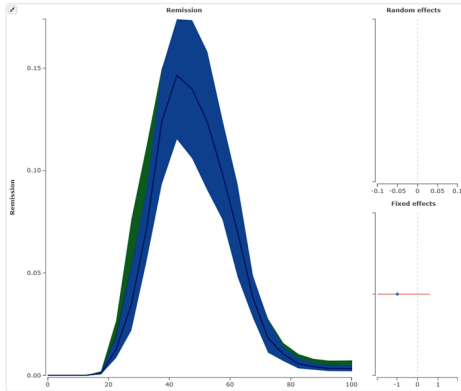
In males – Major Depressive disorders



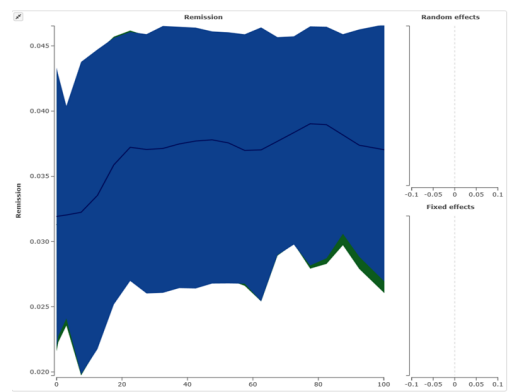
In Females – Anxiety Disorders



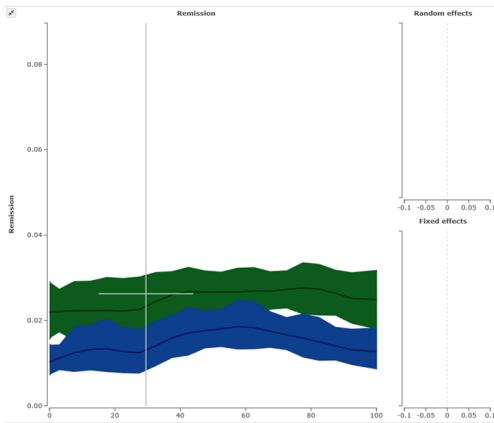
In males – Opioid Use disorder



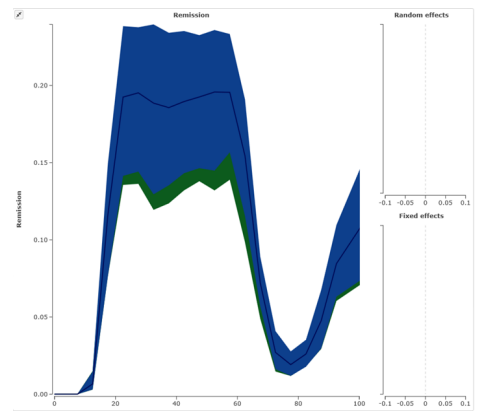
In Females – Bipolar Disorders



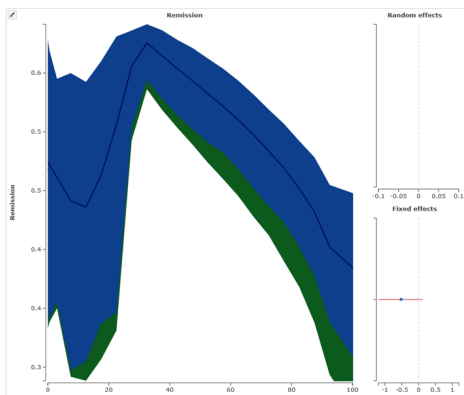
In Males – Schizophrenia



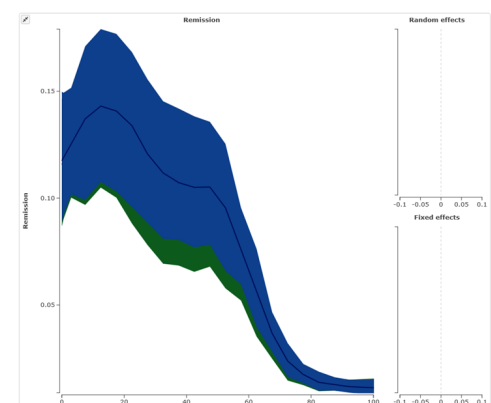
In Females – Cannabis Use Disorder



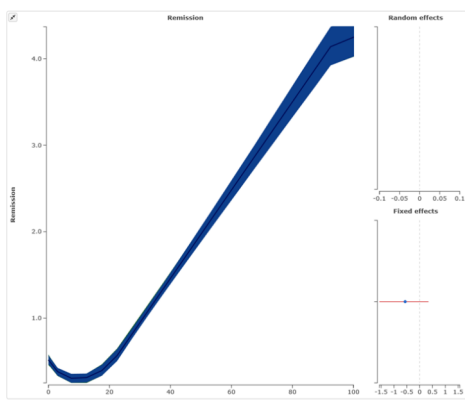
In Females – Alcohol Dependence



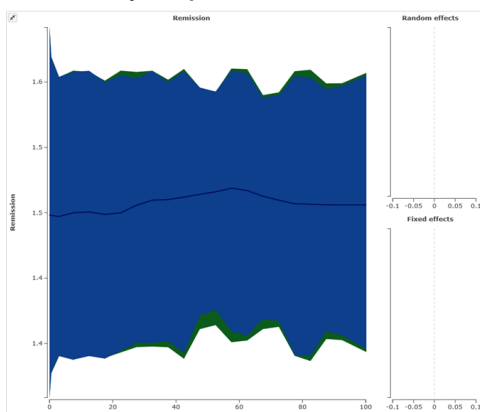
In Females – Cocaine Use disorder



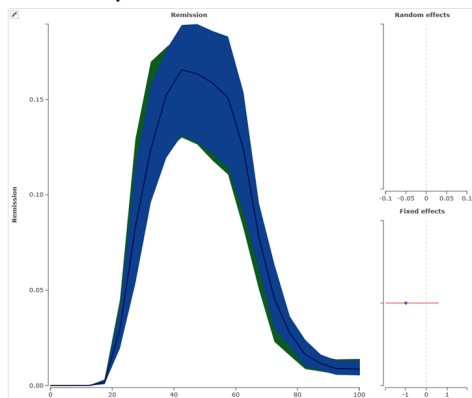
In Females – Conduct Disorders



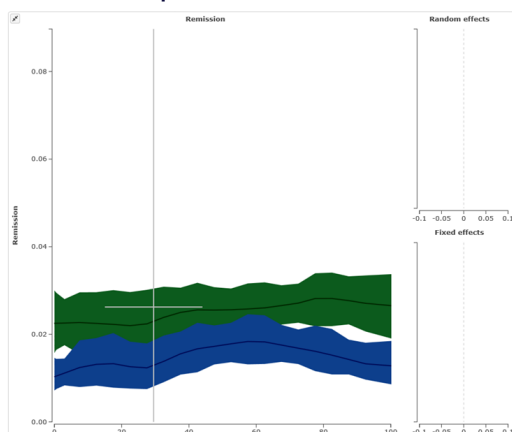
In Females – Major Depressive Disorders



In Females – Opioid Use disorder



In Females – schizophrenia



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