RESEARCH PAPER

Age Wise Classification of Detoxified Drug Abuse Patient: An Empirical Study in Rangpo, Sikkim

Piyanka Dhar[1], Rajan Durairaj[2], Puran Chettri[3], Samrat Kumar Mukherjee[*4]

[1]*Department of Mathematics, Sikkim Manipal Institute of Technology, Majhitar, Sikkim Manipal University, Gangtok, Sikkim, India*
[2]*Department of Logistics and Supply Chain Management, The University of Hull, Hull, HU6 7RX, United Kingdom, Email id: drdirajan@gmail.com*
[3]*GT Mathematics, Government Junior High School, Lingthem, North Sikkim*
[4]*Department of Management Studies, Sikkim Manipal Institute of Technology, Majhitar, Sikkim Manipal University, Gangtok, Sikkim, India, Email id: s.mukherjee@rediffmail.com*
**Corresponding author: Samrat Kumar Mukherjee*

Received: 14th Aug, 2025; Revised: 15th Sep 2025; Accepted: 15th Nov, 2025; Available Online: 30th Nov, 2025

Abstract
This paper examines the effectiveness of the rehabilitation centre situated in Rangpo, Pakyong District, Sikkim, which helps the drug addict patients to detox themselves through yoga, meditation, group counselling e.t.c. In this study, a patient is considered detoxified if he/she stayed at least 90 days as duration of each detoxification programme is at least 90 days. Those who left the programme before 90 days were treated as censored (2). Censored patients are discarded from the study assuming that they are not detoxified.
Real-life data of admitted patients were collected from the centre over two years,2023 and 2024. Since the exact pattern of recovery times are not known, Histograms are used to assess the recovery times of the patients who completed the programme.
The objective of this study is to classify the detoxified patients according to the age bracket. An exploratory data analysis is performed by calculating the mean, median, and variance of their ages to get an overall view of the age distribution of the patients. To determine that there is a significant difference between the median ages of patients over two years Mann-Whitney U test is applied, as the two population found to be non-parametric. This test is used to evaluate the centre's performance over time.
Keywords: Drug abuse, Detoxification programme, Rehabilitation centre, Age-wise classification, Survival analysis, Censored data, Mann–Whitney U test, Sikkim, Northeast India, Substance use disorder
How to cite this article: Piyanka Dhar, Rajan Durairaj, Puran Chettri, Samrat Kumar Mukherjee; Age Wise Classification of Detoxified Drug Abuse Patient: An Empirical Study in Rangpo, Sikkim. International *Journal of Drug Delivery Technologies*. 2025;15(4): 1859-1868 , DOI: 10.25258/ijddt.15.4.39
Source of support: Nil.
Conflict of interest: None

INTRODUCTION

Drug abuse in Northeast India, particularly Sikkim, represents a significant public health concern with distinct regional characteristics. Sikkim, inhabited by indigenous Lepchas, Bhutias, and Nepalis, shows high prevalence rates of substance use, with alcohol being the predominant substance (3, 5). A community survey found 76.7% prevalence of substance use, with alcohol alone accounting for 55.3% (5). Prescription opioid abuse has emerged as a growing problem, particularly among young, unemployed males of Nepalese ethnicity, with commonly abused substances including dextropropoxyphene and codeine (4). Injection drug use behavior has been detected with concerning trends of unsafe practices and high-risk behaviors (3, 4). The epidemic has reached alarming proportions among youth, attributed to changing cultural values, economic stress, and weakening traditional social controls due to industrialization and urbanization (12).

Detoxification programs serve as a critical entry point for substance abuse treatment, though their effectiveness varies significantly based on multiple factors. Research shows that 46% of inpatient detoxification patients successfully transfer to rehabilitation treatment, with severe drug use and medical problems being the strongest predictors of negative outcomes (16). Treatment duration is crucial for success, as clients spending less than three months in treatment show outcomes similar to detoxification-only groups (13). A 21-day detoxification program demonstrated that longer stays increase transfer rates to residential treatment, with transferred patients showing lower relapse rates compared to those receiving outpatient care or no further treatment (8). Healthcare utilization and needle-exchange program attendance significantly promote entry into detoxification among injection drug users, with these services acting as important bridges to treatment for both HIV-infected and uninfected individuals (14).

**Author for Correspondence: s.mukherjee@rediffmail.com*

The age group of 18 to 25 years old is significantly impacted by drug use, often influenced by environmental factors (1). Continuous exposure to areas where drug use is normalized can contribute to substance use behaviors, especially in children raised in such environments (9). Recent studies show that nearly half of high school seniors have experimented with illicit drugs, underscoring the importance of addressing substance use in adolescence (*9*). While younger populations are traditionally viewed as the primary demographic for drug use, recent findings suggest a disturbing rise in substance abuse among older adults. Data reveals that drug-related death rates among adults aged 55-64 increased by 2.3% between 2022 and 2023, with an even sharper rise of 11.4% among those aged 65 and older (6). The increased use of prescription drugs, often leading to dependency, is particularly concerning within this age group (15).

Research on substance abuse in Sikkim reveals significant gaps in age-wise classification studies of detoxified patients. Researcher conducted a retrospective study of 54 substance abusers using emergency services, finding alcohol abusers comprised 77.8% of cases with a median abuse duration of 12 years, but provided limited age-specific analysis (3). Experts examined 223 male prescription opioid abusers with a mean age of 27 years, focusing primarily on demographic and behavioral patterns rather than age-stratified treatment outcomes (4). Researchers reviewed the overall substance use scenario in Sikkim, noting complex challenges but lacking empirical age-wise classification data (10). Experts reported on developing de-addiction services, highlighting high alcohol prevalence rates (45% males, 19% females) compared to national averages, but again without age-specific detoxification outcomes (11). These studies collectively demonstrate the scarcity of systematic, age-stratified empirical research on detoxified drug abuse patients in Sikkim.

2. RESEARCH QUESTIONS/OBJECTIVES

- What is the age-wise distribution of detoxified drug abuse patients in Rangpo?
- Are there significant demographic/behavioral differences across age groups?
- What implications do findings hold for targeted interventions?

METHODOLOGY

3.1. Data Collection:

The real-life data from the Anuragh Detoxification and Rehabilitation Centre in Rangpo, Sikkim. This dataset includes Patients age, date of admission and date of release. The primary goal is to know the distribution of ages of patients admitted during the years 2023 and 2024 who successfully detoxified.

The study covers two distinct time frames:

- For the year 2023, the observation period is from 1st January 2023 to 31st December 2023 (365 days).
- For the year 2024, the observation period is from 1st January 2024 to 31st December 2024 (366 days, as it is a leap year).

Based on information from the rehabilitation centre staff, their course is of 90 days minimum for detoxification. So, for a patient to be consider detoxified at least 90 days stay in the centre is required. However, patients may choose to remain in that programme longer, depending on their individual needs. The number of days stayed in the centre can be calculated from the date of admission and date of release of the centre for every patient.

Then,

In this study:

- Event ≡ Patients detoxifying after staying in the rehabilitation centre for at least 90 days during the study period.
- Patients who stayed less than 90 days in the rehabilitation centre during the study period are censored (right censoring) and discard those patients assuming they are not detoxified (2).

3.2. Exploratory Data Analysis:

An exploratory data analysis is carried out based on the age-wise distribution of detoxified patients. This analysis includes average age, variation (in terms of variance) etc. of detoxified patients. This analysis reflects light an overview of the considered dataset.

Average age $(\bar{x})$ is defined as $\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i$ and Variance $(s^2) = \frac{1}{n-1}\sum_{i=1}^{n}(x_i - \bar{x})^2$

where, $n =$ number of detoxified patients of a certain year.

x_i = Age of i^{th} detoxified patients of a certain year.

3.3. Formation of frequency distribution of detoxified patients:

A frequency distribution of detoxified patients age-wise for every year is formed. To check the age-wise distribution of patients more explicitly two Histograms are construed.

3.4. Significance Testing: (Mann-Whitney U test)

To examine whether there is a statistically significant difference between the median ages of patients who successfully detoxified in 2023 and 2024, a non-parametric test Mann-Whitney U test was used. This test enables to compare two independent samples by testing hypothesis on two population medians.

Following are the steps involved in this test:

Step 1: **Setting up null and alternative Hypotheses**

Null Hypothesis (H_0): There is no significant difference in the median ages of detoxified patients between the two years.

Alternative Hypothesis (H_1): There is a significant difference in the median ages of detoxified patients between the two years

Step 2**: Ranking the Data** Combine the observed ages of detoxified patients from both years into a single data set. Arrange the ages in ascending order and assign ranks. In the case of tied values, assign the average of their ranks to each of the tied values.

Step 3: **Compute the U Statistics**
Suppose T_x = Sum of the ranks of age of the patients who successfully detoxified after staying at least 90 days in rehabilitation centre in the year 2023
T_y = Sum of the ranks of age of the patients who successfully detoxified after staying at least 90 days in rehabilitation centre in the year 2024
n_1 = Number of detoxified patients of rehabilitation centre in the year 2023
n_2 = Number of detoxified patients of rehabilitation centre in the year 2024
Mann-Whitney U-statistics are defined as follows:
$U_x = n_1 n_2 + \frac{n_1 (n_1+1)}{2} - T_x$, $U_y = n_1 n_2 + \frac{n_2 (n_2+1)}{2} - T_y$. Then, $U = \min(U_x , U_y)$

Step 4: Apply Z-Approximation (Large Sample Size) For Large sample size, we use the normal approximation:
$\mu_U = \frac{n_1 n_2}{2}$, $\sigma_U = \sqrt{\frac{n_1 n_2 (n_1+n_2+1)}{12}}$; The standardized test statistic is $Z = \frac{U-\mu_U}{\sigma_U}$
Step 5: Decision Rule At the 5% level of significance, the critical Z-values are

$$-Z_\alpha \leq Z \leq Z_\alpha$$

If the computed value of Z lies within this interval, we fail to reject the null hypothesis, indicating no significant difference in medians. Here Z_α = critical value of Z at level of significance α.

Otherwise, we reject the null hypothesis, indicating a significant difference in the median ages of the two groups.

4. STATISTICAL ANALYSIS

4.1. Status wise classification of patients

The following tables shows the details of patients who admitted in the centre in two respective years 2023 and 2024. The patients those who stayed in this centre more than or equal to 90 days are considered as detoxified as the duration of the detoxification program is of total 90 days. The patients who stayed this centre less than 90 days are excluded from the study as they have not completed the program, thus considered as not detoxified. Those kinds of patients are considered as censored.

Table 1: Patient details for 2023 and 2024

Patient Number	Patient age	Date of Admission	Day of admission	Date Released	Day of release	Days stayed	Status 1= event 0= censored
1	24	04-01-2023	4	07-02-2023	38	34	0
2	42	04-01-2023	4	04-05-2023	124	120	1
3	56	04-01-2023	4	06-04-2023	96	92	1
4	28	06-01-2023	6	09-04-2023	99	93	1
5	32	08-01-2023	8	11-04-2023	101	93	1
6	24	09-01-2023	9	12-03-2023	71	62	0
7	39	10-01-2023	10	12-04-2023	102	92	1
8	28	14-01-2023	14	15-04-2023	105	91	1
9	24	16-01-2023	16	19-04-2023	109	93	1
10	42	18-01-2023	18	28-04-2023	118	100	1
11	29	20-01-2023	20	29-03-2023	88	68	0
12	33	22-01-2023	22	30-03-2023	89	67	0
13	39	26-01-2023	26	15-07-2023	196	170	1
14	56	28-01-2023	28	05-06-2023	156	128	1
15	28	30-01-2023	30	15-04-2023	105	75	0

16	26	31-01-2023	31	01-03-2023	60	29	0
17	36	01-02-2023	32	20-04-2023	110	78	0
18	52	02-02-2023	33	25-04-2023	115	82	0
19	56	06-02-2023	37	24-04-2023	114	77	0
20	26	06-02-2023	37	25-04-2023	115	78	0
21	29	07-02-2023	38	08-05-2023	128	90	1
22	43	07-02-2023	38	10-05-2023	130	92	1
23	29	09-02-2023	40	12-05-2023	132	92	1
24	19	10-02-2023	41	09-05-2023	129	88	0
25	42	10-02-2023	41	08-05-2023	128	87	0
26	46	13-02-2023	44	22-04-2023	112	68	0
27	43	21-02-2023	52	23-05-2023	143	91	1
28	29	28-02-2023	59	15-05-2023	135	76	0
29	45	05-03-2023	64	05-04-2023	95	31	0
30	27	06-03-2023	65	06-06-2023	157	92	1
31	42	14-03-2023	73	08-05-2023	128	55	0
32	29	14-03-2023	73	28-05-2023	148	75	0
33	24	23-03-2023	82	30-06-2023	181	99	1
34	42	24-03-2023	83	30-04-2023	120	37	0
35	46	31-03-2023	90	14-05-2023	134	44	0
36	29	31-03-2023	90	17-05-2023	137	47	0
37	26	01-04-2023	91	06-07-2023	187	96	1
38	19	05-04-2023	95	16-07-2023	197	102	1
39	28	09-04-2023	99	12-06-2023	163	64	0
40	26	11-04-2023	101	13-06-2023	164	63	0
41	48	13-04-2023	103	03-07-2023	184	81	0
42	32	15-04-2023	105	17-07-2023	198	93	1
43	34	25-04-2023	115	28-07-2023	209	94	1

44	36	05-05-2023	125	04-08-2023	216	91	1
45	44	06-05-2023	126	11-09-2023	254	128	1
46	36	07-05-2023	127	07-08-2023	219	92	1
47	28	08-05-2023	128	24-08-2023	236	108	1
48	43	11-05-2023	131	11-08-2023	223	92	1
49	30	12-05-2023	132	16-08-2023	228	96	1
50	29	15-05-2023	135	12-08-2023	224	89	0
51	29	15-05-2023	135	12-08-2023	224	89	0
52	23	15-05-2023	135	16-08-2023	228	93	1
53	52	21-05-2023	141	27-07-2023	208	67	0
54	22	22-05-2023	142	22-07-2023	203	61	0
55	30	05-06-2023	156	28-09-2023	271	115	1
56	36	13-06-2023	164	13-09-2023	256	92	1
57	29	15-06-2023	166	15-12-2023	349	183	1
58	26	15-06-2023	166	18-09-2023	261	95	1
59	46	16-06-2023	167	14-09-2023	257	90	1
60	48	24-06-2023	175	24-10-2023	297	122	1
61	24	29-06-2023	180	30-09-2023	273	93	1
62	29	03-07-2023	184	03-10-2023	276	92	1
63	29	06-07-2023	187	09-10-2023	282	95	1
64	25	06-07-2023	187	11-10-2023	284	97	1
65	24	12-07-2023	193	11-10-2023	284	91	1
66	28	13-07-2023	194	16-10-2023	289	95	1
67	22	13-07-2023	194	23-10-2023	296	102	1
68	45	13-07-2023	194	14-10-2023	287	93	1
69	42	13-07-2023	194	12-10-2023	285	91	1
70	46	17-07-2023	198	18-08-2023	230	32	0
71	29	18-07-2023	199	18-10-2023	291	92	1

72	22	21-07-2023	202	07-09-2023	250	48	0
73	39	22-07-2023	203	28-10-2023	301	98	1
74	32	24-07-2023	205	10-10-2023	283	78	0
75	32	27-07-2023	208	11-10-2023	284	76	0
76	43	30-07-2023	211	07-10-2023	280	69	0
77	36	01-08-2023	213	02-09-2023	245	32	0
78	56	02-08-2023	214	01-11-2023	305	91	1
79	31	08-08-2023	220	08-11-2023	312	92	1
80	46	12-08-2023	224	16-12-2023	350	126	1
81	32	18-08-2023	230	22-10-2023	295	65	0
82	31	19-08-2023	231	23-11-2023	327	96	1
83	22	17-09-2023	260	16-12-2023	350	90	1
84	48	17-09-2023	260	16-12-2023	350	90	1
85	35	19-09-2023	262	16-11-2023	320	58	0
86	28	08-10-2023	281	31-12-2023	365	84	0
87	36	10-10-2023	283	10-12-2023	344	61	0
88	34	10-10-2023	283	10-12-2023	344	61	0
89	34	11-10-2023	284	31-12-2023	365	81	0
90	28	12-10-2023	285	31-12-2023	365	80	0
91	34	12-10-2023	285	31-12-2023	365	80	0
92	27	14-10-2023	287	31-12-2023	365	78	0
93	36	15-10-2023	288	31-12-2023	365	77	0
94	29	17-10-2023	290	31-12-2023	365	75	0
95	18	21-10-2023	294	31-12-2023	365	71	0
96	21	25-10-2023	298	31-12-2023	365	67	0
97	23	27-10-2023	300	31-12-2023	365	65	0
98	24	01-11-2023	305	31-12-2023	365	60	0
99	28	03-11-2023	307	31-12-2023	365	58	0

100	28	03-11-2023	307	31-12-2023	365	58	0
101	30	14-11-2023	318	31-12-2023	365	47	0
102	56	22-11-2023	326	31-12-2023	365	39	0
103	56	24-11-2023	328	31-12-2023	365	37	0
104	24	27-11-2023	331	31-12-2023	365	34	0
105	24	08-12-2023	342	31-12-2023	365	23	0
106	28	09-12-2023	343	31-12-2023	365	22	0
107	42	09-12-2023	343	31-12-2023	365	22	0
108	42	11-12-2023	345	31-12-2023	365	20	0
109	38	16-12-2023	350	31-12-2023	365	15	0
110	32	18-12-2023	352	31-12-2023	365	13	0
111	22	21-12-2023	355	31-12-2023	365	10	0
112	28	22-12-2023	356	31-12-2023	365	9	0

Table 2: Data of patients admitted in in the Rehabilitaion Centre in the Year 2024

Patient age	**Date of Admission**	**Day of admission**	**Date Released**	**Day of release**	**Days stayed**	**Status 1= event 0= censored**
27	06-01-2024	6	06-04-2024	97	91	1
47	17-01-2024	17	13-03-2024	73	56	0
43	18-01-2024	18	18-04-2024	109	91	1
29	06-02-2024	37	17-03-2024	77	40	0
32	08-02-2024	39	01-04-2024	92	53	0
28	09-02-2024	40	20-05-2024	141	101	1
25	09-02-2024	40	22-06-2024	174	134	1
48	10-02-2024	41	15-05-2024	136	95	1
29	13-02-2024	44	13-05-2024	134	90	1
27	13-02-2024	44	13-05-2024	134	90	1
48	16-02-2024	47	13-05-2024	134	87	0
32	18-02-2024	49	20-05-2024	141	92	1
29	20-02-2024	51	20-06-2024	172	121	1
38	24-02-2024	55	28-05-2024	149	94	1
42	03-03-2024	63	06-06-2024	158	95	1
32	06-03-2024	66	12-06-2024	164	98	1
29	19-03-2024	79	23-06-2024	175	96	1

24	04-04-2024	95	20-06-2024	172	77	0
28	05-04-2024	96	14-07-2024	196	100	1
22	07-04-2024	98	02-08-2024	215	117	1
32	10-04-2024	101	07-07-2024	189	88	0
32	12-04-2024	103	16-07-2024	198	95	1
22	13-04-2024	104	16-05-2024	137	33	0
29	14-04-2024	105	07-07-2024	189	84	0
42	16-04-2024	107	18-07-2024	200	93	1
39	19-04-2024	110	07-08-2024	220	110	1
46	27-04-2024	118	27-07-2024	209	91	1
56	28-04-2024	119	29-07-2024	211	92	1
39	12-09-2024	256	04-10-2024	278	22	0
32	12-09-2024	256	04-10-2024	278	22	0
56	13-09-2024	257	09-12-2024	344	87	0
29	19-09-2024	263	02-12-2024	337	74	0
24	24-09-2024	268	09-12-2024	344	76	0
24	03-10-2024	277	04-12-2024	339	62	0
29	07-10-2024	281	17-12-2024	352	71	0
32	09-10-2024	283	15-12-2024	350	67	0
34	14-10-2024	288	31-12-2024	366	78	0
34	14-10-2024	288	31-12-2024	366	78	0
24	16-10-2024	290	31-12-2024	366	76	0
32	19-10-2024	293	31-12-2024	366	73	0
46	23-10-2024	297	31-12-2024	366	69	0
26	26-10-2024	300	31-12-2024	366	66	0
42	31-10-2024	305	31-12-2024	366	61	0
24	06-11-2024	311	31-12-2024	366	55	0
42	07-11-2024	312	31-12-2024	366	54	0
19	09-11-2024	314	31-12-2024	366	52	0
46	09-11-2024	314	31-12-2024	366	52	0
39	13-11-2024	318	31-12-2024	366	48	0
39	14-11-2024	319	31-12-2024	366	47	0
26	14-11-2024	319	31-12-2024	366	47	0
39	22-11-2024	327	31-12-2024	366	39	0
29	24-11-2024	329	31-12-2024	366	37	0
29	27-11-2024	332	31-12-2024	366	34	0
30	03-12-2024	338	31-12-2024	366	28	0
56	03-12-2024	338	31-12-2024	366	28	0

28	05-12-2024	340	31-12-2024	366	26	0
26	05-12-2024	340	31-12-2024	366	26	0
25	05-12-2024	340	31-12-2024	366	26	0
29	06-12-2024	341	31-12-2024	366	25	0
24	19-12-2024	354	31-12-2024	366	12	0
19	19-12-2024	354	31-12-2024	366	12	0
34	21-12-2024	356	31-12-2024	366	10	0

The above tables show real-life data from the Anuragh Detoxification and Rehabilitation Centre in Rangpo, Sikkim. The primary goal is to classify the patients age-wise admitted during the years 2023 and 2024, and to evaluate how effectively the centre is helping individuals achieve detoxification.

Data of Patients Admitted in the Rehabilitation Centre in the Year 2023 contains information of 112 patients, including their age, date of admission and release, total days stayed in the centre. Out of these 112 patients, it is observed that 50 patients 44.6% stayed for at least 90 days during the study period and are considered to have experienced the event i.e., successful detoxification. The remaining 62 patients 55.4 % stayed for less than 90 days and are therefore treated as censored.

On the other hand, Data of Patients Admitted in the Rehabilitation Centre in the Year 2024 contains information of 93 patients, including their age, date of admission and release, total days stayed in the centre, and detoxification status. In this year, it is observed that 36 patients 38.7% stayed for at least 90 days and are classified as events i.e., successful detoxification. The other 57 patients 61.3 % were discharged before completing 90 days and are treated as censored.

4.2. Descriptive Statistics of Detoxified patients

Table 3:Detoxified patients

	Age 2024	**Age 2023**
N	36	50
Missing	14	0
Mean	32.4	34.3
Std. error mean	1.57	1.36
Median	30.5	31.0
Mode	32.0	29.0
Sum	1167	1717
Standard deviation	9.40	9.60
Variance	88.3	92.1
Minimum	18	19
Maximum	56	56
Skewness	0.660	0.641
Std. error skewness	0.393	0.337

The above table reveals that the average age of patients who are detoxified are 34.3 years and 32.4 years in the year 2023 and 2024 respectively. Moreover, the variances of the year 2023 and 2024 are 92.1 years and 88.3 years. From the above result it is seen that the patients whose age is around 30-35 years are more interested to be detoxified than other age group.

In this study to know the distribution of ages of patients who are successfully detoxified, we constructed two histograms of the year 2023 and year 2024 respectively. Each histogram represents the ages of patients who successfully detoxified after staying at least 90 days in the rehabilitation centre. Histograms are based on frequency distribution of ages of detoxified patients with classes of width 5.

Table 4: Frequency distribution according to age group of patients who are detoxified in the year 2023

Age Group	No. of Patients (f_{2023})
18–22	1
22–26	8
26–30	13
30–34	6
34–38	4
38–42	3
42–46	8
46–50	4
50–54	0
54–58	3
Total Frequency N_{2023} = 50	

Table 5: Frequency distribution according to age group of patients who are detoxified in the year 2024

Age Group	No. of Patients (f_{2024})
18–22	3
22–26	4
26–30	10
30–34	7
34–38	1
38–42	3
42–46	4
46–50	2
50–54	1
54–58	1
Total Frequency N_{2024} = 36	

Fig1: Histogram of Age Distribution of detoxified Patients in 2023

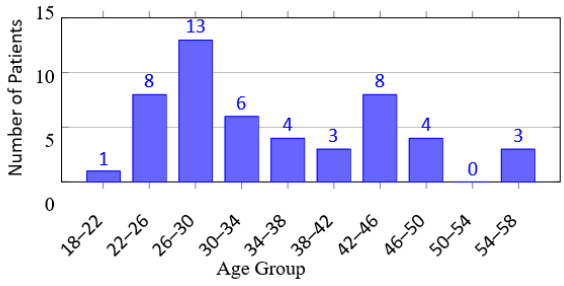
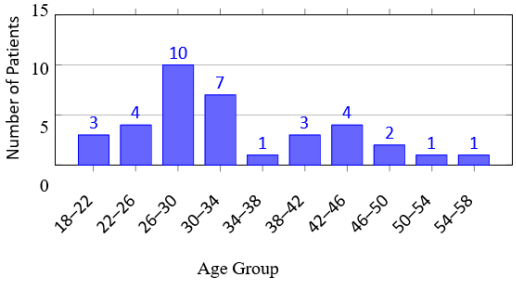


Fig 2: Histogram of Age Distribution of detoxified Patients in 2024



From both the histograms it is seen that most of the young patients are detoxified compared to old patients in both years, the data in both histograms are clustered towards the left side with less data in right side, so the age distribution of patients is positively skewed.

4.3. Significance testing

Since both histogram indicates that the distribution of age is positively skewed, we use Mann-Whitney test which is a non-parametric test which enables us to compare the two independent samples by testing a hypothesis on two population medians at 0.05 level of significance

Null Hypothesis (H_0): There is no significant difference in the median ages of detoxified patients between the two years.
Alternative Hypothesis (H_1): There is a significant difference in the median ages of detoxified patients between the two years.
We combine the observed ages of patients admitted in rehabilitation centre in the year 2023 and 2024 into one a single data and arrange the ages of patient in ascending order of magnitude and give them rank according to position in the ordered list. When ages are repeated, the rank for each repeated value is obtained by taking the average of their positions in the ordered list.
Table 6: Combined the observed ages of patients in the year 2023 & 2024

S. No	Age of Patients	Sample (X=2023, Y=2024)	Rank
1	18	Y	1.5
2	18	Y	1.5
3	19	X	3.5
4	19	Y	3.5
5	22	X	7
6	22	X	7
7	22	Y	7
8	22	Y	7
9	22	Y	7
10	23	X	10
11	24	X	12.5
12	24	X	12.5
13	24	X	12.5
14	24	X	12.5
15	25	X	15.5
16	25	Y	15.5
17	26	X	18.5

18	26	X	18.5
19	26	Y	18.5
20	26	Y	18.5
21	27	X	22
22	27	Y	22
23	27	Y	22
24	28	X	26.5
25	28	X	26.5
26	28	X	26.5
27	28	X	26.5
28	28	Y	26.5
29	28	Y	26.5
30	29	X	34.5
31	29	X	34.5
32	29	X	34.5
41	30	X	41
42	30	Y	41
43	31	X	44
44	31	X	44
45	31	Y	44
46	32	X	49
47	32	X	49
48	32	Y	49
49	32	Y	49
50	32	Y	49
51	32	Y	49
52	32	Y	49
53	34	X	53
54	35	Y	54
55	36	X	56
56	36	X	56
57	36	X	56
58	38	Y	58
59	39	X	61
60	39	X	61
61	39	X	61
62	39	Y	61
63	39	Y	61
64	42	X	66.5
65	42	X	66.5
66	42	X	66.5
67	42	Y	66.5
68	42	Y	66.5
69	42	Y	66.5
70	43	X	71.5
71	43	X	71.5
72	43	X	71.5
73	43	Y	71.5
74	44	X	74
75	45	X	75
76	46	X	77
77	46	X	77
78	46	Y	77
79	48	X	80
80	48	X	80
81	48	Y	80
82	52	Y	82
83	56	X	84.5
84	56	X	84.5
85	56	X	84.5
86	56	Y	84.5

$T_X = 2267.5$, $T_Y = 1473.5$, $U_X = 992.5$, $U_Y = 807.5$
Now, $U = \min(U_X , U_Y) = 807.5$
Here, we have large sample i.e.,

$n_1 > 20$ and $n_2 > 20$

For large sample, the value of U approaches a normal distribution, we test the null hypothesis H_0 using the Z-test. Now we compute the test statistic $Z = -3.70$.

Here $Z = -3.70 < -1.96$ at 5% level of significance. Therefore, null hypothesis is rejected. Thus, it can be said that there is a significant difference between the median ages of patients of two populations.

5. Conclusion:

The present study provides an empirical age-wise classification of detoxified drug abuse patients admitted to a rehabilitation centre in Rangpo, Sikkim during 2023 and 2024, using real-world service data and survival-analytic thinking on censored observations (7). The findings indicate that the centre performed better in 2023 than in 2024, with an estimated 42.02% probability of non-detoxification in 2023 compared to 55.54% in 2024, highlighting a deterioration in programme effectiveness over time. The Mann–Whitney U test further shows a statistically significant difference between the median ages of detoxified patients across the two years, suggesting that the age profile of successfully treated clients has shifted and may be influencing outcomes. These results underscore the need for age-sensitive treatment planning, closer monitoring of programme adherence beyond the 90-day minimum, and targeted interventions for vulnerable age groups to sustain and improve detoxification outcomes in similar resource-constrained rehabilitation settings in Sikkim and the wider Northeast region

REFERENCE

1. Samarpan Recovery. Substance abuse addiction and age groups [Internet]. 2025 [cited 2025 Dec 23]. Available from: https://www.samarpanrecovery.com/blog/substance-abuse-addiction-age-groups.
2. Prinja S, Gupta N, Verma R. Censoring in clinical trials: review of survival analysis techniques. Indian J Community Med. 2010;35(2):217-21.
3. Bhalla A, Dutta S, Chakrabarti A. A profile of substance abusers using the emergency services in a tertiary care hospital in Sikkim. Indian J Psychiatry. 2006;48(4):243-7.
4. Datta D, et al. Epidemiology of prescription opioid abuse in Sikkim. Indian J Psychiatry. 2015;57(3):284-9.
5. Goel S, Chakrabarti A. Socioeconomic characteristiçs of alcohol and other substance users presenting to emergency services in a hospital in Sikkim, India. J Neurosci Rural Pract. 2010;1(1):20-4.
6. Hanson M, Zougris K, Garcia-Santiago O. Contextualizing drug use and pharmacological harm in the United States: a socio-historical overview. J Ethn Subst Abuse. 2025;24(2):450-78.
7. Kleinbaum DG, Klein M. Survival analysis: a self-learning text. 3rd ed. New York: Springer; 2012.
8. McCusker J, Bigelow C, Frost R, Garfield F, Hindin R, Vickers-Lahti M. The effects of planned duration of residential drug abuse treatment on recovery and relapse. Am J Public Health. 1995;85(1):86-90.
9. PharmChem Inc. Does socioeconomic status impact teen drug use? [Internet]. PharmChem Inc; 2024 [cited 2025 Dec 23]. Available from: [URL].
10. Rasaily S, Thapa N. Current scenario of substance use disorder in Sikkim. J Med Sci Clin Res. 2018;6(7):1000-7.
11. Rasaily S, Sharma IL, Tobgay J. Developing drug de-addiction services in East Sikkim. J Med Res. 2015;2(4):86-7.
12. RR, Muthukumar PK. Changing patterns of drug abuse among youth in India. [Journal name]. 2022.
13. Simpson DD. The relation of time spent in drug abuse treatment to posttreatment outcome. Am J Psychiatry. 1979;136(11):1449-53.
14. Strathdee SA, Ricketts EP, Huettner S, Cornelius L, Bishai D, Havens JR, et al. Facilitating entry into detoxification and treatment among injection drug users. Drug Alcohol Depend. 1999;54(2):147-57.
15. The Recovery Village Drug and Alcohol Rehab. Substance abuse in older adults: signs, risks, and treatment options [Internet]. 2024 [cited 2025 Dec 23
16. Franken IHA, Hendriks VM. Predicting outcome of inpatient detoxification of substance abusers. Psychiatr Serv. 1999;50(6):813-7.