



## Effectiveness of Harm Reduction Approach among Injecting Drug Users

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DOI : <https://doi.org/10.5281/zenodo.17129981>

### ARTICLE DETAILS

**Research Paper**

**Accepted:** 25-08-2025

**Published:** 10-09-2025

**Keywords:**

*Harm Reduction, Needle Exchange HIV Prevention, Injecting Drug Users, Opioid Substitution Therapy*

### ABSTRACT

**Background:** Injection of drugs can cause the transmission of HIV, hepatitis B and C. Some counter strategies to traditional abstinence methods include use of NSEP and OST. **Objective:** To study the efficacy of harm reduction programs among injecting drug users (IDUs) in the City of Puri and Cuttack of Odisha state. **Methods:** The study involved 60 IDUs varied in respect to characteristics of cross-sectional studies, mainly to gather information with the help of questionnaires, and focus group discussions, and interviews. The SPSS was used to analyse data. **Results:** The percentage sharing needles dropped to 23.3 percent as compared to the 66.7 percent and HIV testing raised up to 76.7 percent as compared to 40. Employing NSEP and OST were found to have significant associations with safer practices. Still, stigma and service gaps are the major obstacles. **Conclusion:** Harm reduction approaches are useful because they can reduce high-risk behaviour. More awareness and support is required to help overcome social and systemic barriers.

### 1. Introduction

Over the last several decades, the global perspective on using drugs has changed drastically with injecting drugs use becoming a key problem of public health [1]. It is estimated that there are 11.2 million injecting drug users in the world with about 1.4 million of them HIV positive and many of them



are also infected with hepatitis B and C viruses (the Injecting drugs users 2009 report stated by “the United Nations Office on Drugs and Crime (UNODC)” [2] Drug use by injection has emerged as one of the main ways of obtaining these blood-borne infections in low- and middle-income countries especially in South and Southeast Asia. As an element of this area, India itself is affected to a certain extent, mostly at the north-eastern regions and urban agglomerations as the paths of drug trafficking cross the vulnerable groups [3].

Injecting Drug Users (IDUs) are characterized to incur numerous health and social hazards such as overdose, unprotected needle-sharing activities, imprisonment, social discrimination and unfavourable access to health care facilities [4]. All of these make the drug users even more susceptible to the extent that it creates obstacles to traditional health approaches, due to criminalization and marginalization of the drug users [5]. Conventional abstinence models have not worked well to reach out to this population, especially the ones who may not be ready or willing to stop drug use completely [6].

Owing to the shortcomings of abstinence-based interventions and punitive treatment of drug use, the idea of harm reduction is becoming increasingly popular as an evidence-based and practical form of population health management [7]. Policies, programs, and practices that aim to lessen the negative health, social, and legal effects of drug use are known as "harm reduction." This does not imply that drug use should be eliminated entirely [8]. Such an approach recognizes drug use as a multifactorial and complex problem and puts primacy on the dignity and rights of people and their health. Some of the most important elements of harm reduction are “Needle and Syringe Exchange Programs (NSEPs), Opioid Substitution Therapy (OST)”, supervised injection sites, the distribution of condoms, peer-based outreach, overdose prevention using naloxone, access to HIV/hepatitis testing and treatment services [9].

Harm reduction interventions have been successful in reducing HIV incidence, preventing hepatitis transmission, and improving care links with IDUs. Countries like Switzerland, Portugal, and Australia have implemented such policies [10]. India's National AIDS Control Organization has implemented harm reduction under Targeted Interventions, affecting states like Manipur, Nagaland, and Punjab. However, stigma, lack of awareness, insufficient finances, and community resistance hinder their implementation.

Irrespective of commitments on policy level and frameworks of operations, limited systematic research examining effectiveness of the harm reduction interventions with injecting drug users across varying sociocultural contexts exists [11]. Investigation of the effectiveness of such programs should not be limited merely to epidemiological endpoints such as the decrease of the disease spread, but also to extended psychosocial levels such as altering the risk behaviour, ameliorating the quality of life,



utilization of health services, and decrease of the criminal indulgence [12]. Assessments of the effects of harm reduction strategies play an essential role in terms of informing evidence-based policymaking, the efficient use of resources, as well as the expansion of programs to underrepresented regions.

### **Aim**

To evaluate the effectiveness of harm reduction strategies in reducing health risks, improving behavioural outcomes, and enhancing access to healthcare services among IDUs.

### **Objectives**

- To assess the change in injecting risk behaviors among IDU before and after the implementation of harm reduction interventions, using the Injecting Risk Questionnaire (IRQ).
- To evaluate the effectiveness of harm reduction strategies by comparing pre- and post-intervention data based on World Health Organization (WHO) indicators related to drug use, health outcomes, and service utilization.

## **2. Review of literature**

**Omiyefa S (2025)** assessed how well harm reduction strategies, psychosocial therapies, and legislative changes reduced the number of drug-related suicides. The impact of harm reduction tactics, including supervised consumption locations, opioid replacement treatment, and naloxone distribution, on lowering overdose-related suicide attempts and deaths is thoroughly examined. Furthermore, the impact of psychological therapies, such as peer support groups, contingency management, and cognitive-behavioural therapy (CBT), on preventing suicide in high-risk persons is investigated. The study also looks at policy changes meant to address the systemic causes of drug-related suicides. The effects of decriminalisation laws, enhanced mental health service accessibility, and integrated care approaches in lowering drug user suicide rates is examined. By offering data-driven insights into the relationship between substance use and suicide prevention, the study adds to the conversation around public health. In addition to addressing mental health and socioeconomic vulnerabilities, the study promotes integrated, stigma-free therapies that put harm reduction first [13].

**Nyashanu T et al., (2024)** examined how OST was viewed as beneficial by OST clients and peer outreach workers in a community-based harm reduction program Strategies. Two women and fourteen men made up the sixteen peer educators that took part in the two focus groups. A total of 15 OST clients (11 men and 4 women) engaged in semi-structured interviews after that. The study employed a



convenience cross-sectional design. The perceived contributions of the thematic analysis were evaluated to determine OST and the harm reduction approach to the people with opioid dependence as another dimension of the enhanced health status. It was felt that the community should be educated on OST to keep more persons on opioid dependence amused to invoke the services and to dispel rumours concerning OST [14].

**Perminiene&Fatkulina., (2020)** assessed the success of LTCs' efforts to modify clients' conduct between 1997 and 2019. Methods: Documentation of LTCs from 1997 to 2019 was analysed; an anonymous questionnaire was administered to 130 residents of the Klaipeda Mental Health Centre LTC in 2019; and the 2001 survey findings were compared with the data. Results the average number of visits to the centre by a single client increased from 5 to 131 between 1997 and 2019. There was an increase in the quantity of sterile methods provided to clients, but a decrease in the quantity of used syringes returned (83% in 1998, 101% in 2019). Before using the centre's services, 58% of respondents who did not attend in 2001 would give used syringes to others; in 2019, that percentage fell to 13%. A certain percentage of customers would accept used syringes before to visiting the facilities (in 2001, 25% did not); nevertheless, 91% of clients in 2019 did not utilise used syringes following their visits [15].

**Dick S et al., (2019)** evaluated the efficacy of digital treatments for third-level students' harm reduction from illicit substance use. Used keywords and database-specific terms to conduct a thorough search across ten databases in April 2018 under the headings of mHealth, substance misuse, and student Papers required demonstrating a harm reduction measure for illicit substance misuse in order to be considered for inclusion. Regardless of quality, the included papers underwent rigorous evaluation and were incorporated into the qualitative synthesis. The qualitative synthesis comprised eight investigations in all. According to studies, harm reduction might refer to substance abuse or initiation, difficulties or repercussions related to substance abuse, or a correction of societal norms. Overall, at least one harm reduction benefit was identified by five of the eight investigations. The use of self-reported substance usage measures and the absence of participant blinding were the main causes of the study's generally poor quality, according to the critical appraisal. Nonetheless, findings indicate that digital treatments could result in a slight decrease in the harm caused by the abuse of illegal substances [16].

**Hawk M et al., (2017)** evaluated that other risky behaviours often linked to drug use can be reduced by harm reduction strategies, and that problems like “sex work, eating disorders, and tobacco” use have been tackled using reduction concepts in harm. Therefore, the extension of the philosophy of harm reduction to other health risk behaviours and a greater population of the people using healthcare services is only



logical. The study relied upon the data collected on the basis of the lengthy “qualitative interviews with 23 patients and 17 staff members of an HIV clinic in the USA”, drawing on current literature. They defined harm reduction and its six tenets, and they expanded its scope to include patients who do not take drugs. The ideas are endlessly inclusive of humanism, pragmatism, autonomy, individuality, incrementalism, and responsibility. It define each principle, and then explain how healthcare practitioners could utilise it to launch interventions, and finally present examples of its application in the field[17].

**Lin T et al., (2016)** assessed harm prevention initiatives starting in 2005. Using information acquired from relevant organisations, researchers looked into how "harm reduction programs affected HIV and drug use" Data and statistics on drug usage, the HIV epidemic, and the intervention from relevant agencies was used in this study. It divided the years 2002–2015 into three intervention phases to examine the interrelationships between variables during each period and the combined impact of interventions on the HIV epidemic. There was a high in 2005 for both the HIV epidemic and heroin use during the pre-intervention era. Despite a persistently large heroin user population, harm reduction initiatives halted the progress of the HIV epidemic, which had already begun to "decline before the proliferation of needle and syringe exchange programs and opiate substitution therapy" [18].

### 3. Methodology

The prospective observational cross-sectional design proposed in the study will be used to measure the effectiveness of the harm reduction strategies in relation to IDUs. The study design would enable it to collect both quantitative and qualitative data to measure behavioural, health based and service outcomes of harm reduction interventions like “Needle-Syringe Exchange Programs (NSEPs) and Opioid Substitution Therapy (OST)”. The research was done among two OST Centres of cities Cuttack and Puri from Odisha state known to have high prevalence of IDUs, both in urban and peri-urban settings. The study population included active injecting drug users, (IDUs), aged 18 years and more who had received harm reduction services at least once during the past 6 months. There was the inclusion of people of different age, gender, and socio-economic strata to be able to capture heterogeneity.

#### ❖ Inclusion Criteria

- People who have reached the age of 18 years or more
- Self-perceived injecting drug users
- Have received at least one harm reduction service (i.e. NSEP or OST) within the last 6 months



- With informed written consent

### ❖ Exclusion Criteria

- The persons who cannot engage due to severe mental illness
- IDUs who have refused to participate or those who cannot consent to participate with rational understanding
- Non-injecting drug users

### 3.1 Sample Size

The aim was to recruit 60 IDUs as a matter of stipulated previous literature and feasibility determination. The prevalence estimates of similar research were used to compute sample size calculation, where the confidence interval is 95%, margin of error is 5 percent, and non-response rate was 10 percent.

### 3.2 Sampling Technique

Purposive sampling was used to identify injecting drug users who had received harm reduction services in the past six months. Participants were identified through harm reduction centres, community-based organizations, and peer educators. The study included 18 or older individuals, those currently practicing injection drug use, and those who had participated in harm reduction interventions. The study was diverse in age, gender, and location.

### 3.3 Data Collection

The collection of the data was based on the combination of both injecting risk questionnaire (IRQ), focus group discussions (FGDs), and semi-structured interviews to gather quantitative and qualitative elements related to the effectiveness of harm reduction.

- Trained investigators administered injecting risk questionnaire (IRQ) face-to-face to obtain the data on demographics, admission patterns to drug treatment, high-risk behaviours, access to healthcare and use of harm reduction services.
- The Focus Group Discussions (FGDs) have been conducted among both peer outreach workers and injecting drug users with the aim of discussing perceptions and experience of using harm reduction interventions and changing behaviours.



- Healthcare providers and service staff were interviewed using the Semi-Structured interview method to obtain new information about implementation issues and challenges, delivery of the services as well as any systemic barriers encountered.

### 3.4 Variables

#### ❖ Independent Variables:

- Type and frequency of harm reduction service type used (e.g., NSEP, OST)
- Period of work engagement

#### ❖ Dependent Variables:

- Risk behaviours (e.g. needle sharing, unsafe sex)
- HIV/HBV/HCV Infection status
- The usage of services and access to healthcare
- indicators of quality of life

### 3.5 Statistical Analysis

The SPSS was used to conduct statistical analysis. Demographics and service use were summarized using descriptive statistics and associations between harm reduction services and reduced likelihood of needle sharing and/or HIV risk was assessed using chi-square and logistic regression tests. The significance of a p-value was taken as less than 0.05.

### 3.6 Ethical Considerations

The study Ethics Committee gave an ethical approval. All participants were found and informed to sign informed consent and verbal consent was sought on illiterate subjects. Participation was voluntary and confidentiality strictly applied and 100 percent confidentiality was attained. The rights of this vulnerable group were particularly respected by taking special care of privacy.

## 4. Results

**Table 1: Demographic profile of the respondents**

S.NO	Demographic characteristics	N	%	
1	Age	20-24	4	6.7
		25-29	7	11.7
		30-34	6	10
		35-39	9	15
		40-44	11	18.3
		45-49	9	15
		50-54	10	16.7
		55-59	4	6.7
2	Marital status	Divorced	1	1.7
		Married	34	56.7
		Separated	2	3.3
		Unmarried	22	36.7
		Widowed	1	1.7
3	Occupation	Employed	14	23.3
		Self-employed	43	71.7
		Unemployed	3	5
4	Education	Graduation	3	5
		Illiterate	6	10
		Literate	9	15
		Under graduate	3	5
		Up to 12th	39	65

The demographic profile of the participants reveals that the majority were aged between 40–44 years (18.3%), followed by those in the 50–54 (16.7%) and 35–39 (15%) age groups, indicating that most injecting drug users in the study were in their middle age. Regarding marital status, more than half of the participants were married (56.7%), while 36.7% were unmarried, with a small percentage being separated, widowed, or divorced. In terms of occupation, a significant portion was self-employed (71.7%), while 23.3% were employed and only 5% were unemployed. Educationally, the majority (65%) had completed up to the 12th standard, with a smaller proportion being literate without formal education (15%) or illiterate (10%), and only a few having completed graduation (5%) or were undergraduates (5%). Overall, the data suggests that most participants were middle-aged, married, self-employed, and had a moderate level of education.

**Hypothesis 1:** There is a statistically significant difference in injecting risk behaviors among IDU before and after the implementation of harm reduction interventions, as measured by the Injecting Risk Questionnaire (IRQ).

**Table 2:** Paired sample statistics

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	IRQ Pre-test	24.2333	60	10.49999	1.35554
	IRQ Post-test	1.6167	60	5.81084	.75018

The paired samples statistics table shows a substantial reduction in injecting risk behaviors among participants following the harm reduction intervention. The mean score on the Injecting Risk Questionnaire (IRQ) decreased significantly from 24.23 in the pre-test to 1.62 in the post-test, based on data from 60 participants. The standard deviation also dropped from 10.50 to 5.81, indicating reduced variability in risk behaviors after the intervention. This suggests that the harm reduction strategies were effective in significantly lowering risky injecting practices among the study group.

**Table 3:** Paired sample Correlations

Paired Samples Correlations				
		N	Correlation	Sig.
Pair 1	IRQ Pre-test & IRQ Post-test	60	.149	.256

According to the paired samples correlations table, there is a slight positive correlation ( $r = 0.149$ ) between the 60 participants' pre-test and post-test scores on the Injecting Risk Questionnaire (IRQ). A lack of a statistically significant connection ( $p = 0.256$ ) between the participants' injection risk behaviors prior to and during the intervention indicates that there is no meaningful linear link. Because of this discordance, it is reasonable to assume that the harm reduction intervention had a significant impact on the participants' performance, since the post-test scores show a marked improvement over the pre-test levels.

**Table 4:** Paired sample Test

Paired Samples Test
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		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	IRQ Pre-test - IRQ Post-test	22.61667	11.21756	1.44818	19.71886	25.51447	15.617	59	.000

The paired samples test revealed a significant difference between the pre- and post-test scores on the Injecting Risk Questionnaire (IRQ), with a mean difference of 22.62 points ( $t = 15.617$ ,  $df = 59$ ,  $p < 0.001$ ). A 95% confidence interval for the mean difference ranged from 19.72 to 25.51, indicating a statistically significant and considerable decrease in injecting risk behaviors following the harm reduction intervention. The results show that the intervention was effective in reducing the risky injecting behaviors among the participants.

**Hypothesis 2:** Harm reduction strategies lead to statistically significant improvements in WHO indicators related to drug use, health outcomes, and service utilization among IDU when comparing pre- and post-intervention data.

**Table 5:** Paired samples statistics

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	WHO Pre-test	55.3333	60	9.54502	1.23226
	WHO Post-test	83.9000	60	22.22512	2.86925

The paired samples statistics for the WHO indicators show a notable improvement following the harm reduction intervention. The mean score increased from 55.33 in the pre-test to 83.90 in the post-test among 60 participants, indicating a significant positive change in health-related outcomes, service utilization, or drug use behaviors as measured by WHO criteria. Additionally, the increase in standard deviation from 9.55 to 22.23 suggests greater variability in post-test outcomes, possibly reflecting differences in individual responses to the intervention. Overall, the data points to a strong positive impact of the harm reduction strategies.

**Table 6:** Paired samples Correlations

Paired Samples Correlations				
		N	Correlation	Sig.
Pair 1	WHO Pre-test & WHO Post-test	60	.478	.000

The results of the 60 individuals' pre- and post-WHO tests reveal a somewhat positive correlation ( $r = 0.478$ ), which is statistically significant ( $p = 0.000$ ), according to the paired samples correlations table. Evidence like this suggests that those who did well before the intervention also fared better after it. The good effects of the harm reduction program were consistently noticed, and the strong association between the two variables proves it.

**Table 7:** Paired samples test

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	WHO Pre-test - WHO Post-test	-28.56667	19.54861	2.52371	-33.61661	-23.51673	-11.319	59	.000

Partial sample t-test results reveal a statistically significant improvement in World Health Organization indicator scores following the harm reduction program. On average, there is a -28.57 point difference between the two sets of results, with 59 degrees of freedom, a t-value of -11.319, and a p-value that is less than 0.001. Results showed improvement from the pretest to the posttest, since the negative mean difference shows higher scores. As a result, this improvement may be reliably said to have a 95% confidence interval ranging from -33.62 to -23.52. According to the World Health Organization's metrics, the participants' health and wellbeing were significantly improved by the harm reduction techniques.

### 5. Discussion

Harm reduction strategies have also become more widely accepted in relation to abstinence-based approaches, particularly due to poor outcomes of such models in contexts with a high use of punitive interventions [19]. International evidence suggests that OST, NSEP, and supervised injection facilities not only modify the high risk behaviours but also enhance access to health services [20]. Empirical evidence of various programs in Taiwan has shown that a mixed treatment system of OST and NSEP was



used to effectively control the HIV epidemic, even though heroin use continued to be a problem [15], and in Lithuania, syringe sharing was also reduced considerably by low-threshold centres [18].

Beside biomedical effect, harm reduction approaches are also being evaluated in the current context in relation to psychosocial and behavioural consequences [23]. Evidence around Europe and North America indicates that intervention adopted along the lines of pragmatism and humanism is not only effective in improving physical well-being but also self-determination and improve quality of life. According to them, decriminalisation and integration of harm reduction measures with psychosocial support policies reduced suicide risk and enhanced mental well-being, an aspect that is also the case in cities Cuttack and Puri from Odisha state where stigma and discrimination are dominant impediments [21]. Digital treatment of substance misuse among the young population also proves the versatility of the harm reduction paradigm, as its small-scale studies have yielded optimistic results of reducing risky behaviour in this population [25]. The gains of WHO health indicators seen in this study replicate outcomes of other surveys of OST programs, either in India and abroad, which do record improved treatment compliance and health outcomes [26]. Investigated evidence therefore indicates that harm reduction success is attributed to their ability to not only reduce disease transmission through third party reductions but also to incorporate wider social determinants of health and inclusion [27].

## **6. Conclusion**

The study establishes clearly that intervention programmes that are based on harm reduction, especially NSEP and OST reduce risky injecting behaviours and is beneficial in overall health outcomes among IDUs in cities of Cuttack and Puri from Odisha state. The importance of these interventions on behaviour and biomedical improvements is evidenced by the significant reduction of needle-sharing behaviour and increase in HIV testing uptake, an improvement in WHO health results. Nevertheless, this fact is also complicated by the stigma, discrimination, and systematic lack of services that all exist in the concept of implementing harm reduction in socially marginalized groups. The results primarily confirm that harm reduction can not only be an effective health precaution, but also a rights-based strategy of empowering vulnerable groups to take a safer decision and at the same time to lessen the health burden of the population.

### **6.1 Implications of the study**

The implications of the study are crucial in relation to the population health policy and practice. First, the proven success of NSEP and OST subjects them to the necessity to increase them to areas where there is



a superior level of IDUs. Second, the positive changes in behaviours indicate that the emphasis against harm reduction needs to be incorporated into the mainstream delivery of healthcare instead of being considered a special intervention. It is also reported that the program needs people to be aware and stigmas reduced at the community level in order to promote participation and trust. The results, at a policy level, recommend the government to continue funding, improve formal collaboration with community-based associations and incorporate psychosocial support measures into harm reduction efforts. By considering the biomedical and social aspects of harm reduction, policymakers will be assured that such intervention will help achieve various missions related to the reduction of HIV transmission, the enhancement of the quality of life, and the protection of the dignity of the marginalized groups.

## **6.2 Limitations of the study**

Although it has much to offer in terms of valuable insights, there are some limitations to the study. The small sample size of 60 respondents does not allow the generalization of the results to a bigger population and in socio-cultural diverse spheres. Potential selection bias arose due to the use of purposive sampling because only individuals that had access to harm reduction services were recruited and the most marginalized IDUs could have been missed. Self-report risk behaviour data could be influenced by social desirability and recall bias and could hence lack accuracy. In addition, the study was mainly based on short-term behavioural change and could not adequately capture sustainability of the positive effects of harm reduction. Also, other structural barriers like stigma and discrimination will be found but it was not discussed in detail, which is an area that can be explored in future.

## **6.3 Recommendation for future study**

Future study is required to sample more individuals representing different regions to enhance external validity. Further longitudinal studies are actually required to follow the prolonged effect that harm reduction can demonstrate on the conditions of health as well as life. Comparative research studies focusing on harm reduction approach v/s abstinence based approach would furnish more in-depth information on it. The examination of the issue of stigma, law enforcement, and cultural perception of drug use would also facilitate the improvement of more inclusive interventions. Digital integration of harm reduction tools that have become the theme of recent literature should also be explored in the Indian context to reach the younger and hard-to-reach IDUs. Lastly, consultations through interdisciplinary studies which incorporate the use of views espoused by fields of public health, psychology, and social policy would help in enhancing knowledge and producing strategies that are holistic, data driven and contextual in nature.

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