TESTING AN APP SUPPORTED DELIVERY SYSTEM FOR

LEPROSY POST EXPOSURE PROPHYLAXIS (LPEP) SERVICES

Summary Report

Background

In 2023, 182,815 new leprosy cases were reported globally, marking a 5% increase from 2022. India continues to report around 59% of global leprosy cases; despite case detection efforts, excellent MDT drugs, follow up and comprehensive National Strategic Plan (NSP) under the National Leprosy Eradication Programme (NLEP) in India. Leprosy elimination remains a challenge. Studies highlight the effectiveness of administering a Single Dose of Rifampicin (SDR) to contacts of leprosy patients, reducing new cases by 57%. Based on the feasibility study in Dadra-Nagar Haveli, conducted by NLR India in collaboration with government, the Leprosy Post Exposure Prophylaxis (LPEP) using SDR was launched on 2nd October 2018 as a national intervention. Single dose rifampicin – post exposure prophylaxis (SDR-PEP) implementation requires contacts of leprosy index cases to be identified, listed and screened for signs and symptoms of leprosy and eligibility criteria. The recording must be detailed and accurate and should be undertaken in a format where the data is easily stored and retrieved for analysis and reporting. To address these aspects, NLR India Foundation (NLRIF) developed a mobile application for SDR-PEP delivery, ensuring adequate use of screening criteria, streamlined data recording, monitoring, reporting and stock maintenance. A study conducted across Howrah and Paschim Bardhaman districts in West Bengal evaluated the app's feasibility in 2022 through an exploratory study followed by app development, training of Front-Line Health Workers (FLW). NLRIF implemented a Cluster-Randomized Controlled Trial (cRCT) during 16 October 2023 to 15 October 2024.

Objectives of the Study

To study the differences between the paper-based system and the App supported system in terms of

- Number of contacts listed, screened, SDR PEP administered; time lag between new case detection, contact listing and SDR provision.
- Screening quality; ease of recording, analysis, and reporting; ease of follow-up; and the time used.

To assess the cost-effectiveness of a mobile Application for recording and reporting of contact screening and SDR PEP administration.

Methods

Study Population

During the CRCT implementation period 16 Oct 2023 - 15 Oct 24, the following data were collected:

- Profile and LPEP related details using the LPEP App- 320 index cases and 11,456 contacts.
- Error related data on LPEP from control blocks using an error tool – records of 72 randomly selected index cases (using 9% overwriting as prevalent error, 90% CI and design effect 2; sample size 66).
- Time utilization and cost of LPEP service using an economic tool among 166 and 154 index cases in intervention and control blocks, respectively.[1]

[1] During the cRCT study period, from 16 Oct 2023 to 15 Oct 2024, two districts provided LPEP to the contacts of 320 index cases.

During post CRCT, during November 2024- January 2025, the following data were collected:

- App users' profile and experiences of App use in intervention blocks- All App users included.
- 28 Observations on LPEP service delivery conducted conveniently, 14 each from intervention and control blocks.
- 14 Key Informant Interviews (KIIs) were conducted, involving key personnels such as District Leprosy Officer (DLO), District Leprosy Consultant (DLC) from both the districts, and Block Medical Officers of Health (BMOH), Public Health Nurse (PHN) and Medical Officers (MO) from intervention clusters.
- Eight (8) Vignettes were conducted among Front Line Workers (FLW) like ASHA and ANM from both the intervention (4) and control clusters (4) of the two districts.

Data analysis:

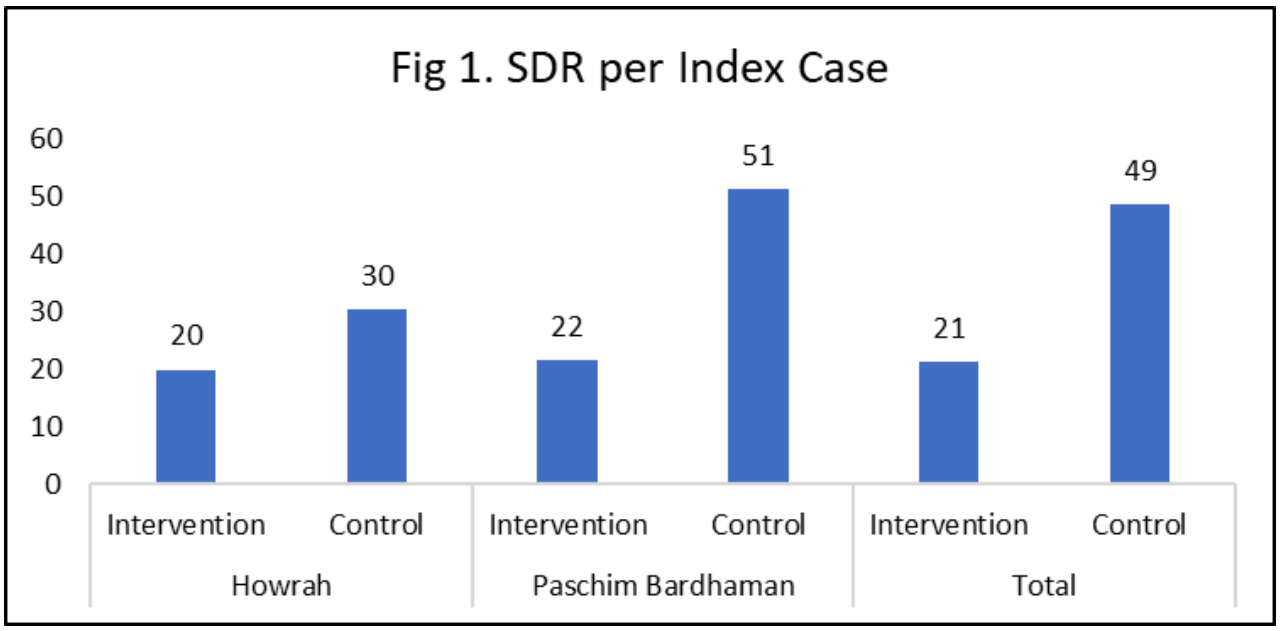
Quantitative data was analyzed using MS Excel and SPSS 23.0; t-tests were performed in Stata SE 18.1. Cost effective analysis was conducted using Incremental Cost Effectiveness Ratio (ICER). Qualitative data was analysis compared findings between intervention and control blocks

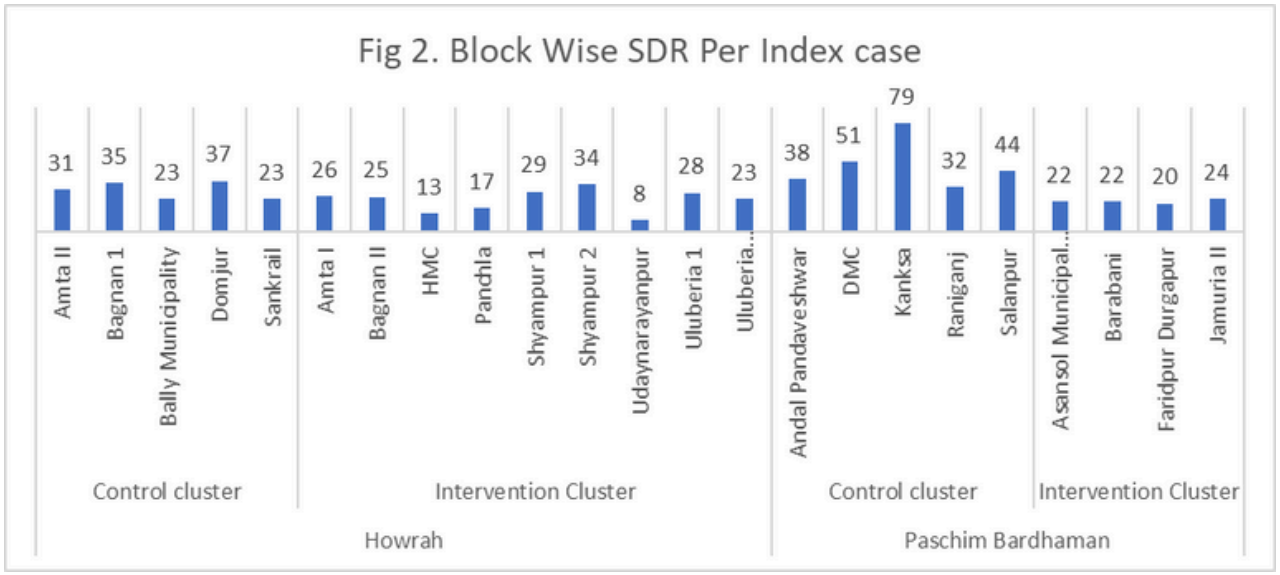
Findings

Number of contacts screened and administered SDR PEP

During the one-year cRCT period, both in intervention and control blocks, a total of 320 index cases were registered and 10,983 contacts were administered SDR. In total, the average SDR administered per index case is 34 (intervention 21, control 49). Kanksa, one of the control blocks in Paschim Bardhaman has

SDR coverage 79 per Index Case, much higher than other blocks. Please refer to Figure 1 and Figure 2 that depict SDR coverage per index case and block wise distribution of SDR coverage per index case.





Excluding two outliers – Kanksa and Durgapur Municipal Corporation (DMC) from the control arm, average SDR coverage per index case is 31 in Paschim Bardhaman. The SDR coverage per index case was also high in control blocks in Paschim Bardhaman - 32 and 38 respectively in FY 2021-22 and FY 2022-23.

App user feedback

Out of 90 App users surveyed, around 59% (53) users reported that App helped in easy enlisting of new cases. As high as 88% (79) respondents reported easy to screen for eligibility criteria and helped in exclusion of contact with quality. In fact, even though the SDR coverage is different between two districts, the App user feedback was similar. It implies that once the App is rolled out, it can be well accepted and practiced by both the districts. in Paschim Bardhaman, 83% App users said that App helped easier enlisting of contacts, and 91% users reported easy eligibility screening. Similarly, in Howrah, 86% respondents said that App helped in error free data record and 89% reported easy monitoring of programme.

Ease of recording, analysis, and reporting

Stakeholders view the App as a valuable tool for LPEP monitoring, reducing missing data, and enabling systematic procedures. It supports paperless operations, ensures data safety, and allows easy retrieval for analysis. Real-time data improves supervision, while digital records reduce risks of document loss and enhance efficiency compared to traditional paper-based systems.

Screening quality

The App enhances contact screening by ensuring that only eligible contacts receive SDR per NLEP guidelines, reducing errors through automated exclusion criteria. It supports FLWs with Rifampicin dosage guidance and facilitates future follow-ups by collecting detailed contact information. Automation minimizes errors, unlike handwritten records, improving trust and efficiency in public healthcare outreach.

Time utilization

Utilization of time of one index case registration was captured using observation methods in intervention blocks. The average time required for completing one house, index case and one contact registration for SDR was 10 min 29 seconds in Howrah compared with 16 min 59 seconds in Paschim Bardhaman.
As reported by the respondents of the qualitative study, around 30 minutes were required for one household and index case registration in intervention blocks compared with 15 minutes in control blocks. In control blocks, there is almost no check about quality of data collection, whereas, in intervention block, App based data collection was error free. Respondents of qualitative study agreed that the slight time increase is outweighed by the benefits of enhanced accuracy and efficiency.

Record keeping

Out of 72 index cases explored in the study in control blocks only, 63% (45) of the cases in control block used registers for maintaining records, while 31% (22) used paper-based formats and 6% (4) used diaries to maintain records.

Highlights from the qualitative study

Advantages of the App include easy data collection & safe storage, mandatory informed consent, App recommending Rifampicin dose on the spot, mandatory contact screening of all criteria, error free steps, evidence of supervised administration of SDR, soft copy of the generated report reduces the reporting time and follow up of contacts become easier with as all contact information are collected. Besides the advantages of the App, the respondents

also provided some suggestions to improve the ease of use. Since geolocation is captured, multiple images may not be collected to avoid uploading heavy files and make it more acceptable to the community. Similarly, the irrelevant data fields, e.g., types of housing can be removed.

Perceptions of both FLWs and supervising officials support the findings because App user has to ask all exclusion criteria and only after the information is entered, next step can be taken. They stated that, “The APP has been useful for quality screening of leprosy contacts since in the procedure, the App has standardized the process with the introduction of exclusion criteria, minimizing the chances of inaccurate screening of leprosy contacts.” An official highlighted that accurate screening is crucial not only for health reasons but also to maintain public trust in the healthcare system. Incorrect screening can lead to distrust and affect outreach efforts. The App supports easy suspect referrals, which can be tracked by supervisors through downloadable data, eliminating the need for referral slips. If a referred individual does not visit the health facility despite counselling, supervisors can track them using the App’s built-in GIS location feature.

Cost effectiveness

In this the study, analysis of the Incremental Cost Effectiveness Ratio (ICER)[2] is used to calculate the cost-effectiveness. After dropping two outlier blocks, the results reveal that costs per index case is uniformly higher in the control blocks vis-à-vis the intervention blocks. The Table-1, depicts the average time and cost spent without the outliers.

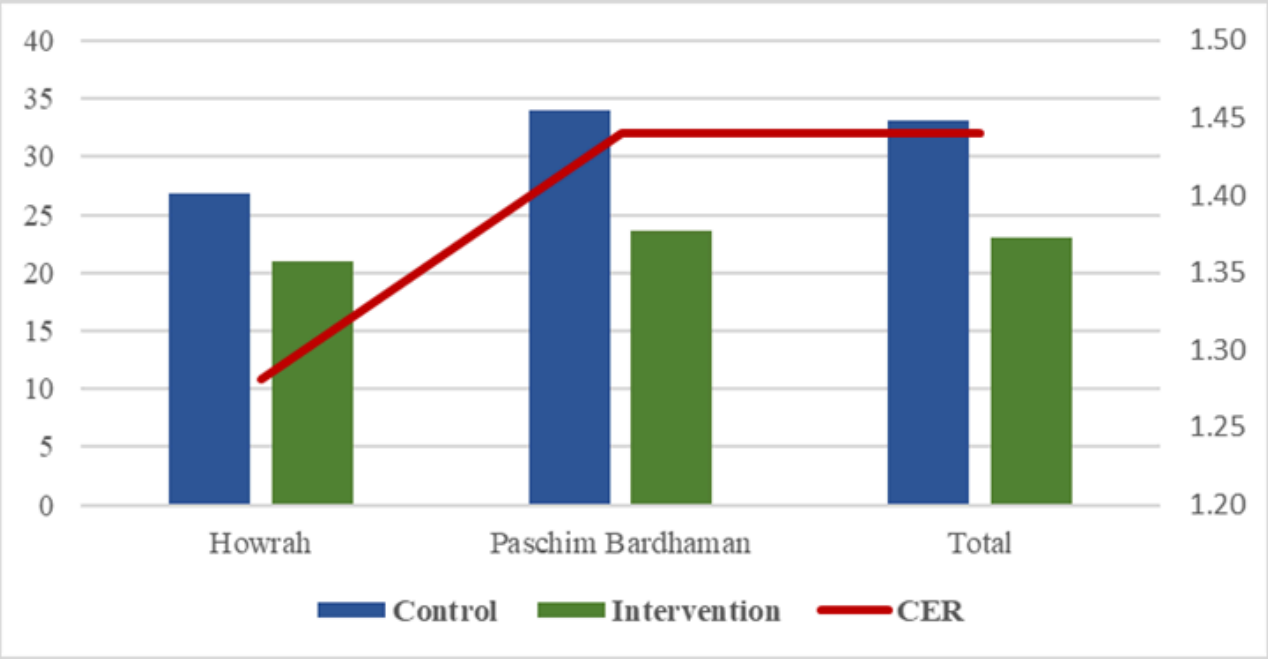
[2] $\text{ICER}_1 = \frac{\text{Cost per index case in control blocks}}{\text{Cost per index case in intervention blocks}} = \frac{C_C/\text{Index}_C}{C_I/\text{Index}_I}$; $\text{ICER}_2 = \frac{\text{Cost per SDR in control blocks}}{\text{Cost per SDR in intervention blocks}} = \frac{C_C/\text{SDR}_C}{C_I/\text{SDR}_I}$

Table 1: Average time and cost spent after dropping outliers – Aggregate of both districts.

Indicator	Control	Intervention	Difference	t-statistic
Number of minutes spent by (ANM + ASHA) per index case	6.40	6.17	0.22	0.32
Cost per index case	18.12	19.81	-1.69	-0.55
Number of minutes spent by (ANM + ASHA) per SDR	0.28	0.31	-0.03	-0.93
Cost per SDR	1.97	0.99	0.99	2.41

SDR coverage per index case is approximately 20, as stated in the operational guidelines. However, this number may vary depending on local administrative decisions and the demographic characteristics of different blocks. In Paschim Bardhaman, when outlier blocks were excluded from the analysis, both the time spent, and associated costs decreased. For SDR per index case may not be appropriate as the SDR dosage is often determined by local need, and implementation efficiency. There are many variations of SDR coverage which is beyond the scope of the App. The App is designed to ensure the quality of LPEP implementation. Mathematically, as SDR coverage increases, the cost per SDR decreases. So, the estimates of ICER using index cases are more appropriate and should be used to determine whether the App should be used in all districts, or not. Even if sometimes we find that the cost is marginally higher, the quality benefits outweigh the expenses, which cannot be compromised. SDR administration without proper screening may harm an individual who has the diseases/ factors which need to be excluded. Figure 3 presents the Incremental Cost-Effective Ratios for intervention and control clusters, shown separately for each district as well as combined.

Figure 3: Results of Incremental cost-effective ratios by districts per index case



Conclusion

The App has been found useful in improving the quality and cost-effectiveness of the LPEP programme. The specific advantages have been:

1. App improves accuracy of information collected during implementation of the LPEP.
2. App ensures quality screening of contacts for both inclusion and exclusion criteria.
3. Guidance on rifampicin dosage on the spot is a helpful feature.
4. Ensures consent and provides evidence.
5. Ensures supervised drug administration and provides evidence.
6. App reduces missing data and enables systematic procedures.
7. It is a paperless operation and ensures data safety.
8. App allows easy retrieval of data for analysis and reporting.
9. Real-time data improves supervision.

10. Allows easy referral.
11. App facilitates future follow-ups.
12. App is cost-effective if we consider ICER ratio per index case.

Further refinement, removing the irrelevant data fields and avoiding multiple imaging can make it more efficient and acceptable.

Investigators of the study

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- All the study participants

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