



Original Research Paper

CBIA Education for Leprosy Knowledge, Attitudes, and Practices Among Health Cadres: A Quasi Experimental Study

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Abstract

Background: Community health cadres play an important role in leprosy control through health education and patient support in endemic areas. **Objectives:** This study evaluated changes in cadres' knowledge, attitudes, and practices following Cara Belajar Insan Aktif (CBIA) education. **Methods:** A nonrandomized quasi experimental time series study involved 70 cadres in Tombariri District, equally allocated to intervention and control groups. The intervention included standardized booklets, teaching aids, facilitated discussions, and plenary clarification. Outcomes were assessed at baseline, immediately after education, one month, and three months. **Results:** At three months, favorable knowledge increased from 46.0% to 71.0%, attitudes from 37.0% to 63.0%, and practices from 31.0% to 51.0% in the intervention group. Significant between group differences were observed for knowledge at three months ($p < 0.001$), attitudes at one month ($p = 0.004$), and practices at one month ($p = 0.003$). Baseline attitudes also differed significantly ($p < 0.001$). **Conclusions:** CBIA education was associated with improved cadre outcomes. However, baseline imbalance and declining attitude and practice gains suggest that sustained reinforcement and cautious interpretation are necessary.

Keywords: Active learning; Community health cadres; Health education; Leprosy; Practice

Introduction

Leprosy is a chronic infectious disease caused by *Mycobacterium leprae* that primarily affects the skin and peripheral nerves. Delayed recognition and treatment can contribute to disability, while social stigma may discourage disclosure, examination, and adherence to care¹. In Indonesia, leprosy services depend not only on clinical treatment but also on effective community communication, contact support, and early referral. Program evaluation in another Indonesian endemic setting has shown that community cadres can contribute to awareness, screening, treatment monitoring,

and referral, while gaps in training and program inputs may limit implementation².

Stigma remains a major barrier to leprosy control because affected people may experience rejection, exclusion, and self isolation. Community studies have documented persistent misconceptions about transmission, curability, marriage, and social contact^{3,4}. These findings support educational strategies that reach community intermediaries who routinely interact with families. Health cadres are relevant because they connect primary health services with local communities and may reinforce accurate messages about

symptoms, multidrug therapy, disability prevention, and stigma reduction.

Education can improve health knowledge and support behavioral change when learning activities are understandable, participatory, and linked to practical decisions. Evidence from *Healthy Tadulako Journal* shows that educational media and structured community education can improve knowledge or health behavior in different populations^{5,6}. A recent quasi experimental HTJ study also reported larger knowledge gains when an animated video and booklet were used compared with leaflet education, illustrating the value of engaging and multimodal learning materials⁷. These studies do not address leprosy directly, but they support the broader rationale for structured educational interventions.

Cara Belajar Insan Aktif, abbreviated as CBIA, is a participatory learning method that encourages participants to identify information, discuss practical problems, compare options, and formulate solutions with facilitator support. Previous studies have applied CBIA to diabetes self care, diarrhea management, rational medicine use, and self medication, with improvements most consistently observed in knowledge and selected behavioral indicators^{8,9,10}. However, evidence on CBIA specifically for leprosy education among community health cadres is limited.

Tombariri District in Minahasa includes communities in which cadres support primary health center activities and may encounter leprosy related concerns. The local evidence gap is whether an interactive CBIA approach can be associated with changes in cadres' knowledge, attitudes, and practices across immediate, one month, and three month assessments rather than only a single post education measurement. This repeated assessment is important because short term educational gains may attenuate over time.

This study therefore aimed to evaluate changes in leprosy related knowledge, attitudes, and practices among health cadres receiving CBIA education compared with a control group across four measurement times. The findings are expected to inform cadre education that is participatory, feasible for primary health care settings, and responsive to the need for sustained reinforcement.

Materials and Methods

Study Design

This study used a nonrandomized quasi experimental time series design with an intervention group and a control group. Four measurements were conducted over approximately three months: pretest, posttest I immediately after the educational session, posttest II at one month, and posttest III at three months. The design was selected to describe both immediate and retained changes after CBIA education while maintaining a comparison group.

Sample

A total of 70 community health cadres were recruited using purposive sampling according to the study eligibility criteria and were analyzed as two groups of 35 participants each. Eligible cadres collaborated with local primary health centers, were 20 to 60 years of age, could read and write, were active in primary health center activities, were willing to complete the study series, and were physically and mentally able to participate. Cadres with previous participation in a leprosy education program were excluded. The source manuscript documented complete denominators of 35 participants per group across all four measurements, and the analysis therefore used the available complete repeated observations.

Data Collection Technique

Knowledge, attitude, and practice questionnaires were prepared for the leprosy education context. Content validation involved five reviewers representing psychology, academia, communicable disease prevention practice, pharmacy practice, and primary health care. Language comprehension was subsequently tested in 10 cadres who were not included in the analytic sample. Internal consistency testing in the study documentation showed Cronbach alpha coefficients above 0.650 for the measured domains. The final categories used in the study were good, moderate, and poor, and the same classification rules were applied at each measurement time.

The CBIA session was delivered in a participatory format for approximately two to three hours, with a maximum planned duration of four hours. The 35 intervention cadres were divided into seven small groups of five participants, and each group selected a leader. Every participant received a standardized leprosy booklet and worksheet. The materials covered the definition of leprosy, signs and symptoms, transmission, multidrug therapy, prevention, and stigma. Participants reviewed the booklet, identified practical problems, discussed possible solutions, and presented unresolved questions during the plenary session. Facilitators supported participation without dominating discussion, while a resource person clarified misconceptions and summarized key messages. This structured combination of written material, small group discussion, and guided clarification reflects active learning principles used in previous CBIA and structured health education studies^{8,11,12}.

Data Analysis Technique

Data were summarized as frequencies and percentages for the good, moderate, and poor

categories at each measurement time. The original analysis used the Shapiro Wilk test to assess distributional assumptions and Levene testing to assess homogeneity. Because the measured scores were not normally distributed, paired within group comparisons from pretest to each posttest were assessed using the Wilcoxon signed rank test, and between group comparisons at each measurement time used the Mann Whitney U test. Statistical significance was set at $p < 0.05$. Values originally reported as $p = 0.000$ were standardized to $p < 0.001$. The repeated pairwise results were interpreted as time specific comparisons rather than as a single causal group by time estimate.

Ethical Consideration

Participation was based on the eligibility requirement that cadres were willing to complete the study procedures. Confidential handling of questionnaire responses and voluntary participation were maintained during data collection. The institutional ethics committee name and approval number were not stated in the source manuscript supplied for revision and therefore were not invented in this author revision; these identifiers should be inserted from the original ethics approval document before journal production.

Result

The analytic sample comprised 70 community health cadres, with 35 participants in the CBIA intervention group and 35 in the control group. All outcome tables used the same denominator at pretest and the three posttest measurements. Table 1 summarizes the study groups and measurement schedule. This consistent sample distribution across measurement periods facilitated longitudinal comparisons of knowledge, attitudes, and practices between the intervention and control groups.

Table 1. Study groups and repeated measurement schedule

Study group	n	Measurements	Educational exposure
CBIA intervention	35	Pretest; immediate; 1 month; 3 months	Booklet, worksheet, small group CBIA discussion, plenary clarification
Control	35	Pretest; immediate; 1 month; 3 months	No CBIA session described in the source manuscript

Source: Primary data, 2026

Table 2 shows the longitudinal distribution of participants classified in the good category. In the intervention group, good knowledge increased from 46.0% at pretest to 71.0% at three months. Good attitude increased from 37.0% to 91.0% at one month and then declined

to 63.0% at three months. Good practice increased from 31.0% to 86.0% at one month and declined to 51.0% at three months. The control trajectories were less consistent and included declines in good knowledge and attitude by later measurements.

Table 2. Participants in the good category across four measurement times

Outcome	Group	Pretest n (%)	Posttest I n (%)	Posttest II n (%)	Posttest III n (%)	Pattern
Knowledge	Intervention	16 (46.0)	22 (63.0)	24 (69.0)	25 (71.0)	Progressive increase
Knowledge	Control	24 (69.0)	26 (74.0)	21 (60.0)	9 (26.0)	Late decline
Attitude	Intervention	13 (37.0)	27 (77.0)	32 (91.0)	22 (63.0)	Peak at 1 month, attenuation at 3 months
Attitude	Control	29 (83.0)	25 (71.0)	16 (46.0)	18 (51.0)	Decline from baseline
Practice	Intervention	11 (31.0)	25 (71.0)	30 (86.0)	18 (51.0)	Peak at 1 month, attenuation at 3 months
Practice	Control	18 (51.0)	23 (66.0)	15 (43.0)	15 (43.0)	Fluctuating, lower at later measurements

Source: Primary data, 2026

The between group Mann Whitney U comparisons and within group Wilcoxon signed rank comparisons are summarized in Table 3. For knowledge, the groups did not differ significantly at pretest, immediately after education, or at one month, but differed at three months ($p < 0.001$). For attitude, there was a significant baseline difference ($p < 0.001$), no difference immediately after education ($p = 0.911$), a difference at one month ($p = 0.004$), and no significant difference at three months ($p = 0.077$). For practice, the only significant between group difference occurred at one month ($p = 0.003$). Within the intervention group, knowledge and attitude changed significantly at all three posttest comparisons, whereas practice changed significantly

immediately and at one month but not at three months ($p = 0.057$).

Figure 1 visualizes the percentage of cadres in the good category at each measurement time. The intervention trajectories show early gains across all three domains, followed by sustained knowledge improvement but attenuation of attitude and practice at three months. The control group shows variable trajectories, emphasizing the importance of interpreting posttest findings together with baseline differences and within group patterns. These findings suggest that periodic educational reinforcement may be necessary to maintain improvements in attitudes and practices over time.

Table 3. Time specific between group and within group nonparametric comparisons

Outcome	Comparison	Pretest or Posttest I	Posttest II	Posttest III	Interpretation
Knowledge	Between groups	Pretest 0.168; Posttest I 0.403	0.956	<0.001	Difference emerged at 3 months
Knowledge	Intervention vs pretest	0.001	0.017	<0.001	Significant change at each posttest
Knowledge	Control vs pretest	0.472	0.019	0.001	Later time changes also occurred in control
Attitude	Between groups	Pretest <0.001; Posttest I 0.911	0.004	0.077	Baseline imbalance; 1 month difference
Attitude	Intervention vs pretest	<0.001	<0.001	0.001	Significant change at each posttest
Attitude	Control vs pretest	0.737	0.243	0.084	No significant within group change
Practice	Between groups	Pretest 0.211; Posttest I 0.648	0.003	0.072	1 month difference only
Practice	Intervention vs pretest	<0.001	<0.001	0.057	3 month change not significant
Practice	Control vs pretest	0.418	0.448	0.851	No significant within group change

Note: $p < 0.05$ was considered statistically significant. Values originally reported as $p = 0.000$ were standardized to $p < 0.001$.

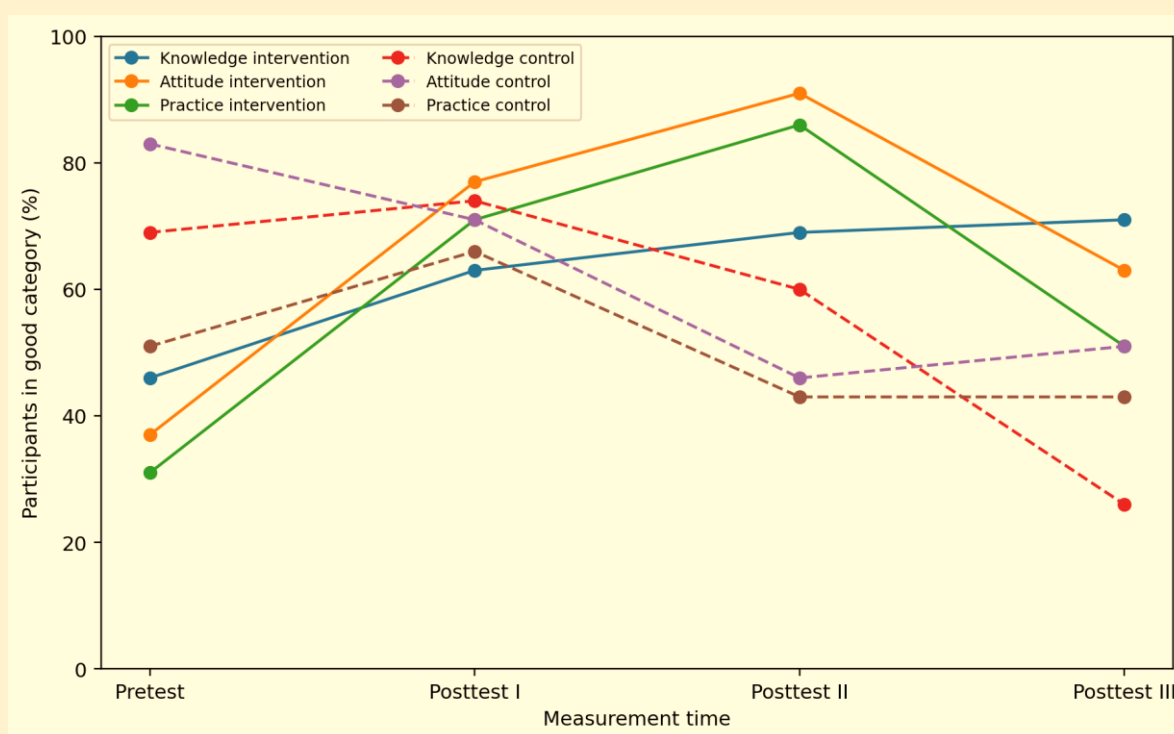


Figure 1. Longitudinal percentage of cadres in the good category for knowledge, attitudes, and practices

The principal finding was a consistent increase in the proportion of intervention cadres with good knowledge through three months, accompanied by larger short term gains in good attitude and practice that peaked

at one month and attenuated by three months. Statistical comparisons supported a between group knowledge difference at three months, an attitude difference at one month, and a practice difference at one month. The significant

baseline attitude imbalance means that attitude findings require particular caution and should not be interpreted as a simple intervention effect.

Discussion

The study found that CBIA education was associated with favorable changes in cadres' leprosy related knowledge, attitudes, and practices, but the pattern differed by outcome and time. Knowledge in the intervention group increased progressively from 46.0% in the good category at baseline to 71.0% at three months, while attitude and practice reached their highest proportions at one month and then attenuated. This temporal pattern is more informative than a single immediate posttest because it suggests that different learning domains may have different retention trajectories.

The knowledge pattern is consistent with the educational logic of CBIA. Participants actively searched for information, discussed realistic problems, and received clarification rather than relying on one way instruction. Earlier CBIA studies in diabetes self care, diarrhea management, rational medicine use, and self medication similarly reported improvements in knowledge after participatory learning.^{8,9,10,13} HTJ studies of cadre education and structured education also support the general principle that organized, context specific learning can improve knowledge and selected health behaviors.^{14,15} These comparisons support the plausibility of the observed educational gains without implying that the same magnitude should be expected across diseases or populations.

The intervention group's attitude and practice gains were strongest at immediate and one month assessments and were smaller at three months. This attenuation is important. It may reflect fading recall, reduced reinforcement after the initial session, competing routine responsibilities, or the

greater difficulty of maintaining attitudinal and behavioral changes compared with factual knowledge. Participatory health education can initiate change, but maintenance may require booster sessions, supervision, repeated practice, or integration into routine cadre meetings.^{16,17} The three month practice comparison in the intervention group did not reach statistical significance ($p=0.057$), so the data do not support describing practice improvement as uniformly sustained.

Between group interpretation also requires attention to baseline comparability. Knowledge and practice did not differ significantly at baseline, whereas attitude differed substantially between groups ($p<0.001$). Consequently, later attitude comparisons cannot be interpreted as if the groups started from equivalent levels. In a nonrandomized quasi experimental design, baseline imbalance can arise from selection differences and may interact with regression to the mean. The one month attitude difference therefore provides supportive but not definitive evidence of a CBIA related effect.

The control group also showed changes over time, including later declines in knowledge and relatively stable within group attitude and practice tests. Such patterns may result from ordinary variation, repeated measurement, external information exposure, or other contextual factors. Because group allocation was not randomized and contamination between cadres cannot be excluded from the available records, the findings are best interpreted as associations between CBIA exposure and observed trajectories rather than proof of a causal effect.

The findings remain relevant for leprosy programs because community cadres often serve as trusted intermediaries. A recent evaluation of a leprosy program in South Sorong identified cadre involvement in awareness and referral but also highlighted the need for adequate training and program

support.² For Tombariri, CBIA can be considered a practical educational format for reinforcing accurate messages about symptoms, multidrug therapy, prevention, stigma, and referral. The observed attenuation in attitude and practice suggests that a single session may be insufficient for sustained change and that periodic reinforcement should be incorporated into implementation.

This study has several strengths, including a comparison group, four measurement times, a participatory intervention, and domain specific reporting of knowledge, attitudes, and practices. The main limitations are the nonrandom sampling and allocation, the significant baseline imbalance in attitude, reliance on self reported questionnaire responses, the use of multiple time specific nonparametric tests rather than a single longitudinal group by time model, and limited information in the source manuscript on participant allocation procedures, exact instrument scoring specifications, and ethics approval identifiers. These factors restrict causal interpretation and generalizability.

Future studies should prospectively document allocation and intervention fidelity, use validated instruments with fully reported scoring and domain reliability, register booster education schedules, and apply longitudinal models such as generalized estimating equations, mixed models, or appropriate rank based repeated measures methods. A design that directly estimates the group by time interaction would provide a clearer intervention effect and allow adjustment for baseline differences and relevant cadre characteristics.

Conclusion

CBIA education was associated with improved leprosy related knowledge, attitudes, and practices among health cadres in Tombariri District, with the clearest sustained pattern observed for knowledge. Attitude and practice

improved most strongly in the short term and attenuated at three months, and the three month practice change was not statistically significant. These findings support participatory cadre education while also indicating the need for reinforcement and more rigorous longitudinal evaluation before drawing causal conclusions.

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Conflict of Interest Statement

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