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An Evaluation of COVID-19 Investigation and Contact Tracing Training in Karnali, Nepal

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ABSTRACT

Background: Case investigation and contact tracing (CICT) is considered one of the key strategies to prevent further spread of COVID-19 and to reduce its deleterious impact. It is considered a specialized skill. This study aimed to assess the effect of CICT training and the perceived challenges in implementing CICT.

Methods: A mixed method study was conducted among the health workers of Surkhet, Kalikot, Dolpa, and Mugu district of Karnali province who had received CICT training. The study was conducted from 25th September 2020 to 23rd October 2020. A total of 98 health workers were interviewed using 12-item questionnaires to assess the knowledge and skills gained from the training, followed by a total of 20 KII to explore the perceived challenges of implementing the knowledge gained from CICT training. Pre and post-test data were analyzed using paired t-test and the thematic analysis of KII was performed.

Results: A significant increase in mean score (Mean score change= 3.09±2.27, p-value=<0.001) was observed after the CICT training. Perceived challenges in CICT implementation in Nepal encompassed issues such as coordination at the local level, shortages of safety items and tents during the initial quarantine phase, low testing rates, vaccine hesitancy, economic hardships, transportation limitations, skilled manpower shortages for record-keeping, constraints in healthcare infrastructure, political instability, and geographical obstacles.

Conclusion: The CICT training was effective in the Karnali province in changing knowledge and perception of CICT. However, during the COVID-19 pandemic, they faced new experiences and difficulties.

Keywords: *Evaluation; capacity building; CICT; COVID-19; Karnali Province; Nepal.*

INTRODUCTION

The COVID-19 pandemic has caused significant global loss of life and posed an unparalleled threat to public health, food systems, and the world of work.[1] In Nepal, lockdowns, self-isolation, social distancing, and quarantine measures have adversely affected the population's physical, emotional, moral, and social well-being.[2,3]

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Various sectors have been impacted, underscoring the urgent need to curb the virus's spread.[3] Case investigation and contact tracing are key strategies to prevent COVID-19 transmission and minimize its impact, as emphasized by the Centers for Disease Control and Prevention.[4,5]

To support these efforts, the Nepal Health Training Centre (NHTC) has developed a facilitator guide for onsite CICT training. This course trains team members, including a public health graduate, a nurse/paramedic, and laboratory personnel[6] to perform case investigations and contact tracing according to established protocols.[7] In this regard, this study aims to assess the change in knowledge among health workers following CICT training.

METHODS

Study design and sample size:

A mixed-method cross-sectional study, including a pre-post intervention, was carried out in Karnali province from 25th Sep 2020 to 23rd Oct 2020. A total of 98 samples were taken for the quantitative study and a Key Informant Interview (KII) was done among 20 participants to assess the qualitative aspect.

Study site and population

Data were collected from health workers enrolled in municipal CICT teams across the Surkhet, Kalikot, Dolpa, and Mugu districts of Karnali Province, as shown in Figure 1.

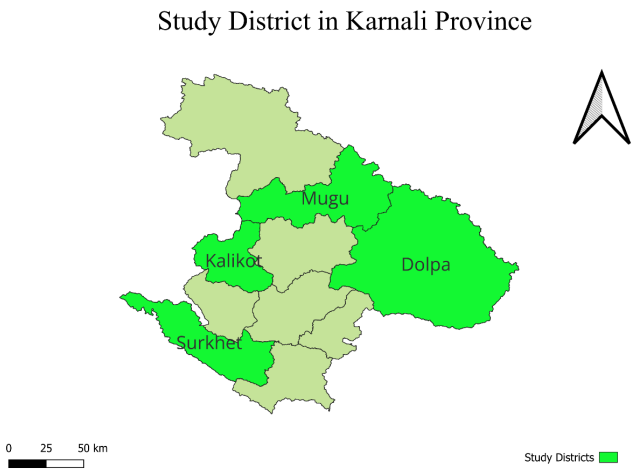

Figure 1 Study Districts of Karnali Province

Training curriculum:

CICT training was conducted for two days and trainers represented from Epidemiology and Disease Control Division (EDCD), Health Service Offices, USAID's Strengthening Systems for Better Health (SSBH), and Dhulikhel Hospital-Kathmandu University Hospital.

CICT guidelines were followed during the training which was published by EDCD. The NHTC has developed this training package for the members of the CICT team. This course focuses on having the CICT team members acquire basic scientific knowledge that helps them to conduct the case investigation, contact tracing, and contact follow-up. Knowledge and skills developed through this course will enable participants to investigate a case, identify the contacts, follow up with them, and take necessary action to contact them.

Data collection tools and techniques: A **s**emi-structured questionnaire consisting of two components, quantitative and qualitative parts, was used in this study. Quantitative components consisting of sociodemographic questionnaires, pre-test, and post-test questionnaires as per the EDCD guidelines. Socio-demographic questionnaires consist of age, gender, religion, ethnicity, education, and monthly income. Pre-test and post-test questionnaires consist of 12 questions each scoring one mark on the correct answer with a possible score ranging from 0 to 12. Pre-test and post-test questionnaires were adjusted from the facilitator's guide developed by the NHTC.

The qualitative parts consist of key informant guidelines with 19 questions focusing on the theme of work experience during the COVID-19 pandemic, the situation of CICT in respective municipalities, the effectiveness of CICT training, the importance of CICT training, and knowledge on prevention and control of COVID-19.

Data management and analysis:

Quantitative analysis: The collected data was entered and cleaned in MS Excel 2013. Then, it was exported to R (R 4.0.3) for further analysis. Mean and standard deviation were calculated for the continuous data and frequency and percentage were calculated for categorical data.

The total score of the pre and post-test questionnaire was calculated by adding the scores from all the 12 items. The mean change in pre and post-test scores was calculated by using a paired t-test.

Qualitative analysis: The KIIs were transcribed and entered in MS Excel and were coded manually. Thematic analysis of the data was done to explore the perceived challenges of implementing the knowledge gained during CICT training.

RESULTS

The socio-demographic characteristics of participants are presented in (Table 1). We included a total of 98 participants in this study, of which 76 (77.6%) were males. The mean age of the participants was 35.3 (± 9.3) years. The majority of participants were Brahmin/Chhetri (77.6%) followed by Janajati (15.3%) and Dalit (7.1%). Among the participants, 56.1% had completed

a diploma or intermediate. The monthly income of the participants was NRs. 34,360.8 ± 11,021.7.

Table 1. Socio-demographic characteristics of trainees

Socio-demographic characteristics	Quantitative interview frequency (%) n = 98	Qualitative interviews frequency (%) n = 20
Gender		
Male	76 (77.6)	18 (90.0)
Female	22 (22.4)	2 (10.0)
Age (Mean ± S.D)	35.3 (±9.3)	40.3 (±10.9)
Ethnicity		
Brahmin/Chhetri	76 (77.6)	20 (100.0)
Janajati	15 (15.3)	NA
Dalit	7 (7.1)	NA
Education		
TSLC	6 (6.1)	3 (15.0)
10+2, Diploma, and intermediate	55 (56.1)	12 (60.0)
Bachelor and above	37 (37.8)	5 (25.0)
Monthly Income: Mean (S.D)	34360.8 (11021.7)	38644 (11717.1)

Overall, the mean scores (±SD) of participants before and after CICT training were 6.6 (±2.3) and 9.9 (±2.0) respectively. The pretest scores of participants from Dolpa, Kalikot, Mugu, and Surkhet were 4.3 (± 2.7), 9 (±1.4), 5.1 (±1.1), and 7.2 (±1.7) respectively. Post-test scores of all the participants from different districts (Dolpa: 8.1 (3.3), Kalikot: 11.0 (1.0), Mugu: 11.1 (0.7), and Surkhet: 9.8 (1.4) of Nepal were significantly higher than the pretest score at 95% confidence interval (Table 2).

Table 2. Comparison of pre and post-test scores of trainees:

Overall and District wise	Pretest score Mean (SD)	Post-test score Mean (SD)	Difference in score	p-value
Overall (n=98)	6.6 (2.3)	9.9 (2.0)	3.1 (2.3)	<0.01
Dolpa (n=16)	4.3 (2.7)	8.1 (3.3)	1.9 (3.3)	<0.01
Kalikot (n=9)	9 (1.4)	11.0 (1.0)	2.0 (1.1)	<0.01
Mugu (n=15)	5.1 (1.1)	11.1 (0.7)	6.0 (1.4)	<0.01
Surkhet (n=58)	7.2 (1.7)	10.0 (1.4)	2.7 (1.7)	<0.01

Perceived benefits of training:

a) Improved CICT skills: Most participants reported that the CICT training made their work simpler and more efficient. They were better equipped to support patients using CICT guidelines, understand CICT forms (A, B1, B2), and provide counseling, education, and support on managing their risk, isolating from others, monitoring for illness, and preventing infection spread.

"At the initial time of COVID-19, we had no ideas of quarantine and isolation. during the starting period, managed quarantine as per the higher level suggestions, and later managed the case, skills have gradually increased within two months from the initial stage"- P2.

b) Improved understanding of CICT for COVID-19 prevention and control: After training, participants found it easy to identify and interview individuals with COVID-19 infections, support isolation, notify contacts, assess symptoms and risks, provide next steps, and connect symptomatic individuals to testing and care.

"CICT plays a crucial role for the prevention and control of viruses. I know that CICT breaks the chain of infection, disease transmission, also identified close and casual contact of COVID-19, we strictly follow these procedures, the case has decreased, felt easy to manage". - P6

c) **Improved knowledge of the role of contact tracing in emergency response:** Respondents gained improved knowledge of contact tracing's role in emergency response, including managing suspected cases, isolation centers, and contacts. They recognized contact tracing as a crucial component of the emergency response, regardless of job titles.

"After the formation of the CICT team, receiving training, we felt easy for case management, the contact tracing team was capacitated for overall management but at the last time, the budget was insufficient comparative initial stage, I recommend these types of training, resource would be ready any time for the response, training should provide on time" - P15.

CICT became simpler and easier after the trainees received CICT training. The training successfully met the participants' expectations, as they learned crucial aspects of CICT, including the proper completion of forms (A, B1, and B2) and the conditions under which these forms should be filled out. Suggestions were made that a longer training duration would have been more beneficial, addressing current time limitations and allowing for further improvement.

Perceived effectiveness of training

The training significantly enhanced health workers' knowledge and skills in key areas such as CICT concepts, infectious disease transmission modes, team formation,

and accurate completion of CICT forms (A, B1, and B2). The perceived effectiveness of training can be explained as follows

- Transmission chain breakdown: CICT is crucial for interrupting pathogen transmission, including COVID-19. Participants identified facilitators, barriers, and solutions for improving COVID-19 contact tracing implementation.
- Improved communication and coordination: Standardized communication training, supportive supervision, and peer networking enhance CICT implementation. Improved management tools, engaging interview scripts, and protocols for special situations further boost its effectiveness.
- Timely Identification of Suspected or Confirmed Infection: Effective CICT and monitoring are linked to prompt testing and clinical services. Agile data management enables the real-time transmission of laboratory and case data, facilitating timely public health action.
- Understanding of the nature of COVID-19: Improved comprehension of medical terms, exposure principles, infectious periods, symptoms, and pre-symptomatic/asymptomatic infections.
- Enhanced skills: Basic crisis counseling skills and confidence in referring patients for further care.

Challenges of implementing CICT after training:

During the initial phases of CICT, challenges included shortages of masks, gloves, sanitizers, and other essential safety items, along with difficulties in transportation and managing quarantine and isolation centers. The lack of skilled manpower also hindered the management of extra workload and the maintenance of up-to-date records and reports.

These issues have complicated Nepal's efforts to control the virus and manage the pandemic effectively. Limited healthcare infrastructure, low testing rates, and vaccine hesitancy have further impeded the ability to provide adequate care, identify and isolate cases, and advance the vaccination campaign.

DISCUSSION

Our study aimed to assess the effectiveness of training in empowering the capacity of CICT team members in Karnali Province, Nepal. To the best of our knowledge, this is the first comparative study in the country evaluating the impact of such training, particularly focusing on the pre-and post-test scores of trainees.

The results indicate a significant improvement in knowledge of case investigation and contact tracing among participants following the CICT training, highlighting the efficacy of the training program. Similarly, the CICT trainings were found to be effective in improving the knowledge and skills of the health workers in training done in the USA.[8,9] The acquired knowledge and skills enabled participants to effectively identify cases, trace contacts, and take necessary actions to mitigate the spread of COVID-19, including counseling contacts for home quarantine and facilitating testing. The positive outcomes observed in our study underscore the plausibility and importance of investing in targeted training initiatives to enhance the capabilities of frontline health workers during public health crises such as the COVID-19 pandemic, a notion supported by a systematic review conducted by Martin et al.[10] CICT training also highlights the importance of understanding contact tracing as part of an expansive vision to scale a broader set of public health solutions to control the spread of COVID-19 and build long-term sustainability. [11,12]

Our study revealed numerous challenges in delivering health services and managing COVID-19 cases and contacts before the implementation of CICT training. Health workers encountered experiences and difficulties, notably a shortage of personal protective equipment (PPE) such as masks, gloves, and sanitizer. The lack of PPE may have adverse mental health impacts on healthcare professionals, directly affecting the effectiveness of the CICT process. Therefore, ensuring adequate management of PPE and sanitation is essential to improve the CICT process and maintain the well-being of CICT members.[13] Additionally, members faced challenges related to delays in completing the construction of quarantine and isolation centers.

However, following the training and the dissemination of government guidelines, many of these challenges were effectively mitigated. Qualitative data further suggests that health professionals enhanced their skills, particularly in addressing challenges like case management. Post-training, health workers reported feeling more equipped to manage isolation and quarantine measures, emphasizing the value of coordination with local government and other stakeholders. This underscores the broader benefits of CICT training beyond mere knowledge acquisition, including improved coordination and collaboration in public health responses. These findings align with similar studies, such as the implementation of a volunteer contact-tracing program for COVID-19 in the United States, which underscored the pivotal role of training in enhancing contact-tracing efforts**.** [14]

This study aimed to assess the effectiveness of the CICT guidelines endorsed by the EDCD, marking one of the first evaluations of a COVID-19-related training program in Nepal. While findings may not universally apply, they provide valuable insights into contact tracing strategies and the necessity of adapting protocols to local needs.

However, the evaluation's scope did not cover all health workers in Nepal. Nonetheless, recommendations for CICT improvement have been formulated based on respondent feedback. Further investigations should delve into the perception and attitudes of local leaders and non-health government employees, as engaging the municipal executive board is equally crucial to the success of CICT initiatives.

CONCLUSION

Our study demonstrates a significant improvement in the knowledge level of CICT members following the training. However, challenges such as the unavailability of PPE and delays in the construction of quarantine and isolation centers were notable hurdles encountered during the CICT process. Therefore, it is evident that training on CICT, coupled with the availability of PPE and timely management of quarantine and isolation centers, could further enhance the effectiveness of the CICT process.

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CONFLICT OF INTEREST

None

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