Assessment of Preparedness of COVID-19 Vaccination Programme at Local Government Level in Nepal

Government of Nepal
Nepal Health Research Council (NHRC)
Ramshah Path, Kathmandu, Nepal

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Research report

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Acknowledgment

It is a content moment to bring out the report of the study entitled "Assessment of Preparedness of COVID-19 Vaccination at Local Government Level in Nepal". The core objective of this study was to determine preparedness of health facilities at local level for COVID-19 vaccination and to identify strategies for vaccination implementation at local level in Nepal. This study has been completed with great support, cooperation, and coordination from many individuals.

I would like to take this opportunity to express my special thanks of gratitude to Dr. Meghnath Dhimal, Chief/Senior Research Officer, Dr. Bishnu P. Marasini, Consultant/Senior Research Associate, Nepal Health Research Council (NHRC) for their invaluable guidance and excellent leadership in the completion of this project. I would like to convey my deepest gratitude and appreciation to Dr. Dipendra Raman Singh, Dr. Krishna Prasad Poudel, Dr. Abhiyan Gautam, Dr. Guna Nidhi Sharma, Ministry of Health and Population, and Prof. Dr. Anand Ballabh Joshi for their guidance, support, and dedication throughout the study period. I would also like to express my special mention and sincere gratitude to Dr. Megha Raj Banjara, Tribhuvan University for his remarkable support during the conceptual phase to report preparation stage. Furthermore, I would also like to extend my thanks to our Team Member Ms. Pratima Dawadi for her outstanding effort and sincere work throughout the study.

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We would like to express our sincere gratitude to The Task Force for Global Health (TFGH), USA, and the Centers for Disease Control and Prevention (CDC), USA, for their funding and generous technical assistance, which made this research possible.

Dr. Pramod Joshi
Member Secretary (Executive Chief), NHRC

Abbreviations

CDC	Central for disease control
CoVs	Coronaviruses
ERB	Ethical Review Board
FCHV	Female Community Health Volunteer
FGD	Focused Group Discussion
HF	Health Facility
HP	Health post
IDI	In-depth Interview
KII	Key Informant Interview
M&E	Monitoring and Evaluation
NA	Not available
NHRC	Nepal Health Research Council
PHCC	Primary Health Care Center
RM	Rural Municipality
UM	Urban Municipality
USA	United states of America
WHO	World Health Organization

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Executive Summary

Background: Vaccination against COVID-19 in Nepal began on January 27, 2021, achieving an 83% coverage rate, second in the WHO South-East Asia Region. However, there were several enablers and barriers to achieve this success at central level and at local implementation level. This study focuses on the local-level implementation of COVID-19 vaccination, examining decision-making processes and challenges faced by local governments in managing vaccine distribution and public health responses.

Methods: A mixed-methods convergent parallel study was conducted involving 617 individuals across 14 districts of seven provinces in Nepal, selected based on COVID-19 vaccine coverage; rural municipality for low vaccine coverage and urban municipality for high coverage. The study aimed to assess the preparedness of local health facilities for vaccination and identify strategies for implementation, incorporating both health professionals and general people. Quantitative data were collected from health workers and COVID-19 vaccine focal persons from the local health facilities, and community people through interview using semi-structured questionnaire. Qualitative data were collected through key informant interviews (KIIs) with vaccination program's focal person of from local health facility and Municipality office, former chairpersons of rural and urban municipalities, and focus group discussions (FGDs) with Female Community Health Volunteers using interview guidelines. Informed consent was secured from the participants, and data were entered into Microsoft Excel 2010 before analysis using SPSS 23.0 for descriptive statistics. Qualitative data underwent thematic analysis with RQDA software. Monitoring and follow-up mechanisms were established throughout the research to ensure data integrity.

Results: The sample of community people was mainly within the 21-30 and 41-50 age groups, with females 42.7%. It was found that 27% of the participants had a morbidity, with hypertension being the most common condition (46%). Vaccination coverage was found 91.7% with 45.2% having received two doses of vaccine, and 41.7% at least one booster dose. Health workers were the primary source of vaccination information (30.5%), news portals (18.5%), and social media (17.6%) are the most common sources of information. Most participants rated the vaccination campaign positively, though unvaccinated individuals expressed concerns about side effects (45%) and safety (50%). Despite these hesitations, a large majority believe vaccines are essential for controlling disease spread (95.4%) and feel they are safe (nearly 90%). Most vaccinated individuals reported no significant side effects, with 54.3% experiencing no pain and 87.8% reporting no itching.

The study aimed to explore the participation and willingness of local health workers for COVID-19 vaccination, revealing that all health workers interviewed were fully vaccinated, with 70.9% receiving a booster dose. Information sources for vaccination of health workers included other health workers (27.0%) and television (43.7%). A remarkable 94.9% rated the vaccination campaign positively, with

62.0% describing it as "very good," and 64.6% strongly agreeing on the vaccine's essential role in controlling COVID-19. Minimal side effects were reported, with 42.4% experiencing no pain post-vaccination. Health workers mentioned that there was strong community support and effective communication regarding the campaign.

Findings revealed that 98.8% of the participants had experience as vaccinators at the time of vaccination against COVID-19, with 92.7% willing to continue in vaccination programs. During COVID-19 vaccination, community engagement was found strong, with 90.3% were having strategies to inform local communities, primarily through individual contact, social media, and community members. However, vaccine availability was inconsistent, particularly with 41.8% rating the supply was irregular. Training programs were attended by 87.9% and only 1.2% used electronic data management systems. While 95.8% of health workers received incentives, payment delays of six to twelve months were common. Additionally, while 90.3% of sites had a vaccine list, only 1.2% had safety boxes for waste disposal, with many facilities rely on manual recording systems and faced challenges with electronic ones.

Community people primarily received official information from government agencies and community health workers, such as Female Community Health Volunteers (FCHVs). Effective planning and communication were vital for vaccine delivery, although challenges arose with the availability of personal protective equipment (PPE). While health workers received training, support staff often lacked adequate training, impacting capacity during the initial roll out. Key challenges included vaccine supply shortages, hesitancy, logistical issues, and geographical barriers, especially for general public, Vaccine distribution relied on district health offices for storage and delivery, but cold chain facilities faced limitations. Coordination across government levels was crucial, with monitoring by organizations like WHO and UNICEF ensuring effective vaccination efforts. Local authorities adapted strategies to meet community needs but lacked formal written protocols. Participants emphasized the need for additional resources and highlighted strategies for future pandemic preparedness, including early detection, capacity building, and community engagement.

Conclusion: There was a high level of participation and support for COVID-19 vaccination among both community people and health workers. A significant majority of the community people were vaccinated, demonstrating a strong belief in the importance and safety of vaccines, despite some concerns about side effects. Health workers also had positive attitude toward vaccination, with nearly all fully vaccinated and actively engaging in community outreach. However, challenges persisted, including inconsistent vaccine availability and delays in incentive payments for health workers. Training and data management practices need improvement, as most facilities still rely on manual systems of reporting vaccine information. The positive and enabling factors for achieving high vaccination coverage against COVID-19, and improving the identified barriers/challenges from this study could be the lessons to improve the immunization programmes and disease control efforts in pandemic situation.

Key words: Pandemic, COVID-19 vaccination, community engagement, enablers, barriers

CHAPTER 1 INTRODUCTION

Background

Coronaviruses (CoVs) are enveloped, single-stranded RNA viruses. Corona virus disease (COVID-19) is an infectious disease caused by the SARS-CoV-2 Virus. World Health Organization (WHO) declared COVID-19 pandemic on 11th March 2020[1]. The WHO advised countries to give high priority against the COVID-19 pandemic as it has caused tremendous social and economic distress worldwide[2]. Many countries including Nepal have implemented preventive measures to stop the virus from spreading which included social distancing, use of hand sanitizer and wearing of face mask. A strict lockdown was implemented to restrict the spread of COVID-19 in nations following a persistent increase in COVID-19 cases[3]. As of April 28, 2024, there have been over 775 million confirmed cases and more than seven million deaths reported worldwide[4] and by March 2023, COVID-19 had resulted in nearly 12,000 deaths in Nepal[5].

The first case of COVID-19 in Nepal was discovered in a migrant student from Wuhan, China, during the third week of January. It wasn't until migrant workers from India started returning home over the porous border in late March that the infection became widely distributed. The situation was made worse by hospitals' lack of holding centers, quarantine rooms, and testing equipment [6]. An important factor in disease management and prevention is a nation's readiness for the timely and effective execution of vaccination programs[7]. COVID-19 vaccination was introduced in Nepal on 27 January 2021. There has been significant progress in the rollout of COVID-19 vaccines. Four types of COVID-19 vaccines AstraZeneca-SII (ChAdOx1-S, recombinant); Sinopharm; Janssen and AstraZeneca (AZD1222) have been rolled out in the country [8]. Earlier, receiving a vaccination is a significant event for the person, their family, and their community. It was also quite difficult and contentious to accept at the same time. However, vaccination is necessary to protect both the environment and oneself from COVID-19[9]. An effective vaccine against SARS-CoV-2 will reduce illness and death, enabling significant relaxation of physical distancing policies[10].

COVID-19 vaccination coverage in Nepal is 83%. Nepal ranks second in WHO South-East Asia Region in terms of COVID-19 vaccine coverage. A National COVID-19 Vaccine Advisory Committee provided guidance for all aspects of COVID-19 vaccine introduction, including regulatory guidance on vaccine access, vaccine selection, equitable distribution of vaccine, procurement, financing, delivery mechanisms, prioritization of population groups, vaccine safety surveillance, communication, media response, etc. The government has formed task forces and committees across the federal, provincial, district, and local levels to facilitate the implementation of COVID-19 vaccination [11].

Vaccine preparedness actions and key response activities should be undertaken for effective vaccination campaign, Afghanistan appears to be inadequately prepared to effectively implement the COVID-19 vaccination program due to numerous challenges. These challenges include a shortage of vaccinators, a lack of a fully integrated and functioning cold chain, difficult geographical barriers, cultural issues,

insecurity, and ongoing conflicts [7].

The role played by local level health facilities and health workers to roll out COVID-19 vaccine is instrumental to achieve high coverage of COVID-19 vaccine. However, studies in limited number of participants and areas revealed that vaccination campaigns were poorly managed in both urban and rural settings in Nepal[12]. Nepal has had a three-tier government since less than a decade ago, allowing all tiers to make independent decisions. This project explores the implementation of COVID-19 vaccines at the local level in Nepal, the last government tier. In this investigation, the decision-making process of local governments regarding policy management will be examined. It's important to assess whether local governments followed federal guidelines or made independent decisions, and the obstacles they faced.

Rationale

Amid a disease outbreak like COVID-19, the world may once again rely heavily on non-pharmaceutical interventions (NPIs) such as lockdowns, social-distancing measures, and mask mandates[13]. Pandemics are a threat to global health security, and vaccine preparedness is essential to decrease the transmission and disease severity, early vaccine availability during COVID-19 reduced the mortality in some countries[14]. Developing COVID-19 vaccines doesn't mean the pandemic is over; countries must buy and distribute enough doses. Vaccination has been slow globally, except in a few high-income countries. Most low- and middle-income countries depend on the COVAX Facility for vaccines [15]. Over the years, vaccination programs in Africa have often encountered numerous challenges including slow start to the vaccination campaigns, insufficient funding, concerns about vaccine safety and efficacy, stringent storage requirements, and regulatory barriers. Additionally, the limited shelf life of COVID-19 vaccines, difficulties in reaching vulnerable communities promptly, complications from the use of different vaccine types, were highlighted challenges for the successful implementation of the vaccination efforts[16]. Leveraging health workers at local level as part of a pandemic vaccination and public health response timely produces response to public health emergencies. Previous study conducted by Nepal Health Research Council in collaboration with CDC USA evaluated the impact of COVID-19 vaccine introduction on the country's immunization Programme, identifying problems needing corrective actions, highlighting lessons for strengthening the overall immunization services, and informing recommendations to improve the roll out of COVID-19 vaccine. The study evaluated regulatory preparedness, planning and coordination, service delivery, impact on routine immunization, financing and funding, vaccine procurement, supply chain and waste management, human resources, training and supervision, demand generation activities at central, provincial and local levels, and monitoring and evaluation. With decentralization in the country, local level is equally responsible for managing disease outbreaks by itself. However, there are no reports available how local levels respond to COVID-19 through vaccination. It is important to understand workflow, resources, staff and patient safety, communication, and documentation and training at local level to document for learning positive lessons to future outbreaks and pandemics.

Objectives

General objective

The main objective of this study was to determine preparedness of health facilities at local level for COVID-19 vaccination and to identify strategies for vaccination implementation at local level in Nepal.

Specific objectives:

1. To explore the participation and willingness of the health workers and community from the local levels for vaccination against COVID-19.

2. To identify the required protocol implementation of local health facilities for vaccination.

3. To describe the barriers and challenges for response including vaccination of COVID at the local level during COVID-19.
4. To identify the associated factors for vaccine acceptance among health care workers and community people.

Research Hypothesis: NA

Study Variables

Dependent variables:

Preparedness for COVID-19 vaccination program,

Vaccine acceptance among health workers and community people

Independent variables:

Socio-demographic factors

Age

Ethnicity

Educational status of respondent

Occupation of respondents

Other factors

Infrastructure

Logistic preparation

Work flow

Patient safety

Communication

Documentation

Human resource management

Training

Supply chain management

Vaccine site preparation

Community engagement

Financial preparation

Funding and support

Preparation of safety protocol

Conceptual Framework

Framework on Assessment of Preparedness of COVID-19 Vaccination Programme at Local Level in Nepal

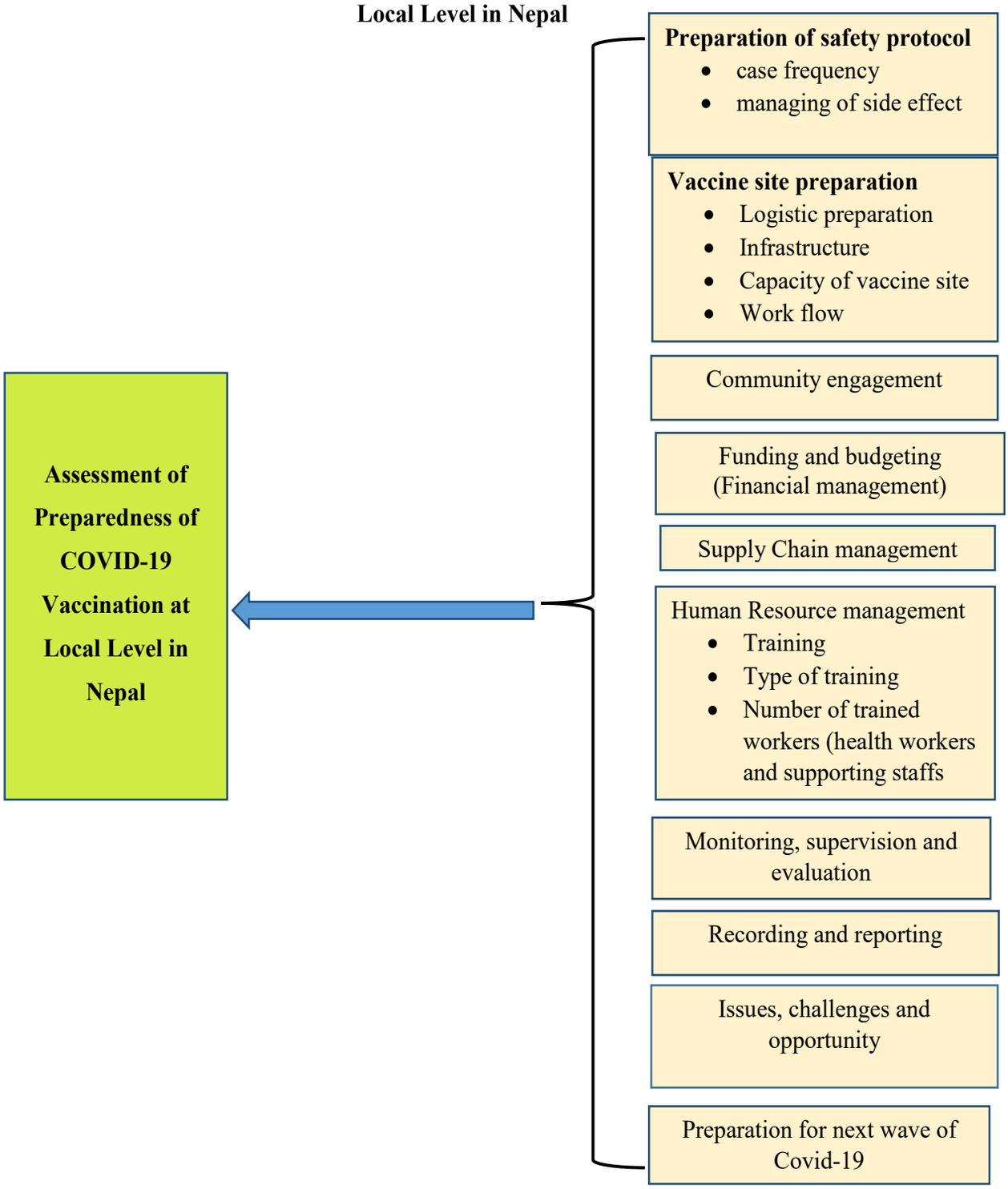

Figure 1: Framework on Assessment of Preparedness of COVID-19 Vaccination Programme at Local Level in Nepal

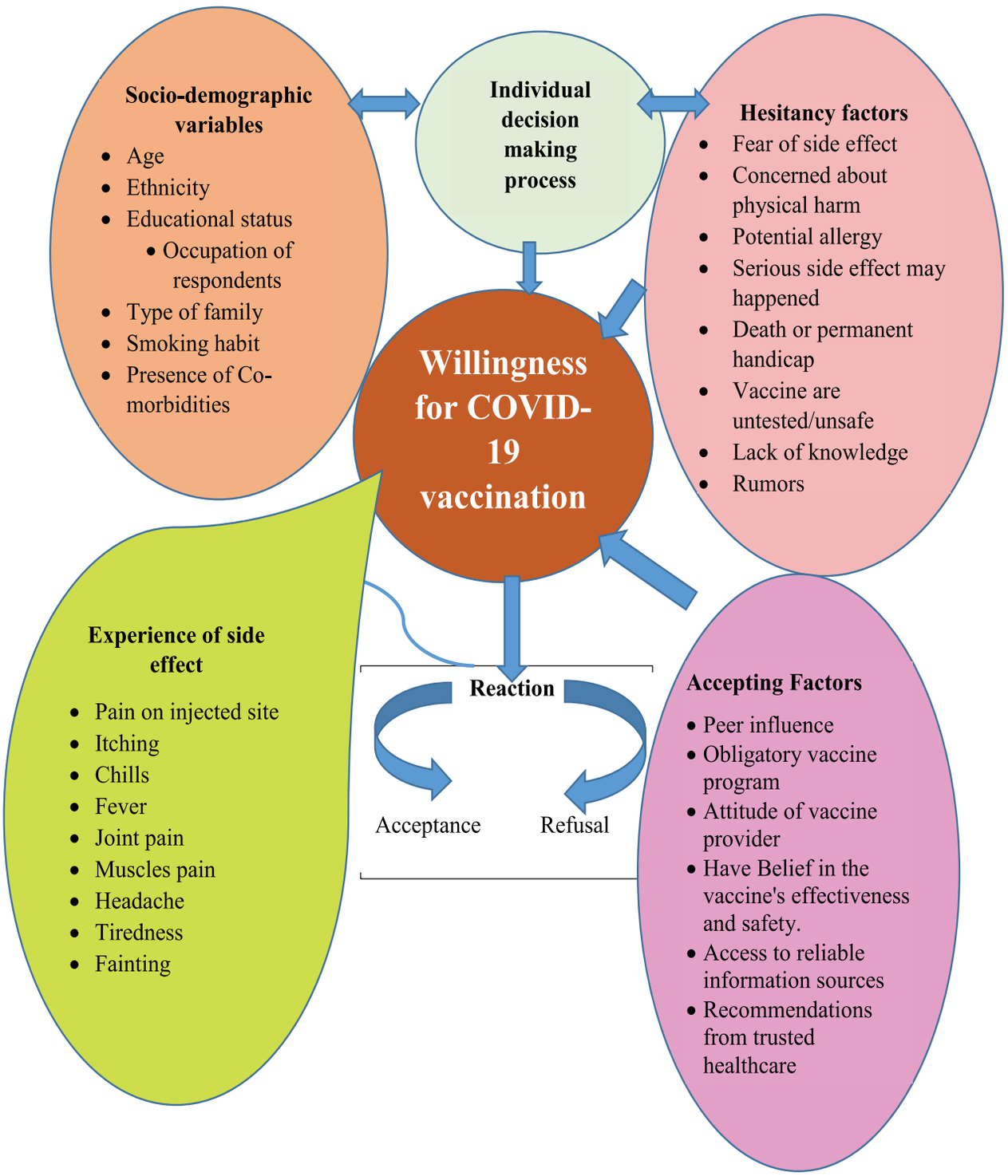

Figure 2: Conceptual framework for willingness for COVID-19 vaccination

CHAPTER 2 METHODOLOGY

2.1 Study Design

A cross-sectional mixed-methods convergent parallel design was adopted for this study, where the quantitative and qualitative components were collected separately and analyzed simultaneously with the aim of understanding preparedness and strategies for COVID-19 vaccination at the local level in Nepal.

2.2 Study Period

This study was carried out from June to September 2024, which was almost 6 months.

2.3 Study Site and Population

The study population included both vaccinated and unvaccinated community members, the municipal immunization focal person, the immunization focal person from local health facilities (vaccinators), the immunization focal person from the District Health Office (DHO), former municipality or rural municipality chairpersons who had worked during the implementation of the COVID-19 vaccination program, and Female Community Health Volunteers (FCHVs). Participants were selected from high and low vaccination coverage districts in each province, resulting in a total of 14 districts (7 provinces x 2 districts each).

2.4 Sample Size and Sampling

To gather the sampling frame, a preliminary mapping exercise was conducted in the first phase of the study. COVID-19 vaccination coverage data published by the Integrated Health Information Management System (IHIMS) was used to identify the areas for data collection.

The total sample size for this study was at least 589, including both quantitative and qualitative components. Ultimately, there were 617 respondent for both types of studies.

Quantitative study

The total sample size was set at 544 for quantitative study (589 for quantitative and qualitative). In relation to the objective concerning acceptance and vaccine hesitancy, we determined a sample size of 384 from community members and health workers from all 7 provinces, with participants including both vaccinated and unvaccinated individuals. As mentioned earlier, 2 districts with high and low COVID-19 vaccine coverage were selected from each province (2 x 7 = 14). Furthermore, municipality was taken from district with high vaccine coverage and rural municipality from low coverage. Various studies on COVID-19 vaccination have reported sample sizes ranging from 200 to 500 participants. Based on these references, we aimed to collect at least 384 participants from community members and various health

workers. To achieve the mentioned objective, we collected 241 samples from community members and 158 from health workers who were willing to provide information during data collection, resulting in a total of 399 samples from 14 different study sites. From each of the 14 districts, we gathered at least 18 samples from community members and 11 samples from health workers at each site. Systematic random sampling was used to choose participants from each household.

On the other hand, to identify the required protocol preparation of local health facilities for vaccination, we planned to collect quantitative data from specialized health workers with prior experience in the COVID-19 vaccination program, specifically vaccinators. A total of 150 participants were selected purposively from across Nepal. To ensure representative data from all 14 sites in the seven provinces, we collected at least 11 data from each study site.

Qualitative study

On the other hand, a total of 53 (45 Key Informant Interviews (KIIs) and 8 FCHV) respondent were considered across seven provinces for the qualitative study among local-level stakeholders to describe the barriers and challenges for the COVID-19 response, including vaccination efforts at the local level during the pandemic. KIIs were carried out until the point of saturation among local-level representatives. We included three different stakeholders with experience in the COVID-19 vaccination program: the ex-chairperson of RM/UM, the vaccine focal person from RM/UM, and a vaccinator from a local health facility. Moreover, 8 focus group discussions were conducted in seven provinces. We initially planned for 42 KII and 7 FGDs, but we have since conducted 45 KII and 8 FGDs

Table 1: Sample size of the participants for qualitative and quantitative study

SN	Category	Total Number	Sample for each province	Sample for each RM and UM
Quantitative Study				
1	Community people	240	35	18
2	Any health worker	150	22	11
3	Vaccinator and vaccine chief from each HF	150	22	11
Qualitative study				
1	Municipal immunization section chief (Focal person, COVID-19 vaccination program)	14	2	1
2	Ex-chairperson of RM/RM (prior exposure on COVID-19 vaccination programme	14	2	1
3	Vaccinator and vaccine chief from local HF	14	2	1
4	Female community health volunteer (FCHV)	7	1	-

2.5 Sampling Method

Secondary data from IHMIS was used to obtain information on COVID-19 vaccine coverage in Nepal. The following districts were selected based on COVID-19 vaccination coverage.

Table 2: List of data collection site

SN	Name of district	Palika
1	Jhapa	Kamal Municipality
2	Ilam	Mangsebung Rural Municipality (RM)
3	Mahottari	Ramgopal Municipality
4	Siraha	Bhagawanpur Rural Municipality
5	Chitwan	IchhyaKamana Rural Municipality
6	Bagmati	Lalitpur Municipality
7	Bagmati	Dakshinkali Municipality
8	Kaski	Lekhnath Metropolitan City
9	Baglung	Kathekhola Rural Municipality
10	Lumbini	Tillotama Municipality
11	Banke	Baijyanath Rural Municipality
12	Dailekh	Narayan Municipality
13	Humla	Simkot Rural Municipality
14	Dadeldhura	Amargadhi Municipality
15	Bajhang	Kedarsyun Rural Municipality

For the quantitative study, after selecting 2 districts from each province, probability systematic random sampling was used to select the sample. Based on the population density of the wards, the first 100 households were selected as the sampling units. The first sample was chosen randomly by spinning a bottle at the junction of the road. The sample was determined by where the opening of the bottle pointed, and subsequent samples were taken at intervals of 4 households ($k = N/n$, $k = 100/28 = 3.57$, approximately every 4th household). Only one sample meeting the inclusion criteria was taken from each household. If more than one eligible respondent was available in the household, a lottery method was used to select a single sample unit. If the respondent was not available, the nearest household (to the left side) was approached to obtain the sample.

For the qualitative studies, a non-probability purposive sampling method was adopted to collect data from 14 sites across the seven provinces.

2.6 Criteria for sample selection

Inclusion Criteria

- Participants had to be 18 years or older.
- Participants had to be a local representative (Chairperson/Vice Chairperson) or health worker or local resident or FCHV.
- Health workers and FCHVs were required to have work experience during the initiation of the COVID-19 vaccine and to continue working in the current phase.

Exclusion Criteria

- Participants who did not sign the informed written consent to participate in the study were excluded.
- Participants with unstable mental status were also excluded.

2.7 Data collection tools

For the quantitative study, the research team developed structured and semi-structured questionnaires according to the study's objectives. The questionnaire consisted of two sections:

Part I: Questions related to socio-demographic characteristics
Part II to part V: Questions aligned with the study objectives

Table 3: Description of data collection tool

Objective	Type of respondent	Type of interview	Data collection tool
Quantitative part			
To explore the participation and willingness of the health workers and community from the local levels for vaccination against COVID-19	Community people	Face to face interview	Semi-structured Interview schedule
To explore the participation and willingness of the health workers and community from the local levels for vaccination against COVID-19	Any health workers	Face to face interview	Semi-structured Interview schedule
To identify the required protocol preparation of local health facilities for vaccination.	Immunization focal person from local health facility (vaccinator)	Face to face interview	Semi-structured Interview schedule
To identify the associated factors for vaccine acceptance among health care workers and community people.	Local community people and health workers	Face to face interview	Semi-structured Interview schedule
Qualitative study			
To identify the required protocol preparation of local health facilities for vaccination.	3 Different stakeholders • Ex. Chairperson of RM/UM • Focal person of vaccination program from RM/UM • Vaccinator/vaccine focal person from local health facility	Key informant interview (KII) with three different participants	Key informant interview guideline

A literature review and expert opinions were considered before finalizing the research instruments. Initially, the questionnaire was prepared in English and then translated into the local language (Nepali) by experts. The language was rephrased to ensure that participants could understand the content. Content

validity of the research instrument was established through consultations with subject experts and a research advisor. The research instrument was translated into Nepali with the assistance of a language expert.

For the qualitative data collection, an open-ended questionnaire (interview guideline) was used. A total of 42 Key Informant Interviews (KIIs) were conducted across all provinces (3 x 7 x 2 = 42). The Key Informant Interview guidelines were developed through a series of consultations with qualitative study experts in English, followed by translation into Nepali by experts. The language was rephrased to ensure clarity for participants. A literature review and expert opinions were considered before finalizing the research instruments. Initially, the questionnaire was prepared in English and then translated into the local language (Nepali) by experts. The language was rephrased to ensure that participants could understand the content. Content validity of the research instrument was established through consultations with subject experts and a research advisor. The research instrument was translated into Nepali with the assistance of a language expert.

2.8 Pre-testing of the Questionnaires

After finalizing the test instruments for both quantitative and qualitative studies, the research team conducted pre-testing to refine the tools. They visited Panchkhal Municipality in Kavre district for three days. On the first day, they collected data from 20 community members in the bazaar area and held a discussion to modify the tool. The following day, data was gathered from health workers at Panchkhal Primary Health Care Center, along with a focus group discussion (FGD) with Female Community Health Volunteers (FCHVs) and a key informant interview (KII) with the vaccination program focal person. After returning, the team held a meeting to refine the questionnaire based on the pre-testing findings.

2.9 Meeting of the Technical Working Group (TWGs)

To finalize the research proposal and implement necessary changes, a meeting was held with the TWG coordinator/Additional Secretary of MoHP, Dr. Dipendra Raman Singh, along with other TWG members. During this meeting, a presentation on the proposal was made, leading to a rearrangement of the study objectives and finalization of the research instruments as well as data collection sites.

Additionally, the research team has been holding TWG meetings regularly, in accordance with the study's requirements.

2.10 Training of Research Assistants

After finalizing the dates for data collection, the research team selected data enumerators based on the nature of the data and the data collection sites. All field researchers have a background in health and possess substantial experience in mixed-method studies. Based on their prior research experience, some field researchers were chosen for Key Informant Interviews (KII) and Focus Group Discussions (FGD), while the remainder was assigned to the quantitative study.

Once the field researcher team was finalized, a two-day orientation and training program was conducted at the NHRC premises from 10 AM to 5 PM. Experts from various backgrounds facilitated the training workshop.

2.11 Data collection techniques

For the quantitative data, a semi-structured interview schedule was developed by the research team for the study participants. A literature review and expert opinions were considered before finalizing the research instruments. Firstly, questionnaire prepared in English language and then translated into the local language (Nepali) by experts. The questionnaires rephrased into language that participants can understand. After getting written consent from the participants, face-to-face interview conducted to collect data. Data collection was done by the field researchers, who were trained before collecting data. Researcher introduced his/herself for ascertain respondent's cooperation during data collection. Six to eight participants were interviewed per day. The duration for face to face interview was 20-25 minutes for each respondent.

Qualitative data were collected using an open-ended questionnaire. FGD and Key Informant Interview guidelines developed through a series of consultations with qualitative study experts in English and then translated into the local language (Nepali). The questionnaires rephrased into language that participants can understand after the pilot test.

Two key informant interviews were done in each province, one from a rural municipality (RM) and one from an urban municipality (UM). Additionally, two Focus Group Discussions (FGDs) were carried out in each province. Among the 14 FGDs, seven were conducted with health representatives from the Palikas, and seven were conducted with Female Community Health Volunteers (FCHVs).

Full transcription and translation of the KIIs were prepared in the same way as for the FGDs. The prepared translations were thoroughly discussed with the research team to identify confusing issues that need further exploration. Similarly, after the completion of each FGD, the research team discussed about subjects requiring further clarification or exploration. Trained field researchers conducted face-to-face interviews with each participant using the interview guidelines.

2.12 Data management and analysis

Regarding quantitative data, collected data were rechecked and edited daily. Additionally, the field researchers manually organized the data every day to ensure that the questionnaires are properly filled out. Collected data were coded and entered in excel 2010, and for the purpose of analysis, entered data were imported to SPSS version 23. The data were analyzed and calculated according to the nature of the variables and the descriptive results have been presented in tables and figures.

For the qualitative study, transcription of the KIIs was prepared on the same day as the interviews. Similarly, English-language translations of the interviews were thoroughly checked for accuracy. In the next step, researchers read the transcripts line by line to capture the true essence of the information using open codes. The final translated files were uploaded into RQDA software. Similar codes were grouped together to minimize and narrow down the results. Themes and sub-themes were finalized and reviewed by the research team to ensure they align with the study objectives, thereby performing thematic analysis.

2.13 Monitoring of the survey

The NHRC team ensured that the desk review and reference materials were adequately referred to in order to develop relevant and useful survey tools. They also ensured that the field researchers were well-trained to develop their skills, use the tools effectively, and gather data.

Similarly, field monitoring and follow-up was conducted by the NHRC staff throughout the entire fieldwork. Additionally, the core survey members of the NHRC staff and stakeholders involved in the fieldwork, supervision and monitoring (M&E) of the field work.

2.14 Validity and reliability of tool

Content validity of the research instrument was established by consultation with subject expert and consultant. After the expert consultation, feedback were incorporated into the questionnaire. At the same time, developed questionnaire were pre-tested.

In the same way, IDI/KII and FGD guidelines were finalized after a series of consultations with experts from the concerned field and modification were done as per the instruction.

2.15 Ethical Consideration

Ethical approval was obtained from the Ethical Review Board (ERB) of the Nepal Health Research Council (NHRC). The study procedure were designed to protect participants' privacy, allowing for anonymous and voluntary participation. No names or personal identifiers were used in data collection. Prior to

conducting the interview, the purpose and benefits of the study were explained to each participant. They were provided with information about the study risks, confidentiality, and compensation. Before data collection, participants were well informed that participation occurs only once.

Participants were given the opportunity to ask questions about the study and decide whether they were comfortable to participate. During the consent process, it was made clear that they are free to refuse participation and that they can stop at any time. Although there was no risk due to participation in the study, there could be some questions that could make participants uncomfortable. They were clearly informed that they are free not to answer such questions and can stop participating in the study at any time.

CHAPTER 3 RESULTS

3.1 Community People

Altogether, 241 participants voluntarily responded to the questionnaire. The age distribution of the study participants fell within the 21–30 years and 41–50 years age groups, each comprising 27.4% of the total sample. The 31–40 years group accounted for 23.2%, while 19.9% of participants were aged 20 years or younger. Notably, only 2.1% of participants were aged 51 years and above, indicating a relatively small representation of older adults in the study.

This distribution suggests that the participant pool was predominantly composed of young to middle-aged individuals, with a significant skew toward the working-age population. The underrepresentation of older adults (above 50 years) should be considered when interpreting the results, especially in contexts where age-related factors are relevant (Figure 3).

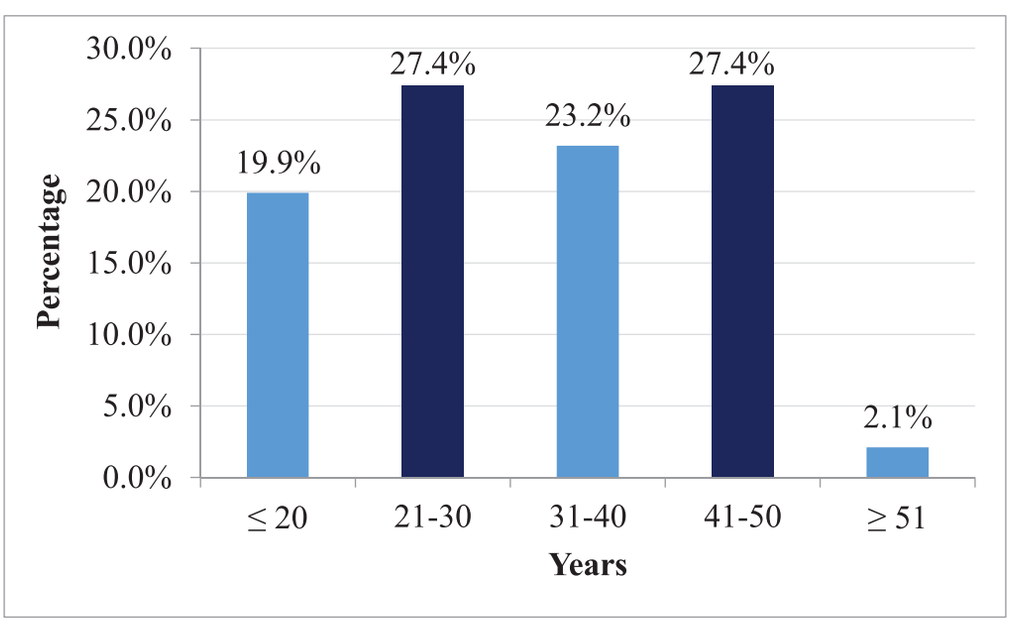

Figure 3: Age of participants

Altogether, 241 participants voluntarily responded to the questionnaire. As shown in the figure 4, 57% (n = 137) of the participants were male, while 43% (n = 104) were female. This indicates a slightly higher representation of males in the study sample. The near-balanced distribution suggests that the views and experiences captured through the questionnaire reflect input from both genders, enhancing the generalizability of the findings. However, the modest male majority may still influence certain gender-specific analyses and should be acknowledged when interpreting gender-related trends or outcomes.

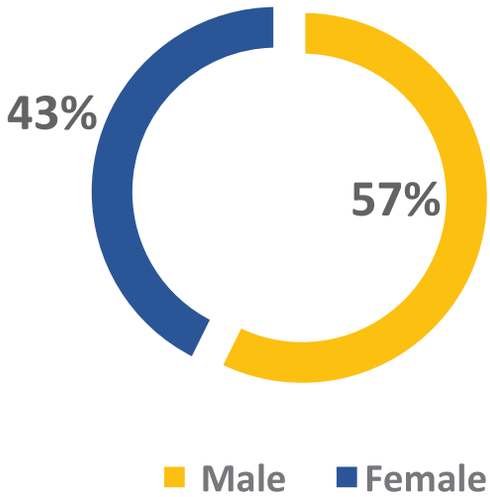

Figure 4: Gender distribution of study participants (n = 241)

Table 4 (A-b): Socio-demographic Information of participants (n=241)

Variables	Frequency	Percent (%)
Cast/Ethnicity		
Dalit	24	10.0
Janajati	77	32.0
Madeshi	26	10.8
Muslim	6	2.5
Brahmin/ Chhettri	108	44.8
Religion		
Hindu	208	86.3
Buddhist	14	5.8
Muslim	6	2.5
Christian	3	1.2
Others (Kirati)	10	4.1
Education level		
Illiterate	31	12.9
Literate without formal education	33	13.7
1 to 5 class	19	7.9
6-8 class	22	9.1
9-10 class	45	18.7
11-12 class	59	24.5
Bachelor and above	32	13.3
Designation		
Service Holder	42	17.4
Business	66	27.4
House Maker	47	19.5

Variables	Frequency	Percent (%)
Security Service	4	1.7
Students	11	4.6
Agriculture	58	24.1
Other	13	5.4
Marital Status		
Married	205	85.1
Unmarried	28	11.6
Widow	7	2.9
Separated	1	.4

Table 4A shows that, Brahmin/Chhetri represents the largest caste group (44.8%), followed by Janajati (32%), with smaller proportions of Dalit (10%), Madeshi (10.8%), and Muslim (2.5%). Hinduism is the predominant religion (86.3%). The largest proportion of individuals have completed secondary education (11-12 class, 24.5%) while 12.9% are illiterate. Business is the most common occupation (27.4%), followed by agriculture (24.1%) and service holders (17.4%). A significant portion are house makers (19.5%). A large majority (85.1%) are married, while small percentages are widowed (2.9%) or separated (0.4%). This data highlights a predominantly married, Hindu population with a significant proportion engaged in business, agriculture, and household activities.

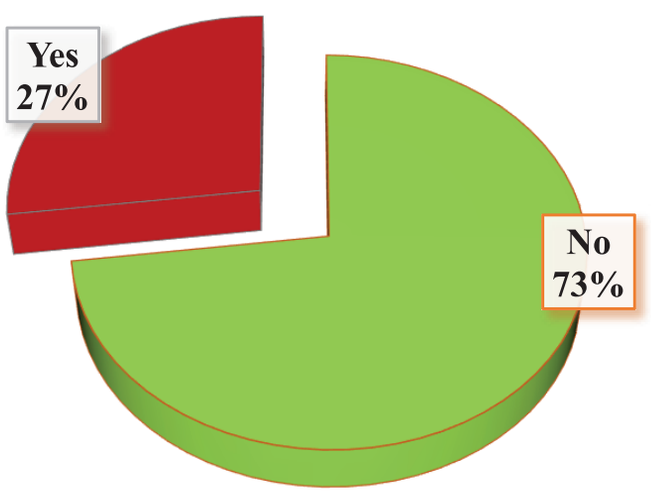

Figure 5: Presence of Morbidity

Table 4B: Socio-demographic Information of Participants (n=241)

Variables	Frequency	Percent (%)
Number of Children	n=213	
No child	8	3.8
1	34	16.0
2	80	37.7
3-5	80	37.7
3 and above	10	4.7

Variables	Frequency	Percent (%)
Type of Family		
Single family	166	68.9
Joint family	75	31.1
Number of Family Member		
≤ 5	148	61.4
6-10	83	34.4
Above 10	10	4.1
Mean=5.50, Min=2, Max=15		
No. of family member aged above 5 Yrs		
≤ 5	164	68.0
6 and above	77	32.0
No. of dependent family member		
≤ 5	209	86.7
6 and above	32	13.3
Min=1, Max=10		
Smoking Habit		
Never	170	70.5
Yes	47	19.5
Quit	24	10.0
Drinking Habit		
Never	195	80.9
Yes	30	12.4
Quit	16	6.6
Type of Morbidities (MCQ)		
Hypertension	40	46.0
DM	16	18.4
Heart disease	4	4.6
Cholesterol	8	9.2
Asthma	5	5.7
COPD	2	2.3
Depression/Anxiety	5	5.7
Thyroid dysfunction	7	8.0
Number of Comorbidities		**n=65**
One	50	76.9
Two and above	15	23.1

Table 4B, outlines socio-demographic and health information of 241 respondents. Most participants have either 2 children (37.7%) or 3-5 children (37.7%). A majority (68.9%) live in single families, while 31.1% are in joint families. The average household size is 5.5 members, with most having 5 or fewer members (61.4%), followed by 6-10 members (34.4%). Most participants have 5 or fewer family members above 5 years old (68%). Majority of population have never smoked nor have drinking habit. 27% of participants have morbidity with hypertension (46%) being most common health condition followed by diabetes mellitus (18.4%), thyroid dysfunction (8%), and cholesterol issues (9.2%). This data provides insights into family structure, lifestyle habits, and health conditions, with the majority living in single families, having moderate household sizes, and showing low rates of smoking and alcohol consumption. Morbidity is present in over a quarter of respondents, primarily hypertension.

Among the 241 respondent, 221 (92%) of them have covid-19 vaccine at least 1 time as shown in figure 6.

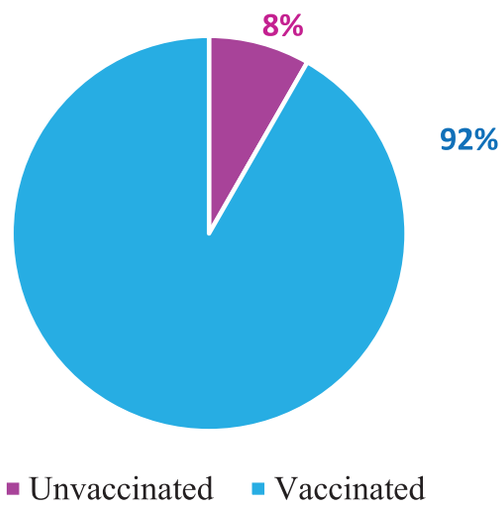

Figure 6: COVID-19 vaccination status

Similarly, out of the total 241 participants, **221 individuals** reported receiving at least one dose of a COVID-19 vaccine. As illustrated in the chart above, **45.20% (n = 100)** of the participants had received the **second dose**, while **41.60% (n = 92)** had proceeded to receive a **booster dose**, indicating a high rate of full vaccination and booster uptake. In contrast, only **13.15% (n = 29)** had received a **single dose**. These findings suggest that the majority of participants had completed the primary vaccination series, and a substantial proportion had received a booster, reflecting a relatively high level of adherence to COVID-19 vaccination recommendations among the respondents. The comparatively lower percentage of single-dose recipients may indicate ongoing efforts or gaps in reaching full vaccination coverage (Figure 7).

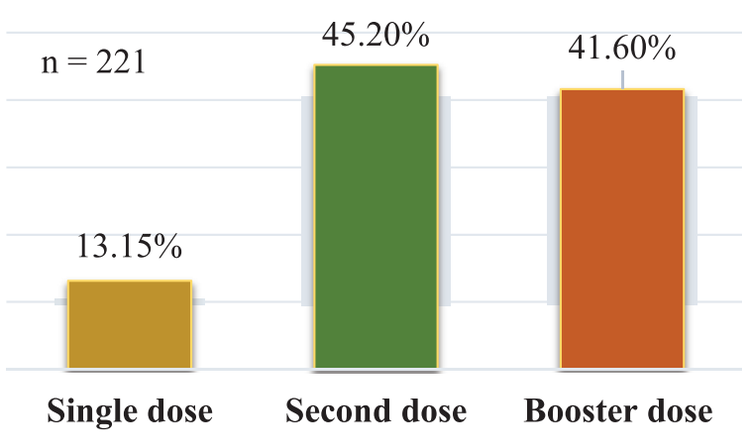

Figure 7: Distribution of COVID-19 vaccine doses received among vaccinated participants (n = 221).

Out of a total of 241 community participants, the vast majority—92% (n = 221)—reported being vaccinated against COVID-19, while 8% (n = 20) remained unvaccinated at the time of the survey. Among those who were unvaccinated, their intentions regarding future vaccination varied. Specifically, 40% (n = 8) of the unvaccinated individuals expressed a willingness to get vaccinated in the future, while another 40% (n = 8) were undecided. Only 20% (n = 4) clearly indicated that they had no intention of getting vaccinated. These findings reflect a high rate of vaccine coverage within the community and suggest positive public health engagement. However, the presence of undecided individuals highlights the need for continued awareness efforts and trust-building to address vaccine hesitancy among the remaining unvaccinated population.

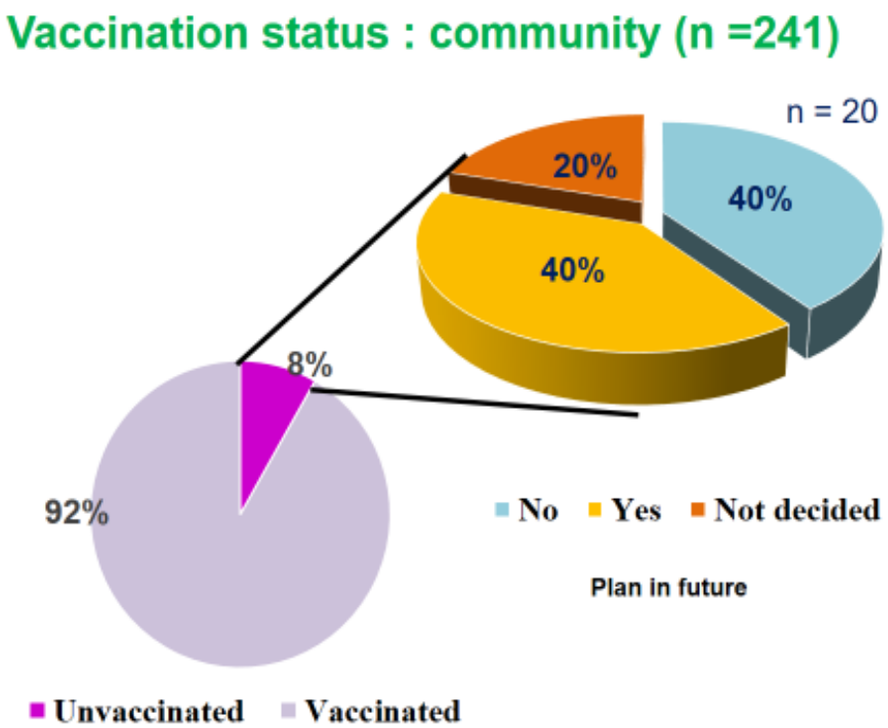

Figure 8: COVID-19 vaccination status and future vaccination intentions among community participants (n = 241).

Table 5: Information related to desire for vaccination among unvaccinated individual (n=241)

Variables	Frequency	Percent (%)
Information received on COVID-19 vaccination Program (MCQ)		
Higher authority	16	3.7
Health worker	132	30.5
News Portal	80	18.5
Social Media	76	17.6
Volunteer	52	12.0
Palika/Ward	44	10.2
Mobile back tone	17	3.9
Others	16	3.7

Variables	Frequency	Percent (%)
Reliable social media platform		
Television	98	40.7
News portal	16	6.6
Radio	51	21.2
Facebook	42	17.4
Tik-tok	7	2.9
YouTube	5	2.1
FCVH	7	2.9
Others	15	6.2
Vaccination site (1st dose)		
HF	110	49.5
PHC/ORC	37	16.7
School	11	5.0
Vaccine booth	19	8.6
Hospital	39	17.6
Others	6	2.7
Travel distance for vaccination site (1st dose) In km		
Less than 1 km	112	50.7
1 to 2 kilometer	54	24.4
2 to 5 kilometer	23	10.4
5 kilometer	32	14.5
Travel distance for vaccination site (1st dose) In minute		
≤ 5 min	54	24.4
6-30 min	124	56.1
31-60 min	27	12.2
Above 60 min	16	7.2
Waiting time for vaccination		
Immediately	29	13.1
Less than 15 min	61	27.6
16 to 60 min	87	39.4
2-3 hour	30	13.6
More than 3 hours	14	6.3
Counseling after vaccination		
No	84	38.0
Yes	137	62.0

Variables	Frequency	Percent (%)
Planning to get vaccine		
No	8	40.0
Yes	8	40.0
Not decided	4	20.0
No. of vaccinated family member		
None	8	3.3
1-5	167	69.3
6-10	62	25.7
Above 10	4	1.7
Improve vaccine coverage (MCQ)		
More information and awareness	146	34.0
Mobile vaccine clinic	74	17.2
Expansion of immunization clinic	56	13.1
Through local leader	46	10.7
Incentive	96	22.4
Others	11	2.6
Role played on vaccination program(MCQ)		
Nothing	124	49.4
Health education	87	34.7
Support on vaccination program	12	4.8
Health education	24	9.6
Coordination	4	1.6
Others	124	49.4
Perception on vaccination program		
Very positive	100	41.5
Positive	111	46.1
Neutral	23	9.5
Negative	6	2.5
Very negative	1	.4

Table 5 illustrates health workers (30.5%), news portals (18.5%), and social media (17.6%) are the most common sources of information. Most participants received their first dose at health facilities (49.5%) or hospitals (17.6%). Some also went to PHCs, vaccine booths, or schools. Half of the participants (50.7%) traveled less than 1 km for vaccination. In terms of travel time, 56.1% reached the site within 6-30 minutes, while 7.2% took over an hour. Majority 62% received counseling after vaccination with have positive perceptions, with 41.5% rating it as "very positive" and 46.1% as "positive' regarding perception on vaccination program.

Table 6: Individual perception on COVID-19 vaccination program (n=221)

Variables	Frequency	Percent (%)
Overall perception of the COVID-19 vaccination campaign		
Bad	1	.5
Very bad	2	.9
Neutral	36	16.3
Good	115	52.0
Very good	67	30.3
Management of COVID-19 vaccination campaign		
Bad	2	.9
Very bad	18	8.1
Neutral	74	33.5
Good	95	43.0
Very good	32	14.5
Information received about vaccination campaign		
Bad	2	.9
Very bad	9	4.1
Neutral	83	37.6
Good	93	42.1
Very good	34	15.4
Treatment by healthcare professional during vaccine session		
Bad	3	1.4
Very bad	4	1.8
Neutral	36	16.3
Good	133	60.2
Very good	45	20.4
Questions and concerns addressed adequately by the healthcare personnel		
Very bad	2	.9
Bad	11	5.0
Neutral	62	28.1
Good	110	49.8
Very good	36	16.3

A majority of participants rated the vaccination campaign as "Good," and "Very good." Management of the vaccination campaign was rated good and very good by maximum number of respondents. Information received about the campaign and treatment done by health care provider was also very good as per majority of population. Almost half of the participants (49.8%) felt their concerns were

addressed "Good," and 16.3% rated this as "Very good" Overall, the COVID-19 vaccination campaign and its management were generally perceived positively, with healthcare professionals receiving good feedback, though there is room for improvement in addressing concerns and providing information.

Table 7: Factors associated with vaccine hesitancy among unvaccinated individual (n=20)

Perceptions regarding vaccine against COVID-19 among unvaccinated individual	Number	Percent
Fear of side effect		
Strongly disagreed	4	20.0
Disagreed	1	5.0
Nutral	2	10.0
Agreed	9	45.0
Strongle agreed	4	20.0
Concerned about physical harm		
Strongly disagreed	4	20.0
Disagreed	2	10.0
Nutral	3	15.0
Agreed	8	40.0
Strongle agreed	3	15.0
Serious side effect may happened		
Strongly disagreed	4	20.0
Disagreed	1	5.0
Nutral	6	30.0
Agreed	5	25.0
Strongle agreed	4	20.0
Death or permanent handicap		
Strongly disagreed	5	25.0
Disagreed	1	5.0
Nutral	6	30.0
Agreed	5	25.0
Strongle agreed	3	15.0
Vaccine are untested so unsafe		
Strongly disagreed	5	2.1
Disagreed	1	.4
Nutral	7	2.9
Agreed	4	1.7
Strongle agreed	3	1.2
Lack of knowledge on vaccine availability		
Strongly disagreed	4	20.0

Perceptions regarding vaccine against COVID-19 among unvaccinated individual	Number	Percent
Disagreed	3	15.0
Nutral	2	10.0
Agreed	10	50.0
Strongle agreed	1	5.0
Lack of knowledge on vaccination site		
Strongly disagreed	3	1.2
Disagreed	8	3.3
Nutral	2	.8
Agreed	6	2.5
Strongle agreed	1	.4
Time was inconvenient		
Strongly disagreed	2	10.0
Disagreed	5	25.0
Nutral	4	20.0
Agreed	7	35.0
Strongle agreed	2	10.0
Got bad on social media regarding vaccination		
Strongly disagreed	3	15.0
Disagreed	2	10.0
Nutral	6	30.0
Agreed	5	25.0
Strongle agreed	4	20.0
Rumors		
Strongly disagreed	3	15.0
Disagreed	6	30.0
Nutral	5	25.0
Agreed	4	20.0
Strongle agreed	2	10.0
Unavailability of vaccine		
Strongly disagreed	3	1.2
Disagreed	5	2.1
Nutral	3	1.2
Agreed	7	2.9
Strongle agreed	2	.8
Long waiting time		
Strongly disagreed	3	15.0

Perceptions regarding vaccine against COVID-19 among unvaccinated individual	Number	Percent
Disagreed	4	20.0
Nutral	7	35.0
Agreed	3	15.0
Strongle agreed	3	15.0
Heard nature immunity		
Strongly disagreed	3	15.0
Disagreed	2	10.0
Nutral	5	25.0
Agreed	5	25.0
Strongle agreed	5	25.0
Physical disabilities		
Strongly disagreed	4	1.7
Disagreed	5	2.1
Nutral	2	.8
Agreed	5	2.1
Strongle agreed	4	1.7
Travel cost		
Strongly disagreed	4	20.0
Disagreed	4	20.0
Nutral	4	20.0
Agreed	3	15.0
Strongle agreed	5	25.0
Family influence		
Strongly disagreed	3	15.8
Disagreed	2	10.5
Nutral	5	26.3
Agreed	5	26.3
Strongle agreed	4	21.1
Preventing measures like social distancing, wearing mask is better than vaccine		
Strongly disagreed	3	15.0
Disagreed	3	15.0
Nutral	3	15.0
Agreed	5	25.0
Strongle agreed	6	30.0
Attitude of vaccine provider		
Strongly disagreed	3	15.0
Disagreed	6	30.0

Perceptions regarding vaccine against COVID-19 among unvaccinated individual	Number	Percent
Nutral	1	5.0
Agreed	7	35.0
Strongle agreed	3	15.0
This vaccine may cause sickness immediately		
Strongly disagreed	5	25.0
Disagreed	1	5.0
Nutral	10	50.0
Agreed	4	20.0
Strongle agreed	5	25.0
Trust issue on vaccine		
Strongly disagreed	5	25.0
Disagreed	2	10.0
Nutral	9	45.0
Agreed	4	20.0
Strongle agreed	5	25.0
Unavailability of preferred vaccine		
Strongly disagreed	5	25.0
Disagreed	4	20.0
Nutral	1	5.0
Agreed	6	30.0
Strongle agreed	4	20.0
No long term immunity		
Strongly disagreed	2	10.0
Disagreed	3	15.0
Nutral	7	35.0
Agreed	6	30.0
Strongle agreed	2	10.0

45% agreed they feared side effects, 40% agreed they were concerned about potential physical harm, 25% agreed that serious side effects could occur, 25% agreed or strongly agreed that the vaccine could cause death or permanent handicap, while 30% disagreed. 50% expressed concerns about vaccine safety, with 10% strongly agreeing that vaccines were untested. 55% of participants agreed that they lacked knowledge on vaccine availability and 35% agreed that the timing for vaccination was inconvenient to them. 45% of participants felt social media or rumors influenced their decision, while 25-30% remained neutral on these factors. 40% agreed or strongly agreed that vaccine unavailability was an issue, and 40% of participants agreed or strongly agreed that travel costs impacted their vaccination decision. 55% agreed or strongly agreed that preventive measures like masks and social distancing are better than vaccination, while 30% disagreed. Trust issues were prevalent, with 45% neutral and 45% agreeing that trust in the vaccine was a concern (Table 7).

Table 8: Factors associated with acceptance of COVID-19 vaccination among vaccinated individual (n=158)

Perception regarding vaccine against Covid-19 among vaccinated individual	Strongle agreed (5)	Agreed (4)	Nutral (3)	Disagreed (2)	Strongly disagreed (1)
COVID-19 vaccine is important to control disease spread	96 (43.4)	115(52)	9(4.1)	1(0.5)	
Vaccine against covid-19 will prevent the spread of infection	58(26.2)	128(57.9)	25(11.3)	10(4.5)	
Self-immunity is not enough to protect from	47(21.3)	112(50.7)	43(19.5)	18(8.1)	1(0.5)
Vaccine is safe COVID- 19	74(33.5)	122(55.2)	20(9)	3(1.4)	2(0.9)
Normal life is possible with vaccination	77(34.8)	113(51.1)	22(10)	8(3.6)	1(0.5)
Fully aware about the type of vaccine available	60(24.9)	102(46.2)	41(18.6)	13(5.9)	5(2.3)
Well aware about vaccine site	69(31.2)	110(49.8)	26(11.8)	14(6.3)	2(0.9)
Peer pressure	53(24)	102(46.2)	35(15.8)	23(10.4)	8(3.6)
Compulsory vaccine program	69(31.2)	98(44.3)	29(13.1)	22(10)	3(1.4)
Supportive health worker	65(29.4)	115(52)	29(13.1)	10(4.5)	2(0.9)
Have full access to reliable information	74(30.7)	104(47.1)	28(12.7)	15(6.8)	
Recommendations from trusted healthcare professionals	64(29)	99(44.8)	36(16.3)	20(9.0)	2(0.8)
Easy access to vaccination sites	86(38.9)	95(43)	19(8.9)	17(7.7)	4(1.8)

Table 8 describes that, majority of participantseither **Strongly Agree** (43.4%) or **Agree** (52%) that the vaccine is crucial for controlling disease spread. A large portion **Agree** (57.9%) that the vaccine helps prevent infection, with only 4.5% **Disagree**. Over 70% either **Strongly Agree** (21.3%) or **Agree** (50.7%) that self-immunity alone is not enough for protection, while 19.5% are neutral, and 8.6% disagree. A majority of participants believe the vaccine is safe, with **Strongly Agree** (33.5%) and **Agree** (55.2%) making up nearly 90% of the sample. Around 85.9% either **Strongly Agree** (34.8%) or **Agree** (51.1%) that normal life can resume with vaccination. Majority of participants are fully aware of the types of vaccines available. A majority feel well-informed about vaccine locations, with Strongly Agree (31.2%) and Agree (49.8%). Peer pressure to get vaccinated is felt by many, with 24% **strongly agreeing** and 46.2% **agreeing**. Most individuals find healthcare workers supportive with easy access to reliable information and vaccination site.

Table 9: Experience of Side-effect among the Vaccinated Individual n=158

Side effect	Frequency	Percent (%)
Pain on injected site		
No	120	54.3
Mild	59	26.7
Moderate	34	15.4

Side effect	Frequency	Percent (%)
Sever	8	3.6
Itching		
No	194	87.8
Mild	22	10.0
Moderate	5	2.3
Chills		
No	193	87.3
Mild	19	8.6
Moderate	7	3.2
Sever	2	.9
Fever		
No	148	67.0
Mild	42	19.0
Moderate	27	12.2
Sever	4	1.8
Headache		
No	172	77.8
Mild	30	13.6
Moderate	15	6.8
Sever	4	1.8
Fatigue		
No	175	79.2
Mild	27	12.2
Moderate	18	8.1
Sever	1	.5
Hypersomnia		
No	205	92.8
Mild	12	5.4
Moderate	3	1.4
Sever	1	92.8
Vision trouble		
No	209	94.6
Mild	9	4.1

Side effect	Frequency	Percent (%)
Moderate	3	1.4
Allergic reaction		
No	211	95.5
Mild	9	4.1
Moderate	1	.5
Abdominal pain		
No	211	95.5
Mild	9	4.1
Moderate	1	.5
Diarrhoea		
No	208	94.1
Mild	10	4.5
Moderate	1	.5
Sever	2	.9
Vomiting		
No	205	92.8
Mild	13	5.9
Moderate	3	1.4

Table 9 describes that, majority of population 54.3% experienced no pain, no itching (87.8%), no chills (87.3%), 67% did not have a fever, while 19% had mild fever, 12.2% moderate fever, and 1.8% severe fever. 77.8% did not experience headache, 79.2% did not feel fatigued, 92.8% did not experience hypersomnia, while 5.4% reported mild symptoms, and a small percentage had moderate or severe hypersomnia. Other experience such as allergy, vision trouble, vomiting and abdominal pain was also not seen in majority of respondents. Overall, most vaccinated individuals did not experience severe side effects, and the majority of reported symptoms were mild to moderate. Pain at the injection site, fatigue, and mild fever were among the most common side effects.

Conclusion

The objective of this study was to explore the participation and willingness of community people from the local levels for vaccination against COVID-19 and to identify the associated factors for vaccine acceptance among then. So the findings from community people concluded that individuals aged 21-30 and 41-50 each comprise 27.4% of the sample, with a gender distribution of 57.3% males and 42.7% females. The largest caste group is Brahmin/Chhetri at 44.8%, and Hinduism is the predominant religion at 86.3%. Educationally, 24.5% have completed secondary education, while 12.9% are illiterate. In terms of family structure, 37.7% of participants have two children, and 68.9% live in single-family units, with an average household size of 5.5 members. Notable health issues include hypertension (46%) and diabetes (18.4%). Vaccination rates are high, with 91.7% vaccinated: 45.2% received two doses, and 41.7% have had at least one booster. The primary sources of vaccination information are health workers (30.5%) and news portals (18.5%). Most individuals received their first dose at health facilities (49.5%) and traveled

less than 1 km for vaccination (50.7%). Travel time was predominantly 6-30 minutes (56.1%), and 62% received post-vaccination counseling, with 41.5% rating their experience as "very positive." Overall, these findings indicate strong vaccination acceptance and positive perceptions of the campaign.

Recommendation

- Launch targeted campaigns to provide clear information on vaccine safety and efficacy, using trusted community health workers and social media to reach a wider audience.
- Build public trust by communicating transparently about vaccine development and safety. Engage community leaders to promote vaccination and counter misinformation.
- Increase the number of vaccination sites and extend hours to make it easier for people to get vaccinated. Offer free transportation or mobile units to reach underserved areas.
- Establish a system for individuals to report side effects and regularly share this information to reassure the public about vaccine safety.

3.2 Health Workers (Other Than Vaccinator)

Altogether 158 health professionals participated. The majority of the participants (47.5%) were aged between 21 and 30 years, indicating that young adults formed the largest segment of the study population. This was followed by 24.7% in the 31–40 year age group, and 19.6% in the 41–50 year category. Participants aged 51 and above constituted only 6.3%, while the youngest group (≤ 20 years) represented the smallest share at 1.9%. These results suggest a significant skew toward younger age groups in the participant demographic.

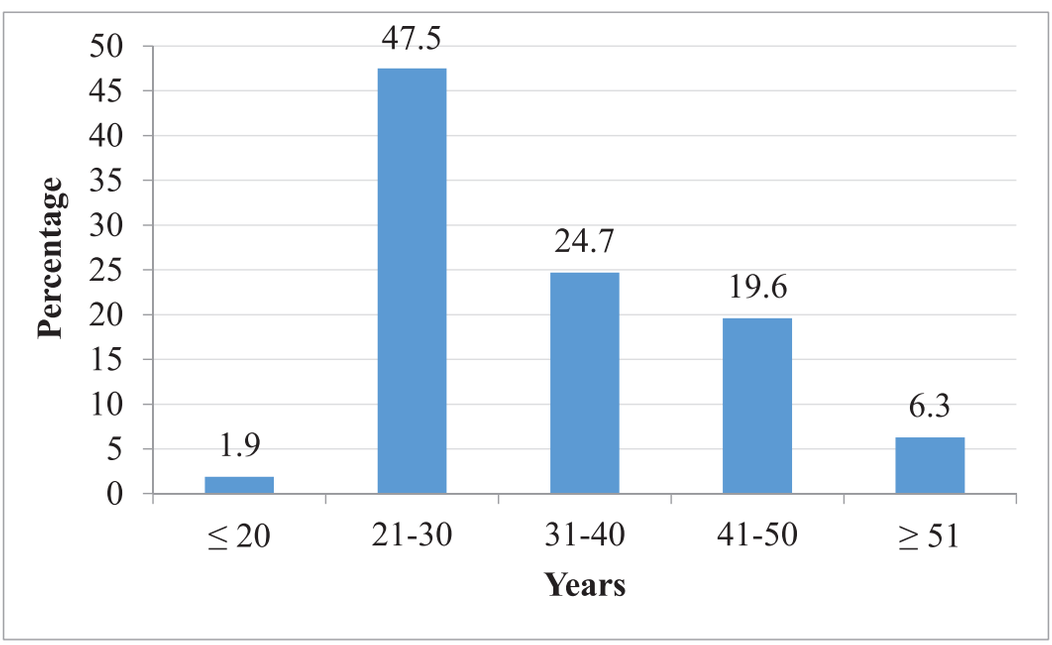

Figure 9: Age distribution of the participants

The gender breakdown among the 158 participants is presented in the figure. The majority of participants identified as female, accounting for 57% of the total. Male participants represented 42%, while only 1% identified as others. This indicates a higher level of female participation in the survey compared to other gender categories.

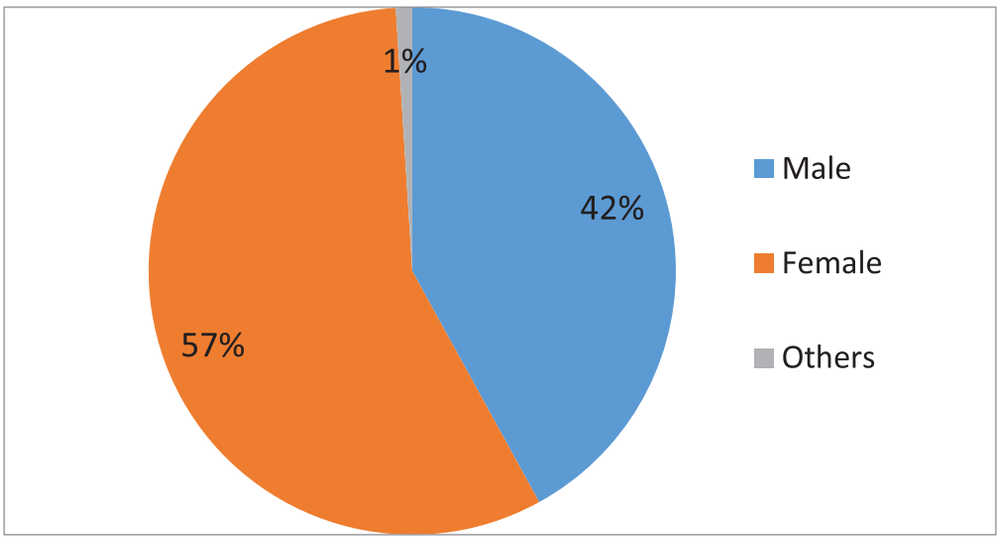

Figure 10: Gender Distribution of Participants (n = 158)

Table 10 (A-B): Socio-demographic Information of participants (n=158)

Variables	Frequency	Percent (%)
Your cast		
Dalit	9	5.7
Janajati	36	22.8
Madeshi	26	16.5
Brahmin/ Chhettri	87	55.1
Religion		
Hindu	146	146
Buddhist	6	6
Christian	2	2
Others	4	4
Education level		
Below SLC	1	.6
SLC	4	2.5
Up to +2	102	64.6
Bachelor	43	27.2
Masters and above	8	5.1
Designation		
Doctor	6	3.8
Nursing staffs	55	34.8
Other paramedics	97	61.4
Work experience		
≤ 5 Yrs	57	36.1

Variables	Frequency	Percent (%)
6-10 Yrs	57	36.1
11 to 15 Yrs	17	10.8
16 Yrs and above	27	17.1
Mean exp-9.75 Yrs Mini 0.3 Yrs and Max-38 Yrs		

Table 10A illustrate that, most participants were Brahmin/Chhettri (55.1%), with Dalits being the smallest group (5.7%). A large majority were Hindu (92.4%). Most have completed secondary education ("+2") at 64.6%, and only 0.6% have education below SLC. Paramedics are the largest professional group (61.4%), while doctors make up 3.8%. The average work experience was 9.75 years, with 36.1% having 5 or fewer years of experience.

Table 10B: Socio-demographic Information of Participants (n=158)

Variables	Frequency	Percent (%)
Marital Status		
Married	122	77.2
Unmarried	35	22.2
Separated	1	.6
Number of Children	n=123	
No child	19	15.4
1	38	30.9
2	45	36.6
3 and above	21	17.1
Type of Family		
Single family	92	58.2
Joint family	66	41.8
Number of Family Member		
≤ 5	73	46.2
6-10	68	43.0
Above 10	17	10.8
Mean=6.58, Min=2, Max=22		
No. of family member aged above 5 Yrs		
≤ 5	114	72.2
6 and above	44	27.8
No. of dependent family member		
No one	43	27.2
≤ 5	106	67.1

Variables	Frequency	Percent (%)
6-10	9	5.7
Min=1, Max=17		
Smoking Habit		
Never	140	88.6
Yes	12	7.6
Quit	6	3.8
Drinking Habit		
Never	132	83.5
Yes	17	10.8
Quit	9	5.7
Presence of morbidity		
No	141	89.2
Yes	17	10.8
Type of Morbidities (MCQ)		
Hypertension	11	45.8
DM	2	8.3
Heart disease	1	4.2
Cholesterol	1	4.2
Cancer	1	4.2
Depression/Anxiety	1	4.2
Thyroid dysfunction	7	29.2
Number of Comorbidities		
One	12	70.6
Two and above	5	29.4

Table 10B explain that, significant portion of the population is married (77.2%), with 22.2% unmarried and 0.6% separated. Most participants (36.6%) have 2 children, while 30.9% have 1, and 17.1% have 3 or more. About 15.4% have no children. Single-family structures are predominant (58.2%), while joint families account for 41.8%. Family sizes range from 2 to 22, with an average of 6.58 members. Most families (72.2%) have 5 or fewer members aged above 5 years, and 67.1% have 5 or fewer dependents. In terms of lifestyle, 88.6% have never smoked, 7.6% currently smoke, and 3.8% have quit. Similarly, 83.5% have never consumed alcohol, 10.8% currently drink, and 5.7% have quit. Most of the population (89.2%) report no morbidity, while 10.8% have some health issues, with hypertension being the most common (45.8%).

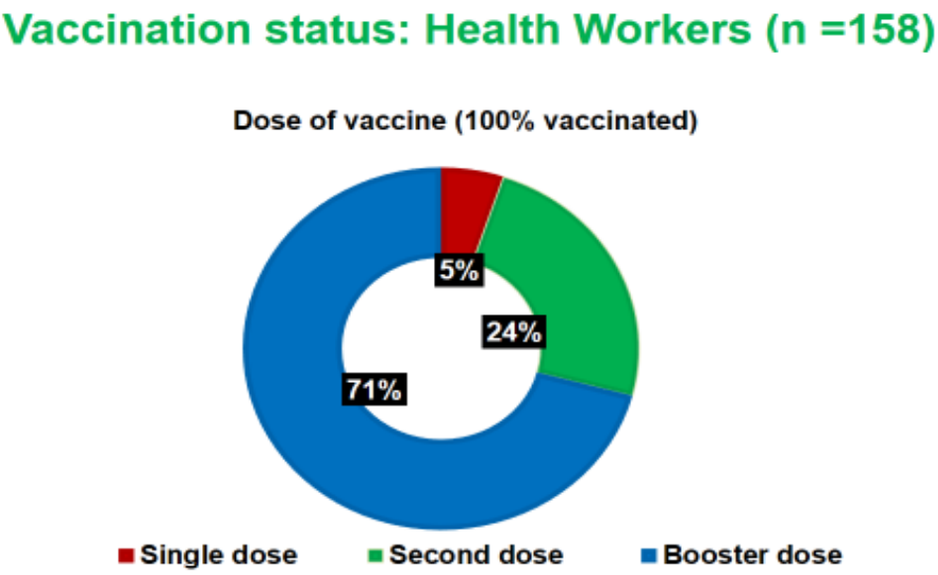

Figure 11: COVID-19 vaccination status among health workers

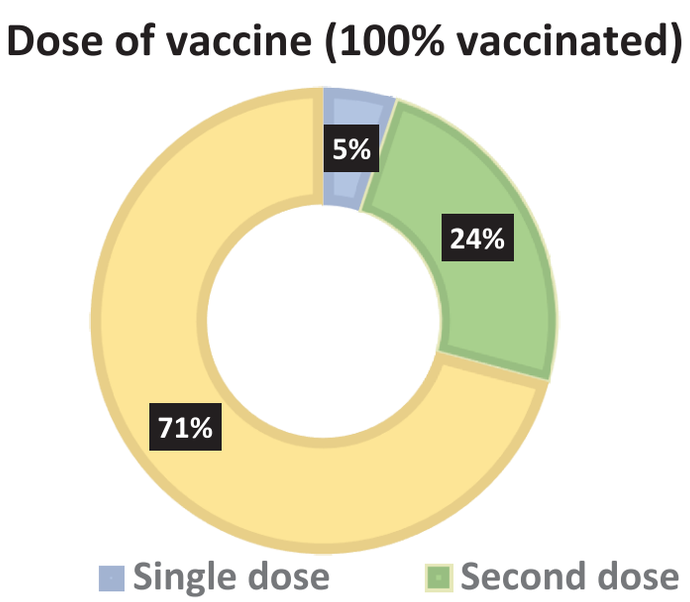

Figure 12: Dose of COVID-19 vaccination after getting first one

Table 11: Information related to vaccination status (n=158)

Variables	Frequency	Percent (%)
Information received on COVID-19 vaccination Program (MCQ)		
HW(Co-worker)	81	27.0
Higher authority	77	25.7
News Portal	53	17.7
Social Media	51	17.0
Volunteer	20	6.7

Variables	Frequency	Percent (%)
Palika/ward	8	2.7
Mobile back tone	8	2.7
Others	2	0.7
Reliable social media platform		
Television	69	43.7
News portal	16	10.1
Radio	28	17.7
Facebook	39	24.7
Others	6	3.8
Vaccination site (1st dose)		
HF	48	30.4
PHC/ORC	14	8.9
School	87	55.1
Others	9	5.7
Vaccination site (2st dose)		
HF	61	38.6
PHC/ORC	25	15.8
School	58	36.7
Others	14	8.9
Travel distance for vaccination site (1st dose) In km		
≤ 5 Km	109	69.0
6-10 Km	17	10.8
Above 10 km	32	20.3
Travel distance for vaccination site (1st dose) In minute		
≤ 5 min	17	10.8
6-30 min	107	67.7
31-60 min	23	14.6
Above 60 min	11	7.0
Waiting time for vaccination		
Less than 15 min	43	27.2
16 to 60 min	90	57.0
above 60 min	25	15.8
Counseling after vaccination		
No	29	18.4

Variables	Frequency	Percent (%)
Yes	127	80.4
Forgot	2	1.3
No. of vaccinated family member		
1-5	121	76.6
6-10	32	20.3
Above 10	5	3.2
Improve vaccine coverage (MCQ)		
1 more information and awareness	110	31.0
Mobile vaccine clinic	73	20.6
Expansion of immunization clinic	45	12.7
Through local leader	45	12.7
Incentive	68	19.2
Others	14	3.9
Role played on vaccination program(MCQ)		
Provide vaccine	57	25.9
Health education	78	35.5
Vaccine site management	64	29.1
Others	21	9.5
Perception on vaccination program		
Very good	98	62.0
Good	57	36.1
Neutral	3	1.9
Challenges on vaccination program(MCQ)		
Scar resources	80	27.2
Public reaction	52	17.7
Worried for personal protection	56	19.0
Insufficient training/orientation	75	25.5
Shortage of vaccine	13	4.4
Others	18	6.1

Table 11 shows that, main sources of information were health workers (27.0%) and television is considered the most reliable platform (43.7%). Most received their first dose at schools (55.1%) and second dose at health facilities (38.6%). A majority (69.0%) traveled 5 km or less to the vaccination site, with 67.7% arriving within 6-30 minutes. 80.4% received post-vaccination counseling. Most families (76.6%) had 1-5 members vaccinated. Key suggestions included increasing information and awareness (31.0%). The most common role played by participantswas in health education (35.5%). Most (62.0%) rated the vaccination program as "very good," with the main challenge being resource scarcity (27.2%).

Table 12: Individual perception on COVID-19 Vaccination Program (n=158)

Perception	Very bad	Bad	Neutral	Good	Very good (%)
Overall perception of the COVID-19 vaccination campaign			5.1	46.2	**48.7**
Management of COVID-19 vaccination campaign		**2.5**	35.4	46.2	**15.8**
Information received about vaccination campaign		1.9	22.8	45.6	29.7
Treatment by healthcare professional during vaccine session		1.3	6.3	57	35.4
Questions and concerns addressed adequately by the healthcare personnel	**0.6**	1.9	18.4	50	29.1

Table 12 describes that, significant majority of participants (94.9%) rated the vaccination campaign positively, with 48.7% rating it as "very good" and 46.2% as "good." Only 5.1% expressed neutral views. Regarding campaign management, 46.2% rated it as "good," while 15.8% rated it as "very good"; 35.4% remained neutral, and 2.5% rated it as "bad." For the information received, 45.6% rated it as "good" and 29.7% as "very good," with 22.8% neutral and 1.9% rating it as "bad." Most participants (57.0%) found the treatment by healthcare professionals to be "good," while 35.4% rated it as "very good." Only 1.3% rated the treatment as "bad," and 6.3% were neutral. Additionally, 50.0% rated the handling of questions and concerns as "good," and 29.1% as "very good," with 18.4% neutral and 2.5% rating it as "bad" or "very bad.

Table 13: Factors associated with Acceptance of COVID-19 vaccination (n=158)

Perception regarding vaccine against COVID-19 among vaccinated individual	Strongly Agreed (5)	Agreed (4)	Nutral (3)	Disagreed (2)	Strongly disagreed (1)
COVID-19 vaccine is important to control disease spread	102(64.6)	45(34.2)	1(0.6)	1(0.6)	
Vaccine against COVID-19 will prevent the spread of infection among health workers	85(53.8)	64(40.3)	2(1.3)	7(4.4)	
Self-immunity is not enough to protect from	49(31.0)	66(41.8)	22(13.9)	20 (12.7)	1(.6)
Vaccine is safe COVID- 19	65(41.1)	82(51.9)	8(5.1)	3(1.9)	
Normal life is possible with vaccination	60(38)	79(50)	11(7)	8(5.1)	
Fully aware about the type of vaccine available	64(40.5)	82(51.9)	7(4.4)	5(3.2)	
Peer pressure	36(22.8)	72(45.6)	17(10.8)	26(16.5)	7(4.4)

Perception regarding vaccine against COVID-19 among vaccinated individual	Strongly Agreed (5)	Agreed (4)	Nutral (3)	Disagreed (2)	Strongly disagreed (1)
Compulsory vaccine program	62(39.2)	63(39.9)	12(7.6)	19(12)	2(1.3)
Supportive health worker	56(35.4)	91(57.6)	7(4.4)	4(2.5)	
Obligatory vaccine program	62(39)	63(39.9)	12(7.6)	19(12)	2(1.3)
Have full access to reliable information	57(36.1)	86(54.1)	7(4.4)	8(5.1)	
Recommendations from trusted healthcare professionals	58(36.7)	69(43.4)	17(10.7)	13(8.2)	1(0.6)
Ease of access to vaccination sites	62(39.2)	75(47.5)	10(6.3)	9(5.7)	2(1.3)

Table 13 describes, 64.6% of participants strongly agreed that the vaccine is essential for controlling the spread of COVID-19, and 53.8% strongly agreed that it helps prevent transmission among health workers. Additionally, 41.1% strongly agreed on the vaccine's safety, while 38% strongly agreed that vaccination facilitates a return to normal life.

On the lower end, only 0.6% of participants disagreed or were neutral about the vaccine's importance, showing minimal opposition. Concerns about self-immunity also stood out, with 12.7% disagreeing that it offers sufficient protection. Similarly, 4.4% disagreed about the influence of peer pressure on vaccination decisions, indicating that most participants felt peer pressure had some effect. Lastly, 12% disagreed with the idea of compulsory vaccination programs, reflecting some resistance to mandatory measures.

Table 14: Experience of Side-effect among the Vaccinated Individual (n=158)

Side effect	Frequency	Percent (%)
Pain on injected site		
No	67	42.4
Mild	50	31.6
Moderate	36	22.8
Sever	5	3.2
Itching		
No	122	77.2
Mild	26	16.5
Moderate	9	5.7
Sever	1	.6
Chills		
No	125	79.1
Mild	22	13.9

Side effect	Frequency	Percent (%)
Moderate	7	4.4
Sever	4	79.1
Fever		
No	65	56.3
Mild	31	17.7
Moderate	48	17.7
Sever	14	8.2
Headache		
No	80	50.6
Mild	31	19.6
Moderate	37	23.4
Sever	10	6.3
Fatigue		
No	90	57.0
Mild	36	22.8
Moderate	25	15.8
Sever	7	4.4
Hypersomnia	90	
No	137	86.2
Mild	15	9.4
Moderate	5	3.1
Sever	1	.6
Vision trouble		
No	142	89.9
Mild	13	8.2
Moderate	2	1.3
Sever	1	.6
Allergic reaction		
No	138	87.3
Mild	17	10.8
Moderate	3	1.9
Sever		

Side effect	Frequency	Percent (%)
Abdominal pain		
No	139	88.0
Mild	12	7.6
Moderate	6	3.8
Sever	1	.6
Diarrhoea		
No	134	84.8
Mild	18	11.4
Moderate	6	3.8
Sever		
Vomiting		
No	132	83.5
Mild	19	12.0
Moderate	6	3.8
Sever	1	.6

Table 14 indicates that 42.4% of individuals reported no pain, while 31.6% experienced mild pain, 22.8% moderate pain, and 3.2% severe pain. Regarding itching, 77.2% experienced none, with mild itching reported by 16.5%, moderate by 5.7%, and severe by 0.6%. For chills, 79.1% reported no symptoms, while 13.9% had mild chills, 4.4% moderate chills, and 2.5% severe chills. In terms of fever, 56.3% experienced no fever, 17.7% reported mild fever, another 17.7% moderate fever, and 8.2% severe fever. Headaches were reported by 50.6% as absent, with 19.6% experiencing mild headaches, 23.4% moderate, and 6.3% severe. Fatigue was noted by 57.0% as absent, while 22.8% had mild fatigue, 15.8% moderate fatigue, and 4.4% severe fatigue. Hypersomnia was reported by 86.2% as absent, with 9.4% experiencing mild hypersomnia, 3.1% moderate, and 0.6% severe. Vision issues were reported by 89.9% as absent, while 8.2% noted mild problems, 1.3% moderate, and 0.6% severe. Allergic reactions were absent for 87.3%, with mild reactions reported by 10.8% and moderate by 1.9%. Abdominal pain was reported by 88.0% as absent, while 7.6% had mild pain, 3.8% moderate pain, and 0.6% severe pain. Lastly, 83.5% experienced no vomiting, with 12.0% reporting mild vomiting, 3.8% moderate vomiting, and 0.6% severe vomiting.

Conclusion

The objective of this study was to explore the participation and willingness of health workers of the local levels for vaccination against COVID-19 and to identify its associated factors among them. Based on above findings, a significant portion of the health worker is married (77.2%), with most participants having two children (36.6%) and a predominant family structure of single-family units (58.2%). The average family size is 6.58 members, with 72.2% having five or fewer members above the age of five. Lifestyle choices show that 88.6% have never smoked and 83.5% have never consumed alcohol. Most individuals report no health issues (89.2%), but among those with morbidity, hypertension is the most common condition (45.8%).

All participants are fully vaccinated, with 70.9% receiving a booster dose. Information sources include health workers (27.0%) and television (43.7%). A vast majority rated the vaccination campaign positively (94.9%), with 62.0% describing it as "very good." Furthermore, 64.6% strongly agreed that the vaccine is essential for controlling COVID-19, while only 0.6% expressed disagreement about its importance. Most participants reported minimal side effects, with 42.4% experiencing no pain post-vaccination. Overall, the findings indicate strong community support for vaccination, effective communication, and a generally positive perception of the campaign.

Recommendation

1. Implement targeted educational campaigns to raise awareness about vaccination benefits and address misconceptions, particularly focusing on the importance of vaccines in controlling diseases like COVID-19.
2. Increase the number of vaccination sites and extend operating hours to accommodate different schedules, ensuring that logistical barriers are minimized for all community members.
3. Engage community leaders and trusted health workers to foster trust in vaccines and provide continuous post-vaccination counseling, which can help alleviate fears and promote vaccination uptake.
4. Establish a robust reporting system for vaccine side effects to ensure transparency and timely responses to community concerns, reinforcing the safety and efficacy of vaccines. Regularly share aggregated data on side effects to build public confidence.

3.3 Vaccinator

Table 15: Basic Information of Participants (n=165)

Variables	Frequency	Percent (%)
Ever worked as a vaccinator		
No	2	1.2
Yes	163	98.8
Provision for informing the local community		
No	16	9.7
Yes	149	90.3
Provision of inform the local people(MCQ)		
Individual contact	98	17.8
Social media	100	18.2
Local FM/radio TV	58	10.5
Community people	91	16.5
Through ward office	87	15.8
Political leaders	62	11.3
FCHV	2	0.4
Others	52	9.5

Variables	Frequency	Percent (%)
Notification on second visit		
During first vaccination visit	117	70.9
By electronic messaging	15	9.1
Community mobilizer	23	13.9
Other	10	6.1
Organized vaccination program		
Daily	39	23.6
Once a week	17	10.30
Twice in the month	29	17.5
Monthly	48	29.0
As per availability	11	6.6
As per schedule	10	6.0
Others	11	6.6
Type of available vaccine		
Verocell	163	18.7
Covishield	163	18.7
Pfizer	157	18.0
Moderna	138	15.9
AstraZeneca	146	16.8
J and J	103	11.8

Experience on vaccine availability (Open ended question)

The feedback indicates a mixed experien with vaccine availability, highlighting initial shortages and challenges, such as confusion over different vaccine types, inadequate management, and crowding issues. Many participants reported insufficient supplies at the beginning of the vaccination campaign, with some noting that while vaccines were initially scarce, supply improved over time. There were mentions of pressure to redistribute vaccines, limited resources, and difficulties managing public fear and expectations. However, there were also positive remarks about later improvements in availability, with several participants expressing satisfaction with their work and the eventual sufficiency of vaccines.

Table 15 summarizes, 98.8% of participants have worked as vaccinators, 90.3% reported that there is a provision to inform the local community, primarily through individual contact (17.8%), social media (18.2%), and community people (16.5%). Most participants (70.9%) inform the public during the first vaccination visit, while others use electronic messaging (9.1%) or community mobilizers (13.9%). Vaccination programs are organized daily (23.6%) or monthly (29.0%), with smaller proportions operating weekly, bi-monthly, or based on availability. Verocell, Covishield, and Pfizer are the most available vaccines (each around 18%), followed by AstraZeneca (16.8%), Moderna (15.9%), and Johnson & Johnson (11.8%). This data highlights the high level of experience and willingness among participantsto work on vaccination programs and various methods for community engagement.

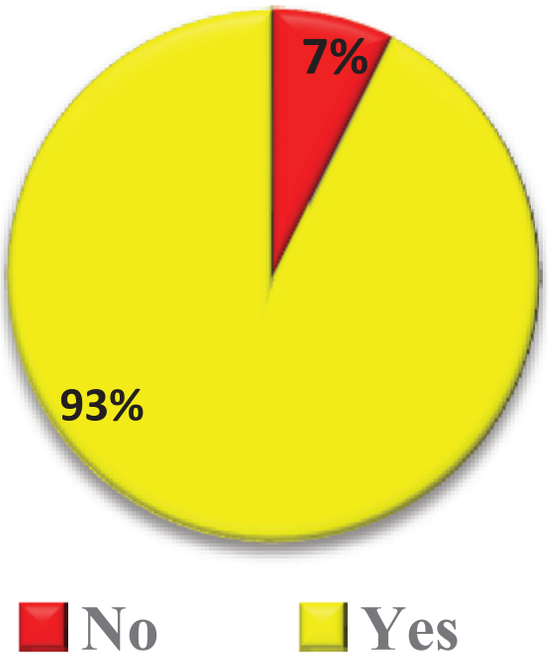

Figure 13: Willingness of vaccinator to work on vaccination program (n=165)

Reason for unwillingness (Open ended):

During the COVID-19 pandemic, there were significant concerns for healthcare workers, including the obligation to work while suffering from the virus and a pervasive fear of contracting it themselves. Issues of personal safety were compounded by a lack of PPE, heightened anxiety fueled by social media, and the fear of transmitting the virus to vulnerable groups, particularly small children. Additionally, there was a notable lack of training and only minimal supervision, all while healthcare workers were responsible for vaccination duties and managing other patients, leading to repeated fears of transmission.

Table 16: Information Related to Training/ Orientation Program (n=165)

Variables	Frequency	Percent (%)
Ever participated on orientation/training		
No	19	11.5
Yes	145	87.9
Don't remember	1	.6
Days of orientation/training program		
1	109	66.1
2	19	11.5
3	15	9.1
4	2	1.2
No. of oriented/trained staffs with in HF		
Don't know	19	11.5

Variables	Frequency	Percent (%)
Single	11	6.7
2-5	108	65.5
6-10	23	13.9
More than 10	4	2.4
Trained/oriented supporting staff		
No	58	35.2
Yes	105	63.6
Don't remember	2	1.2
Days of orientation/training program		
1	86	81.9
2 and more	19	18.1
No. of oriented/trained supporting staffs with in HF		
Single	22	21.0
Two	39	37.1
Three and more	44	41.9

Table 16 describes, majority of participants (87.9%) have participated in an orientation or training program, while 11.5% have not. Most training programs lasted one day (66.1%), with smaller percentages participating in programs lasting two days (11.5%), three days (9.1%), or four days (1.2%). A significant portion (65.5%) reported that 2-5 staff members in their health facility were trained. Fewer facilities had 6-10 trained staff (13.9%) or more than 10 (2.4%). Some participants (11.5%) did not know the number of trained staffs. About 63.6% of participants indicated that supporting staff had received training. Among those whose supporting staff were trained, most (81.9%) said the training lasted for one day. The number of trained supporting staff within health facilities varied, with 37.1% reporting two trained staff members, 41.9% indicating three or more, and 21% having only one trained supporting staff.

Table 17: Incentive to Health Workers during COVID-19 Vaccination Program (n=165)

Variables	Frequency	Percent (%)
Received incentive during vaccination program		
No	7	4.2
Yes	158	95.8
Don't remember		
Average daily incentive (In Rs.)		
Rs. 400-1000	153	96.8
More than Rs. 1000	5	3.2
Min-400. Max-3000		

Variables	Frequency	Percent (%)
Challenges while receiving incentive (open ended question) Participants reported significant challenges related to delayed payments and inconsistencies in incentive distribution, often waiting six to twelve months for compensation. Many indicated a lack of support from administration, with frequent follow-ups required to resolve payment issues. Some faced geographical difficulties that compounded their challenges, while others noted fluctuations in payment amounts or less than expected compensation. Additional concerns included a lack of basic facilities and PPE during their duties, which added to the overall stress and difficulty of the situation. Despite these issues, a few individuals mentioned not encountering problems at all.		

Table 17 illustrates that, majority of health workers (95.8%) received an incentive during the vaccination program, while a small percentage (4.2%) did not. Among those who received incentives, 96.8% reported receiving a daily amount between Rs. 400 and Rs. 1000. A smaller group (3.2%) received more than Rs. 1000 per day. The overall incentive range reported was a minimum of Rs. 400 and a maximum of Rs. 3000 per day. In summary, almost all health workers received daily financial incentives during the COVID-19 vaccination program, with most receiving between Rs. 400-1000 per day.

Table 18: Emergency Medicine and Vaccine Supply (n=165)

Variables	Frequency	Percent (%)
Mostly available vaccine (Any three)		
Covishield	78	47.2
Verocell	70	42.4
Pfizer	17	10.3
Regularity of vaccine		
Very irregular	11	6.7
Irregular	69	41.8
Average	61	37.0
Regular	24	14.5
Average client per day		
≤ 100	48	29.1
101-500	94	57.0
More than 500	23	13.9
Min-5, Max-2000		
Adrenaline injection available throughout the vaccination camp		
No	10	6.1
Yes	151	91.5

Variables	Frequency	Percent (%)
Don't remember	4	2.4
Min-1, Max-40		
No. of available Inj. Adrenaline		
1-5	127	84.1
60-10	17	11.3
More than 10	7	4.6
Availability of syringe of 1 ml		
No	14	8.5
Yes	146	88.5
Don't remember	5	3.0

Table 18 shows, top three vaccines reported as being mostly available were Covishield (47.2%), Verocell (42.4%), and Pfizer (10.3%). Vaccine supply was rated as irregular by a significant portion of participants (41.8%), while 37% found it average, and only 14.5% reported it as regular. A small group (6.7%) noted very irregular supply. Most participants handled between 101-500 clients per day (57%), with 29.1% managing fewer than 100 clients and 13.9% seeing more than 500 clients per day. The minimum reported was 5 clients, and the maximum was 2000 clients. A majority (91.5%) confirmed that adrenaline injections were available throughout the vaccination camps, while 6.1% reported no availability. Most camps had 1-5 adrenaline injections (84.1%), with fewer having 6-10 (11.3%) or more than 10 (4.6%). A large majority (88.5%) reported the availability of 1 ml syringes, while 8.5% did not have them, and rest could not remember. In summary, Covishield and Verocell were the most available vaccines, though the vaccine supply was often irregular. Most vaccination sites had a moderate client volume, and essential emergency medicines like adrenaline injections and 1 ml syringes were largely available.

Table 19: Preparation of vaccination site (n=165)

Variable	Frequency	Percent (%)
Mostly used syringe for vaccination purpose		
0.5 ml	159	96.4
1 ml	6	3.6
Availability of safety box		
No	163	98.8
Yes	2	1.2
Size of safety box		
2 Liters	25	15.2
3 Liters	10	6.1
4 Liters	18	10.9
5 Liters	112	67.9
Received vaccine (days before)		
Same day	37	22.4
1 day before	115	69.7

Variable	Frequency	Percent (%)
2 to 7 days before	13	7.9
Duration of vaccination per day per day (in hour)		
Less than 5 hours	22	13.3
≥ than 5 hours	143	86.7

Table 19 shows that, most commonly used syringe was 0.5 ml (96.4%), with only 3.6% using 1 ml syringes. A large majority (98.8%) reported that safety boxes were unavailable at the vaccination sites, with only 1.2% having them. For the few sites that had safety boxes, the most common size was 5 liters (67.9%), and least common was 3 liters (6.1%). Most sites received vaccines one day before the vaccination program (69.7%), while 22.4% received them on the same day and 7.9% received those 2 to 7 days before. Majority of sites (86.7%) conducted vaccination activities for five or more hours per day, while 13.3% operated for less than five hours. In summary, most vaccination sites used 0.5 ml syringes and did not have safety boxes, with those that did favoring the 5-liter size. Vaccines were generally received the day before the program, and vaccination activities typically lasted for more than five hours per day.

Table 20: Available Items for the Vaccination Program (n=165)

Name of items(Variables)	Frequency	Percent (%)
List of vaccine		
No	16	9.7
Yes	149	90.3
Name list of vaccine receiver		
No	4	2.4
Yes	161	97.6
Vaccine carrier with 4 ice pack		
No	2	1.2
Yes	163	98.8
Zip lock bag		
No	14	8.5
Yes	151	91.5
Safety box		
No	3	1.8
Yes	162	98.2
Vaccine card		
No	4	2.4
Yes	161	97.6
Talley sheet		
No	3	1.8
Yes	162	98.2

Name of items(Variables)	Frequency	Percent (%)
IEC Material		
No	6	3.6
Yes	159	96.4
Anaphylactic kit (Inj. Adrenaline and syringe 0.5ml)		
No	2	1.2
Yes	163	98.8
Cotton		
No	3	1.8
Yes	162	98.2
Plastic bag		
No	15	9.1
Yes	150	90.9
Mask and sanitizer		
No	4	2.4
Yes	161	97.6
Hand washing facility		
No	9	5.5
Yes	156	94.5

Table 20 outlines, majority of sites (90.3%) had a list of available vaccines, while 9.7% did not. Almost all sites (97.6%) had a name list of vaccine recipients, with only 2.4% lacking it. Nearly all sites (98.8%) had a vaccine carrier with four ice packs. The majority (91.5%) had zip lock bags, though 8.5% did not. Most sites (98.2%) had a safety box for disposing of used materials. Almost all sites (97.6%) had vaccine cards available for distribution. Similarly, 98.2% of sites had tally sheets for record-keeping. Information, education, and communication (IEC) materials were available at 96.4% of sites. Nearly all sites (98.8%) had an anaphylactic kit, which includes an adrenaline injection and a 0.5 ml syringe. Cotton was available at 98.2% of sites and 90.9% of sites had plastic bags available for waste management. Masks and Sanitizers were available at 97.6% of the sites, with only 2.4% reporting a lack of these protective items. Most sites (94.5%) provided hand washing facilities.

Table 21: Supply Chain, Cold Chain and Management (n=165)

Variables	Frequency	Percent (%)
Temperature monitoring for the COVID-19 vaccine		
No	31	18.8
Yes	128	77.6
Don't remember	6	3.6
Temperature fluctuations affect vaccine quality	136	82.4
No	18	10.9

Variables	Frequency	Percent (%)
Yes	11	6.7
Don't remember	136	82.4
Cold chain capacity for vaccine storage	Before COVID-19 No. (%)	After COVID-19 No. (%)
No	94(57)	68(41.2)
Yes	66(40)	93(56.4)
Don't remember	5(3)	4(2.4)
New cold chain equipment facilitated COVID-19 vaccine storage and delivery	Before COVID-19 No. (%)	After COVID-19 No. (%)
Yes	99(60.0)	76(46.1)
No	59(35.8)	84(50.9)
Don't remember	7(4.2)	5(3)
Counted discarded COVID-19 vaccines		
No	18	10.9
Yes	146	88.5
Don't remember	1	.6
Primary person for the COVID-19 vaccination		
In-charge	125	75.8
Vaccine focal person	25	15.2
Vaccinator	15	9.1
Facility of cold chain space	Before COVID-19 No. (%)	After COVID-19 No. (%)
No	106(64.2)	79(47.9)
Yes	57(34.5)	85(51.5)
Don't remember	2(1.2)	1(0.6)
Source of electrical supply for cold vaccine storage	Before COVID-19 No. (%)	After COVID-19 No. (%)
No electricity-use of cold box		
Yes	59(35.8)	55(33.3)
Electricity		
Yes	65(39.4)	93(56.4)
Solar mix power (hybrid)		
Yes	8(4.84)	5(5.5)
Ice-lined refrigerator available at your health organization	Before Covid-19 No. (%)	After Covid-19 No. (%)
No	125(75.7)	106(64.2)
Yes	23(13.9)	53(32.1)
Don't know	17(10.30)	6(3.6)

Table 21 describes, majority (77.6%) reported that they used temperature monitoring for the COVID-19 vaccine, while 18.8% did not, and 3.6% did not remember. A significant number (82.4%) acknowledged that temperature fluctuations can affect vaccine quality. Only 10.9% disagreed with this statement. Cold Chain Capacity: Before COVID-19, 57% reported no cold chain capacity, while 40% affirmed they had capacity. After COVID-19, the number of participants without capacity decreased to 41.2%, indicating an improvement in cold chain infrastructure, with 56.4% confirming capacity. Prior to COVID-19, 60% reported having new cold chain equipment to facilitate vaccine storage and delivery; however, this figure decreased to 46.1% post-COVID-19. The percentage of those who did not have new equipment increased from 35.8% to 50.9%. Most participants (88.5%) indicated that they counted discarded COVID-19 vaccines. The in-charge person was primarily responsible for COVID-19 vaccination in 75.8% of cases. Regarding Cold Chain Space, Before COVID-19: 64.2% did not have adequate cold chain space while after COVID-19: This number improved to 47.9% without cold chain space, while 51.5% reported having sufficient space post-COVID-19. Before COVID-19: 75.7% reported not having ice-lined refrigerators. After COVID-19: This number improved to 64.2%, with 32.1% confirming availability post-COVID-19.

Table 22(A-B) Preparation of Vaccine site (n=165)

Vari ables	Frequency	Percent (%)
Vaccination campaigns are often run (MCQ)	40	24.5
School	111	68.1
Health facility	10	6.1
Community building	2	1.2
Ward office	40	24.5
Management of Vaccine site (Open ended question): Participants describe the COVID-19 vaccination site as well-organized, focusing on safety and efficiency. Separate rooms for vaccination, counseling, waiting, and observation help streamline the process and reduce crowding, although some mention challenges with limited space for social distancing. They appreciate the orderly flow of the site, with clear lines and counselors available in designated rooms to address questions. Group counseling sessions promote community understanding of the vaccine. Effective management practices, including the involvement of community health volunteers (FCHVs), help maintain order and social distancing. Separate lines for male and female recipients enhance comfort and respect. Overall, the site adheres to Nepalese government protocols, including a mandatory 30-minute observation period post-vaccination. Despite some space challenges, participants feel the commitment to patient care contributes to a positive vaccination experience.		
Average waiting time after vaccination		
<30 min	53	32.1
≥30 min	112	67.9
Ever heard about Immunization stress-related response		
No	100	61.7
Yes	61	37.7
Don't know	1	.6
Area of counselling after vaccination(MCQ)		
Important of vaccine and it's dose	149	18.8
Chances of anaphylactic shock and management	119	15.0
Next dose and next visit date	139	17.6
Side effects of vaccine	137	17.3
Prevention and management of COVID-19	113	14.3
Important of vaccine card and its safety	134	16.9

Management of Vaccine site (Open ended question): Participantsdescribe the COVID-19 vaccination site as well-organized, focusing on safety and efficiency. Separate rooms for vaccination, counseling, waiting, and observation help streamline the process and reduce crowding, although some mention challenges with limited space for social distancing. They appreciate the orderly flow of the site, with clear lines and counselors available in designated rooms to address questions. Group counseling sessions promote community understanding of the vaccine. Effective management practices, including the involvement of community health volunteers (FCHVs), help maintain order and social distancing. Separate lines for male and female recipients enhance comfort and respect. Overall, the site adheres to Nepalese government protocols, including a mandatory 30-minute observation period post-vaccination. Despite some space challenges, participants feel the commitment to patient care contributes to a positive vaccination experience.

Table 22B: Considering Factors while Conducting Vaccination Programme (n=165)

Considerable point	Strongly disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly disagree (1)
Hand washing with soap and water should be done before and after vaccination, and the hands should be cleaned with sanitizer after each vaccination by the vaccinator.	4(2.4))	3(1.8)	1(0.6)	44(26.7)	113(68.5)
It is necessary to check the vaccine and syringe for contamination, inspect the vial for breakage or damage, and label them every time.	1(0.6)	53)	1(0.6)	38(23)	120(72.7)
Date and time should be noted immediately after opening the vaccine vial.				29(17.9)	136(82.4)
We should not use the vaccine after 6 hours of opening.				34(20.6)	131(79.4)
Arrange the sheet of vaccine receiver and provider in an "L" shape.			3(1.8)	45(27.3)	117(70.9)
Keep the vaccine inside the vaccine carrier on the foam pad.		1(0.6)	3(1.8)	33(20)	128(77.6)
If possible, open the vaccine vial after collecting 5-7 receivers.		1(0.6)	1(0.6)	45(27.4)	117(71.3)
Do not mix vaccine from one vial to another.				31(18.8)	134(81.2)
If a vaccine vial is already open, do not carry it to the next vaccination clinic or site.				33(20)	132(80)
Do not load the A.D. syringe before the arrival of the vaccine receiver.				26(15.8)	139(84.2)
Ensure that vaccine care and tally sheets are completely filled out.				37(22.4)	128(77.6)
Do not touch or recap the needle.				26(15.8)	139(84.2)

Table 22B shows, significant majority (68.5%) strongly agreed that hand washing with soap and water should be performed before and after vaccinations. Only a small fraction (4.2%) disagreed. A large majority (72.7%) strongly agreed that checking vaccines and syringes for contamination and inspecting vials for damage is necessary. Only 0.6% strongly disagreed. Regarding the importance of noting the date and time after opening a vaccine vial, 82.4% of participants agreed, highlighting awareness of proper vaccine handling protocols. A high percentage (79.4%) agreed that vaccines should not be used more than 6 hours after opening, indicating compliance with safety practices. Most participants (70.9%) strongly agreed on arranging vaccination sheets in an "L" shape, showing a preference for organized documentation. Keeping vaccines inside the carrier on a foam pad received strong support, with 77.6% strongly agreeing. When asked if vials should be opened after collecting 5-7 receivers, 71.3% agreed or strongly agreed, indicating adherence to efficient practices. An overwhelming majority (81.2%) strongly agreed that vaccines should not be mixed between vials, underscoring the importance of maintaining vaccine integrity. Similarly, 80% agreed that open vials should not be transported to other clinics, ensuring safety protocols are followed. Regarding the timing of loading the syringe, 84.2% strongly agreed that syringes should not be pre-loaded before the arrival of the vaccine receiver. Most participants (84.2%) agreed that needles should not be touched or recapped, promoting safe handling practices.

Table 23 Syringe, Needle and Waste Management (n=165)

Variable	Frequency	Percent (%)
Management of used syringe (MCQ)	34	15.5
Dumping without processing	38	17.4
Municipality waste management system	95	43.4
Burning	7	3.2
Autoclave/microwave	3	1.4
Use of chemical	42	19.2
Dispose by using safety concrete valve	34	15.5
Dispose of used vial		
Same day	14	8.5
Within 15 days	23	13.9
Monthly	115	69.7
6 months to 1 year	11	6.7
Still not done	2	1.2

Table 23 shows, the most common method for managing used syringes was through the municipality waste management system (43.4%) followed by use of chemicals for decontamination (19.2%), dumping without processing (17.4%), disposal using a safety concrete valve (15.5%), burning (3.2%) and autoclaving or microwaving (1.4%) Most participants (69.7%) reported that used vials were disposed of monthly, while smaller percentages indicated: Disposal within 15 days (13.9%), disposal on the same day (8.5%), and disposal after 6 months to 1 year (6.7%), 2 sites (1.2%) had not yet disposed of the vials.

Table 24 Recording and Reporting System (n=165)

Variable	Frequency	Percent (%)
Recording and reporting system of health facility		
Manually	78	47.3
Electronic	2	1.2
Paper-based	48	29.1
Mixed (electronic and paper)	35	21.2
Don't know	2	1.2
Electronic recording stared (n=37)		
New system for COVID-19 vaccination	24	64.9
System was in use previously	13	35.1
Challenge of electronic recording system		
No	13	35.1
Yes	24	64.9
Data entry system		
During the vaccination session	81	50.0
End of the vaccination session	80	49.4
End of each week	1	.6
Separate registration register for COVID-19 immunization		
No	1	.6
Yes	162	99.4
Separate data entry register for outreach clinic		
No	10	6.1
Yes	108	66.3
Don't know	44	27.0
No out-reach clinic	1	.6
Reporting of data related to Covid-19 vaccination(district level)		
Daily	122	73.9
Weekly	7	4.2
Bi-weekly	1	0.006
Monthly	26	15.7
Don't know	1	0.006
Other	4	2.42

Variable	Frequency	Percent (%)
Covid-19 vaccination program and routine immunization		
Don't know	31	18.8
No effect	41	24.8
Some improvements	6	3.6
Some disruptions	87	52.7

The table 24 shows that, the majority of health facilities used manual recording (47.3%), followed by paper-based systems (29.1%). A smaller percentage utilized mixed systems (21.2%), and only 1.2% employed electronic recording. Additionally, 1.2% of participants did not know the system in use. Among those who used electronic recording (n=37), 64.9% reported that this was a new system implemented for COVID-19 vaccination, while 35.1% indicated it was previously in use. A significant number of participants (64.9%) reported challenges associated with the electronic recording system, while 35.1% did not encounter any issues. Data entry during the vaccination session was common (50%), with nearly equal numbers entering data at the end of the session (49.4%). A small fraction (0.6%) entered data at the end of each week. Nearly all facilities (99.4%) maintained a separate registration register for COVID-19 immunization, while 6.1% had a separate data entry register for outreach clinics. For outreach clinics, 66.3% had a separate data entry register, but 27% did not know if one existed. A single respondent (0.6%) indicated that there was no outreach clinic. The majority of participants (52.7%) reported some disruptions in routine immunization due to the COVID-19 vaccination program.

Conclusion

The objective of this study was to required protocol preparation of local health facilities for vaccination. And describe the barriers and challenges for response its response. According to the above finding, it concluded that, a remarkable 98.8% of participants have experience as vaccinators, with 92.7% willing to continue in vaccination programs. Community engagement is also strong, as 90.3% reported having provisions to inform local communities, primarily through individual contact (17.8%), social media (18.2%), and community members (16.5%). However, vaccine availability was inconsistent, with Covishield (47.2%), Verocell (42.4%), and Pfizer (10.3%) being the most reported vaccines. Especially, 41.8% of participants rated the vaccine supply as irregular, underscoring ongoing challenges in this area.

Training and orientation programs were attended by 87.9% of respondents, predominantly lasting one day (66.1%), with only a minority (1.2%) utilizing electronic recording systems for data management. Incentive challenges were significant, as 95.8% of health workers received incentives but faced delays of six to twelve months for payment. In terms of site management, while 90.3% of sites had a list of available vaccines, only 1.2% reported no safety boxes for waste disposal. A majority of facilities (47.3%) used manual recording systems, and 64.9% of those using electronic systems encountered challenges.

Recommendation

- Increase the duration and depth of training for vaccinators and supporting staff. This should include comprehensive sessions on vaccine management, handling community concerns, and ensuring personal safety protocols, especially regarding PPE use.
- Develop a clear and efficient system for incentive distribution to ensure timely payments. Regular updates and communication about payment timelines can alleviate stress and improve morale among healthcare workers.

- Implement better logistical planning to ensure a regular and sufficient supply of vaccines. This includes forecasting demand and establishing contingency plans to address shortages effectively.
- Utilize diverse communication channels, including social media and community mobilizers, to inform the public about vaccination efforts, schedules, and the importance of vaccination, thereby enhancing community trust and participation.
- Standardize and improve the disposal methods for used syringes and vials, ensuring compliance with safety protocols. This includes increasing access to safety boxes and implementing regular disposal schedules.
- Transition to electronic recording systems for vaccination data to streamline data entry and management. This will improve efficiency, accuracy, and ease of access to vaccination records, aiding in better program management.
- Continuously assess and enhance cold chain capacity to ensure the integrity of vaccine storage and delivery. This includes regular maintenance of cold chain equipment and training staff on best practices for temperature monitoring.

Limitations

- Only districts with high and low COVID-19 vaccination coverage were included in this study; medium coverage districts were excluded, as they may provide biased information.
- As mentioned earlier, including only high and low vaccine coverage districts may result in representation from similar ecological regions, potentially limiting the study's ability to represent all three ecological areas of Nepal.

Findings from Qualitative Study

Results

The qualitative interview objective of this study was to explore the vaccination situation related to COVID-19 vaccination. The experiences of various key stakeholders were analyzed as factors contributing to the COVID-19 vaccination program in Nepal. Key interviews were conducted with health coordinators, health post in-charges, vaccinators, and politically elected representatives (mayor or deputy mayor). Interview sites were selected based on low and high coverage of COVID-19 vaccination according to the Department of Health Service Report. The maximum duration spent on each interview was around 35 to 40 minutes. Factors related to the COVID-19 vaccination program were identified through open coding, using thematic analysis. Thematic analysis followed the steps outlined by Braun and Clarke.

Table 25: Major themes along with their sub-themes

SN	Theme	Codes
1	Information for preparation and vaccination	Formal information (government letter) Informal Information (TV, Social Media, Newspaper, Radio) Peer information sharing
2	Distribution and Management of vaccination at a local level	Determining the number, Vaccine delivery technique, Vaccine receiving technique, Vaccine returning technique, site, daily capacity, Type of support,
3	Safety measures during COVID-19 Vaccination Program	Physical and Social distancing, Client Flow, Availability of PPE, Availability of Antiseptic, Waste Management
4	Training related to COVID-19	Type of training, Number of trained manpower, Duration of training
5	Challenges perceived at the initial phase of COVID-19 vaccination	Vaccine hesitancy, Vaccine availability, Site, Vaccine type and dose, Addressing misinformation, community participation, Geographical condition, Migration, Vaccination supply material, Migration, religious
6	Vaccine distribution process at the local level	Vaccine receiving, Determining quantities, Vaccine returning process
7	Vaccine storage and Management at the initial stage	Storeroom, cold chain room setup, Storage capacity, Resources
8	Meeting and Coordination	Meetings (federal, provincial, local, and facility level), Informal meetings, Issues discussion in meeting

SN	Theme	Codes
9	Monitoring, Evaluation, and Performance	Challenges on Monitoring and Evaluation, Support, Monitoring and Evaluation technique, recognition and honor, Vaccine Guideline
10	Vaccination Strategies	Development of stratify design, SOP, Handling the vaccine before administration of vaccine
11	Information management and community involvement	Public informing approach (Ratio, TV, FCHVs, etc), Addressing misinformation, Community participation, Strategy for unreached and marginalized population
12	Budget planning and allocation	Resource Identification, Distribution of financial resources, Supporting Organization, Sufficient and Insufficient, Personal support
13	Monitoring, Supervision, and Evaluation Strategies	Data tracking, Data sharing, Data security and accuracy, Program review
14	Preparedness for future pandemic like COVID-19	Early detection, Early capacity building, Resource identification and management, community involvement

1. Information for preparation and Vaccination

Most of the participants had gotten formal information from a Nepal government authorized agency. However, some of them had gotten informal information from radio, news, and television to prepare at the local level to control the spread of diseases at the community level. Different local-level organizations received information from different levels of government authority; some local-level staff got information from the Ministry of Health and Population, Some got Information from the Department of Health Services, as well as some got information from the district health office.

> *"The information was received from the Ministry of Health (Provincial level) as well as from the health section of Ramgopalpur Municipality." FM-KII_1*

> *"I received the information from the health department. At that time, I was in Baglung Municipality, so I got the information through them." LLFP- KII_10*

> *"No, the information was received from the district." HI-KII_11*

However, the health section in charge and facilities in charge conducted a local-level meeting with Female Community Health volunteers and informed the community through them at the household level.

> *"Yes, we have 18 FCHVs in this ward no one and they used to go to every house. Everyone goes to their area and talks to people of every house and gives information. For that, we should not make separate strategies." HI-KII_11*

In addition, many health workers and community-level people received information about COVID-19 through social media, newsprint, radio, TV, pamphlets, etc.

> *"There were no formal or informal programs, but there were a lot of videos regarding COVID-19 vaccinations and there were guidelines from the health and population ministry and news from health departments." FM-KII_1*

> *Enough information was being circulated in the news. We understood that the vaccine is safe. That is why we took it." HI-KII_8*

2. Distribution and Management of Vaccination at a local level

At the time of COVID-19 vaccination, the delivery of the vaccine to health facilities, receiving the vaccine from higher authority at the Local level, and returning the remaining vaccines to higher centers depended upon the availability of resources available at different levels of health institutions. At that time the recording and reporting of vaccines had played a vital role in vaccine utilization including vaccine-related supplies. The vaccines were delivered to the vaccination site through different means of transportation.

> *"We didn't have an ambulance at that time and we used to hire ambulances and used municipal vehicles to deliver vaccines at vaccination centers and local level health facilities." FM-KII_1*

> *"It was used to go from the district to the municipality and from the municipality it was brought here by transporters. HI-KII_11*

> *"We brought the vaccine by motorbike." HI-KII_11*

> *"Office helper would deliver it to the centers. I used to give vaccines in the vaccine box. They take and bring the rest." HSC-KII_13*

> *"Some came on cycle, bike and some came by walking who were near." HSC- KII_13*

> *"From district to the hospital and the hospitals, all office helpers carried the vaccine in vaccine carriers to their places." IFP-KII_14,*

Regarding vaccine receiving to health facilities and Municipality health section level, they had used many means of transport in the vaccination delivery process.

> *"The vaccine came from Surkhet, Nepalgunj. From Nepalgunj, the vaccines were transported in a vehicle with cold boxes that had ice. After it came to Cold Chain, first of all, we administered it in the hospital." V-KII_12*

> *"No, we had a system of preplanning. The district office used to confirm the date and site of vaccination. And vaccines were sent accordingly." ICDHO-KII_15*

In addition, the vaccine returning process follows the guideline to return it at a higher level after vaccination or for remaining vaccines.

> *"Keeping that in mind, we would maintain it as per the population of our respective wards and fill out the requisite forms and send it with the staff." V-KII_12*

> *"The vaccine would arrive in the district and from there the municipality would send us a vehicle to go and get the vaccine but sometimes it would be sent from the district itself and we took a vehicle from here to the district." HSC-KII_13*

> *"At that time, we had bought a WHO standard fridge, ILR. After that, the vaccine was brought here from the health office." V-KII_16*

Furthermore, for the vaccine returning process, a health worker had maintained the recording and reporting system in the vaccine returning process.

> *"Yes, as per current practices, unused vaccines are returned by maintaining proper ise pack conditions and changing the ice packs as needed." LLFP-KII_10*

"When it was over we would return all the vaccines. We would have 10 to 5. By counting how much was received, how much was spent and how many people got it like, how many males and females got the vaccine. We used to report daily." IFP-KII_14

The vaccination number was determined as per the needs of the community after a discussion with health facility-level staff. However, most of the time we worked according to the target provided by the ministry.

"We had determined the number of eligible people from the population and we used to ask for that much. E.g. if there were 2000 such people, we would ask for 2000 vaccines." V-KII_12

"We were told by the Ministry of Health to vaccinate people according to the targeted age of people likely to get COVID-19 infected." KII_1

"For that, the information was given by the health service department, after the first dose, when the second dose was taken, you would not be infected by COVID-19. So, this is why the information came from higher authorities." KII_5

Only in a few municipalities, the vaccination distribution in the community was supported by female community health volunteers.

"We got some support from FCHVs, people's representatives, health office during vaccination but there was not as much support from them as it should have been. FC-KII_21

Most of the participants reported that the vaccination campaign started at 10 AM and ended at 4 PM.

"We used to start at 10 AM and say it would end at 4 PM. However, it would sometimes be 5 PM when we would be done." V-KII_12

At the local level, many municipalities have established a vaccination center at each ward (health facilities), despite that they had established the outreach vaccination focal point at schools, and other public places.

"We had conducted 48 vaccination sessions in 33 wards, and in some places, the sessions had also started." FC-KII_23

"Vaccination centers were in all nine wards, right?" FC-KII_21

"The vaccine program was managed in the lobby (veranda) of the health post. Problems like weather and lack of halls were there. We couldn't conduct the program in an open field. Some vaccines were also given in schools." HI-KII_8

In addition during the distribution of vaccines or vaccination programs, the health workers used different forms of recording and reporting. Like paper, register digital entry, etc.

"The recording system was manual. We still have the records safely with us, and the data is also entered into the computer, with details like how many males and how many females were vaccinated. So, at the vaccine centers, the recording was manual, and at the end of the month, we entered it into the DHIS tool." LLFP-KII_10

"The number of vaccine vials is recorded in the reporting file. It had the records of several doses received, used, and wasted." V-KII_12

3. Safety Measure during COVID-19 Vaccination Program/At COVID-19 wave

For the prevention, the community as well as health workers were more aware of the availability of PPE, use of PPE, Clint flow and its proper management, availability of antiseptic, occupational hazards assessment and management including waste management. AEFI kits were also available at the vaccination site. However, it was not found in significant numbers in this study. It may be missed by the enumerators during the data collection period.

Most of the participants reported that they were available PPE during the campaign period and it was properly used during vaccination.

> *"We had enough, sir Even at that time, the necessary supplies were available to us. We still have items like gowns, goggles, and PPEs from the COVID-19 period." LLFP-KII_10*

However, in the initial stage, some health workers used plastic as PPE.

> *"We had PPE but it was in limited quantities. So we used homemade plastic as PPE. Then we had N95 masks. If they were not available then we used 2 normal masks." IFP-KII_22*

In addition, there was proper segregation for syringes and vaccine vials however, it was not disposed of properly.

> *"During vaccine camps and programs, wastes that were generated were mostly cotton, syringe covers and caps, and vials. Whatever could be burnt, we would burn them up. We do not have the provision for burying the rest in a pit here." V-KII_12*

> *"The cover of the syringe was taken by the municipality waste collectors. The non-infectious waste was managed like that too. V-KII_16*

> *"District had allocated responsibilities of health care waste management to waste management companies. So, we used to collect the wastes by weight and handled them over to those companies." IFP-KII_23*

Furthermore, after the second wave, there was a huge crowded of clients at vaccination centers. At that time health workers of different places had generated different ideas to manage the client crowd.

> *"We used to ask people to stay in lines. Police personnel were also sent to our center in case of a big crowd. When the crowd would be very big, 5-7 police would come to manage it. The lines used to be very long. We used to prioritize old men and women. That is how we used to manage." V-KII_16*

> *"It was maintained in the card. Later it was said that the people who took Japanese at first can take American later." HSC-KII_13*

In addition, many of the participants reported that there was an availability of antiseptics at the vaccination center.

> *"Masks, PP dress, soaps, sanitizer were provided to health workers for safety protocol." KII_1*

> *"In the beginning, we used whatever was available at the local level. There were no sanitizers so we used more soapy water and later after the management of sanitizers, mask-like surgical masks, KN95 masks, and PPE." KII_21*

4. Training Related to COVID-16

At the last COVID-19 vaccination program, most of the municipality-level health workers were trained to conduct the vaccination. However, only a few participants reported that supporting staff and volunteers were trained for vaccination campaign management at the facility or vaccination site. As well a vaccination orientation program was organized in my municipality at the local level.

> *"One-day orientation at the municipality center. It was just a vaccine orientation program, it did not have a name." HI-KII_8*

> *"We are 25 health workers in total and we all got basic training." HSC-KII_13*

> *"There are 24 wards in Lahan. At that time, I was in Lahan and there were about 50-60 health workers and all were trained." IFP-KII_14*

> *"Almost 22 were trained."ICDHO-KII_15*

However, during the initiation time, few participants reported that there was less number of trained health workers.

> *"No, they were insufficient. At the time of vaccination due to less manpower, it was difficult. We used to spend less time at the office as we were only two." HI-KII_11*

Most of the participants reported that there was no availability of trained health workers in health facilities. Even though some municipalities had enough trained staff and some had insufficient trained staff.

> *"Eight people were trained at the rate of two in four vaccination centers." KII_1*

> *"No, there were no available training programs." LLFP-KII_10*

> *"I have received training before administering this vaccine." HI-KII_11*

Furthermore, some participants reported that the supporting staff and volunteers were also trained but it was in low number and limited municipality.

> *"Yes. Along with 2 health workers, there were FCHVs and office helpers too." HSC-KII_13*

Some health workers had received a day orientation program on COVID-19. However, some were received 2-3 days of training for COVID-19 vaccination.

> *"We got an interview for the vaccination training of 1 Day in Bharatpur Chitwan. The public health office of Chitwan gave training to us." IFP-KII_17*

> *"Yes, if it was a minimum of 2-3 days it would be better if they would have detailed knowledge. As we only oriented to them regarding. HSC-KII_20*

5. Challenges perceived at the Initial Phase of COVID-19 Vaccination

The health workers and health administrators at the facilities level faced many challenges during the initial Phase of COVID-19 vaccination. The most common challenges were insufficient vaccine, vaccine hesitancy, vaccination site setup, type of vaccine and doses, obstacles to home visits, low supply of vaccine-related supply, migration, and many more.

Many of the participants reported that there were insufficient vaccines at the first stage of vaccination.

> *"Yes, we demanded but it was not fulfilled." KII_1*

> *"Yes sir, the situation was such that the availability of vaccines was lower than the number of centers." LLFP-KII_10*

> *"Vaccine was enough during the first and second stages. But it was not enough during the third stage." V-KII_12*

> *"Yes it was good but there was not enough vaccine." IFP-KII_14*

However, some participants reported that there were no challenges to the availability of vaccines due to the low population at the Municipality and proper coordination with higher levels.

> *"Yes, perhaps because our population was less and coordination was done well by the health office, we did not feel a scarcity of vaccine." V-KII_16*

The common challenges during the initial phase of COVID-19 vaccination were hesitancy and public reactions. Many participants reported that people had hesitancy to receive the vaccine including health workers and key stakeholders.

> *"I was scared because it was said that people with cardiovascular diseases and other comorbidities would have a bit of a problem due to this vaccine." V-KII_12*

> *"Yes, at first the people were afraid of getting vaccine." HSC-KII_13*

> *"There was a rumor that vaccine caused COVID-19 or people could be infected with COVID-19 during a time of vaccination." IFP-KII_22*

In addition, only a few participants reported that there were no challenges related to the availability of vaccine-related supplies.

> *"Apart from the vaccine, I also require other things like an ice box, vaccine carrier, and ice and these were available." V-KII_12*

Also, only a few participants were reported about religious issues which did not affect the vaccination programs.

> *"Yes, when I came here, I vaccinated them. In the previous location, there was a Tamang community, so there were no Muslims there." IFP-KII_7*

> *"The Muslim community is very small here, but the Muslim community used to arrive first to get vaccinated. They did get vaccinated." HI-KII_8*

In addition, the different types of vaccines and their doses created challenges among health workers due to their choice by people and lack of training for different vaccines and their doses.

> *"As for the vaccine, it is a bit difficult for us to apply doses because some used to prefer Japanese, some Chinese, and some American. There were challenges for us to adjust the doses according to which one he/she was putting." HSC-KII_13*

> *"At first, they used to take only Covishield and later AstraZeneca, and next is (Johnson) yes, there were a lot of people who took Johnson because one single dose was safe and they did not have to take another, that's why people put more emphasis on Johnson." HI-KII_11*

Many participants reported that the people who faced geographical challenges to come to vaccination centers, it was mainly children and elderly people. It also affected in transportation of vaccines in some areas.

> *"Yes, sir, it is challenging for the elderly, pregnant women, and children. This area is not that easily accessible, it's somewhere in the middle too remote, but also not very easily accessible." LLFP-KII_10*

> *"It has affected still our regular vaccines also. So, it had an effect at that time. It is far away from the vaccination center and they have to walk for 2 hours. We could not be able to complete 100%. HI-KII_11*

Few participants reported that they have faced migration activities during vaccination.

> *"Yes and when we realized later, there were many people who said that we took it in another center and there were also many people who migrated to Damak and took the vaccine and it was very confusing for us whether they took it here or there." HI-KII_11*

6. Vaccine distribution process at a local level

The vaccine distribution process includes determining the quantities of vaccines, the vaccine receiving process, the vaccine delivery process, vaccine storage, and daily arrival and logistics.

Many local-level participants reported that they received vaccines from districts. The district health office managed the vaccination supply process at the Local Level. They had supplied it with ice boxes or ice packs.

> *"After the vaccine came, we used to separate centers and do in one center for one day and another for the next day and while we run the program 4-5 days we used to do the same way." HI-KII_11*

> *"It did not use to take a lot of time. From the center, it used to come to the district. After contacting the district, it would be made available to us in 1-2 days. It did not take very long." FM-KII_5*

> *"Two employees of the cold chain of the district used to arrange cold chain in vehicles." IFP-KII_14*

Most of the participants reported that they had sent vaccines to facilities level or vaccination centers through locally available resources. Like porter, cycle, motorcycle, local ambulance, and hire vehicle. At the time of distribution, the health section chief also checked the target population of that particular ward.

> *"We did not have an ambulance at the time and we used to hire ambulances and used municipal vehicles to deliver vaccines." FM-KII_1*

> *"They would go from the district to the rural municipality and from there we would bring them in vaccine carrier. For one day, ice in that carrier would be worked and after that we looked and if the ice plate has to be changed, change it." HI-KII_11*

> *"Office helper would deliver it to the centers. I used to give vaccines in the vaccine box. They take and bring the rest." HSC-KII_13*

> *"We have a total of 8 wards each with their own health institution. We coordinated with those institutions and distributed the vaccines according to their target population." HSC-KII_9*

Many of the participants reported that they returned the vaccine to a higher level after recording its status at the vaccination center in a register and sending it with an ice pack.

> *"Yes, we had to in the later stages. We had to count the vaccines. We did not write down anything or use a handover form. So we used to count the vaccine and return it to the municipality, except the ones that we had to use." HI-KII-8*

> *"In the storage of vaccine, we used to return back after regular vaccination." HSC-KII_13*

> *"Along with that, we used to discard the vaccine whose vial has been opened, and those vaccines that are not opened we used to return them in icepack and store them in ILR." HSC-KII-20*

7. Vaccine Storage and Management at the Initial stage

Vaccine storage and Management at the initial stage includes cold chain room set-up, store capacity, vaccine storage, and Resources.

Many participants had reported that they were availability of electricity for the cold chain room. However, only a few municipalities had a backup electricity plan.

> *"All electricity powered but we have backups for electricity." IFP-KII_22*

> *"At that time, we had a fridge and inverter for electricity cut off but there was no generator but now we are well equipped we have everything now." IFP-KII_17*

Many participants had reported that they had a cold chain storage room, however, many cold chain rooms did not have sufficient space to store vaccines.

> *"It is good. Previously there was a separate room but now due to lack of space with us as we have to upgrade in hospital. We have ILR, we have a fridge to make icepacks and we have a backup of electricity as well." HSC-KII-20*

> *"Yes it was, we did not have a sufficient number of fridges as opened vaccines must have been used so we bought enough fridges and solved the problem." FC-KII_19*

> *"Yes, there is a refrigerator here but we do not keep the vaccines in the domestic refrigerator." HI-HI-KII_8*

8. Meeting and Coordination

At the time of COVID-19, different levels of government had conducted meetings at different levels for proper coordination and coverage of the vaccination. During the COVID-19 period, major stakeholders conducted meetings at the federal level, Provincial level, Local level, and facility level. They also discussed about COVID-19 related issues.

Only a few participants conducted a meeting at the federal level.

> *"No not at all. Mostly in charge used to go in group discussions. At the local level, we do not used to call all at once, we used to call 5-7 health workers and organize the program by maintaining distance." IFP-IFP-KII_14*

However, most of the participants conducted local-level meetings during the COVID-19 period.

> *"Yes, we used to hold the meetings of the management committee at our office and if there was some school program. We used to call teachers of every school and hold the meeting and later we used to conduct programs." HI-KII_11*

"We had to conduct a lot of meetings with the concerned authorities. Tilottama municipality was where the program started most rapidly. Via Bhairahawa and Sunauli checkpoints, a lot of people used to come from abroad." HI-HI-KII_8

Only a few municipalities had held district-level meetings at the time of the COVID-19 period.

"In earlier stages, we had meetings with district-level authorities, municipality level, and ward levels also we planned a number of the required vaccines." ICDHO-KII_15

"We had frequent meetings. We had meetings at the local level, and district level also. We had a meeting with a respected CDO to manage things more efficiently. We had met every day or once every two days." IFP-KII_23

Similarly, only a few facility-level meetings were conducted at the time of COVID-19. However, it was not held regularly.

"Meetings were not always held, sometimes they came every week. We used to contact them through phone and message as we have a group also. When the information was sent from above, for data the main source was FCHVs for us. So, we used to contact them regularly." HI-KII_11

There was no regular schedule for meetings during the COVID-19 period.

"We had no fixed schedule. But we conducted a meeting at the start of the campaign." ICDHO-KII_15

"There was a gap of up to 2-3 months when Covisheild came but at the time of verosel, it used to be on every 28 days. If it is necessary, meetings would be held from time to time." IFP-KII_6

During the meeting, they discussed contact tracing, counseling for families, and measures to stop transmission.

"We discussed mainly contact tracing, counseling for families whose one of the members was diagnosed with COVID-19, measures to stop transmission." HSC-KII_9

"Mainly on increasing coverage. And no one should be left behind including aged people and handicapped." ICDHO-KII_15

9. Monitoring, Evaluation, and Performance

Regular monitoring and Evaluation was conducted during the COVID-19 vaccination campaign. At that time, most participants reported that District health offices, Provinces, and other supporting organizations monitored the vaccination activities.

"We went for follow–up. The vice presidents went for follow-up especially. I also used to go for follow-ups from time to time. The head of the health department and … group and we sat down for a meeting and did a review. We discussed how we could go forward, the problems, and the number of vaccines we had. We took reporting from the health post and Aadhar group." CA-P-KII_18

"Monitoring was from the district level, WHO, and UNICEF. Main monitoring was done for the cold chain whether proper methods and equipment were used or not. Temperature maintenance in the fridge was monitored." ICDHO-KII_15

"No there was no problem. When we went for supervision, there was a line system so there was no problem." IFP-KII_14

Only a few participants reported that it was supported by local representatives.

> *"There was some support from the health office, people's representatives, health workers, FCHVs, and Local agencies. There were situations where they were unable to help and we were unable to explain." IFP-IFP-KII_21*

In addition, only a few participants responded to the challenges of monitoring and evaluation.

> *"There was no higher-level monitoring system in place. We had direct contact with the health department and provided information about the number of vaccinations administered. Coordination was maintained, but there was no further detailed monitoring beyond our local efforts." LLFP-KII_10*

Most of the participants reported that were appreciated by the community, local leaders, and local elected bodies during the COVID-19 vaccination.

> *"I received a lot of appreciation from locals here." FC-KII_19*

> *"They provide us with money for working during the pandemic. This was done all over the country." HI-KII_8*

> *"There were lunch allowances. That used to come before COVID-19. Some allowances were given only from the above district, province, and WHO." HSC-KII_13*

During monitoring, many participants reported that they observed that the health workers were working according to the vaccination guidelines at the vaccination center.

> *"We couldn't modify the guidelines from above, but we did have to make it easier according to our local situation." FDM-KII_4*

> *"The government of Nepal provided guidelines for that. They all followed guidelines." HSC-KII_20*

> *"The process of vaccination was similar to other immunization campaigns, we updated them about the security protocols and guided them accordingly." HSC-KII_9*

10. Vaccination Strategies at the Local Level

Many participants reported that they had developed a vaccination strategy at the local level.

> *"In our ward, we decided to give vaccination to the basic of age and decided to make a schedule and give them. We have sent staff respective staff from our health post, and hospitals, and started vaccination at the same time everywhere." FC-KII_19*

> *"Our strategies were based on budget, on how we would spend our budget. We made it in a way that would not clash and would be similar to the central and provincial level's strategy. We made our plan in such a way that there would be no backlash against the budget that we had made. We made sure of this and worked. We made plans about how to spend money for the COVID-19 program. This is how we did it." CA-P-KII_18*

> *"First of all, the target program will not be completed until the employees of the relevant agencies are oriented and trained and the listed information is obtained so that the employees can be organized, a coordinated thing should be done to give a message about how to stay away from the effects and effects of civil society be done. I think so." FC-KII_2*

The local level did not make their own written standards protocol to manage the vaccination program.

> *"In my rural municipality, provisions for training were limited. We had orientation programs for workers, and the process of vaccination was similar to other immunization campaigns, we updated them about the security protocols and guided them accordingly. HSC-KII_9*

11. Information management and Community Involvement

The key stakeholders related to health received messages from higher levels and spread that information in the community through different approaches like; radio jingle, Local FM, News, Social media, Pamphlet distribution, and FCHVs mobilization.

> *"Yes, without forming a crowd, we spread awareness from a distance via radio." FM-KII_5*

> *"It was spread through radio but we knew it from Facebook, newspaper." IFP-KII_21*

> *"The district used to do it through FM and the date would be the same according to the district." HI-KII_11*

> *"Micking was also arranged from the beginning. Banners were used to run the vaccination campaigns. We used to inform people about the vaccination sites, and their consequences before." IFP-KII_6*

Most of the participants reported that there was a high level participation of community for COVID-19 vaccination.

> *"I was invited to a seminar for the first time when the province was conducting a vaccination campaign to discuss the condition of vaccinations and the management of their citizens and municipalities." FC-KII_2*

> *"Primary, there was the main committee. We would meet with the ward chairpersons as needed to discuss what had to be done in their wards. We dedicated specific individuals for health-related tasks, and we also provided contact numbers." FDM-KII_4*

> *"I went to the community. We had made quarantine centers in schools. We went there as well. The people who had just returned from other places were made to stay in these centers before going to their houses. Food and shelter were arranged by us." FM-KII_5*

Most of the participants reported that there was much misinformation spread in the community regarding COVID-19 vaccines. However, they addressed that information from their perspectives.

> *"Yes, it was difficult to counsel people. We organized programs such as interaction programs, did miking, and gave awareness programs. We initiated by receiving vaccination by ourselves which set an example that it would be of no harm and was very effective." FC-KII_19*

> *"Fear and false information were going around. We corrected the false information." FM-KII_5*

> *"We used to tell them that if one person took it and the other did not, then there would be risk so the neighbors would come to press it on themselves and those who left would also take it later." HSC-KII_13*

Few participantsreported that they planned to be informed about the vaccination to unreached people and administered it by reaching them.

"People with disabilities were prioritized to get the vaccine at first." HI-KII_8

"There is Musari community which is difficult and uneducated. The people of that community did not accept so we have to go there anyhow." IFP-KII_6

'If someone refused to get vaccinated, we would go door-to-door with the ward chairperson's agreement and counsel them, explaining that if one person did not get vaccinated, it would affect others." IFP-KII_7

12. Budget Planning and allocation

Many local authorities have added the municipality budget in COVID-19 management and vaccination. Mainly, it was used in transportation, health workers' allowances, and information sharing with the community.

Participants reported that they had identified resources themselves and managed them in the COVID-19 program at the local level.

"We decided to provide remuneration for 1 month from the people's representatives itself. Then we requested teachers at school about how much they could give whether it was for two days or five days. All organizations, institutions, and cooperatives helped us. They said they would help the municipality and at that time, around six lakhs rupees was given by them." CA-P-KII_18

"Also at that movement, we did not have enough infrastructure as well we had to manage staff along with that, people declined to help us make quarantines as they believed that it would spread diseases. It was very challenging. We used to conduct meetings very frequently even multiple times a day." FC-KII_19

During the COVID-19 period, few elected stakeholders had highly prioritized COVID-19-related activities and added more municipality budget for COVID-19 intervention and prevention.

"The citizens also contributed. During that time, we could not focus on infrastructure development; we felt that saving lives was the priority, and infrastructure could come later, so we allocated the budget accordingly. FDM-KII_4

Most of the participants reported that they received donations from different supporting organizations.

"As it is only the rural municipality of Chitwan we also got several donations from various organizations, NGOs, and INGOs as well." FC-KII_19

"No not at all. Allocation of the budget is all from the district such as food expenses, and transportation expenses. These all are allocated by the province." HSC-KII_13

"it has been with the help of supporting organizations. A review was done at some of the meetings through World Vision, Rehab Program." IFP-KII_21

Regarding personal support, we did not find more responses on personal support taken for COVID-19 at the local level for budget but individually certain people help to address the other problem in the community.

"We meet them (community people) and talk to them as in the beginning when the symptoms of COVID-19 appear, they do not touch people. If they think they are infected, more people run instead of getting treatment. We used to counsel them and in some situations." FC-KII_2

In the initial phase, there was not enough budget. However, after allocating the budget from the municipality for COVID-19, the situation changed. Many elected participants claimed that they prioritized their municipality activities and allocated more budget to the COVID-19 program.

> *"We determined how much money we can spend from the danger management budget treasury. Political parties also helped. Organizations and institutions also helped. From that budget, we spent money for those who directly went to the field and we gave services and facilities." CA-P-KII_18*

> *"I saved people by saving another budget of other sectors on health." FC-KII_19*

> *"The municipality said it would do it if necessary. There was no budget before, but seeing the possibility that the situation getting a little complicated, some budgets were managed and done for that. The contracts of two employees were extended by two years. FC-KII_2*

13. Monitoring, Supervision, and Evaluation strategies

In the COVID-19 vaccination program, different strategies were used to monitor the vaccination. It includes data tracing, Data sharing, Data security and accuracy, program review, etc.

Few participants reported that they had reviewed the program during the COVID-19 vaccination period.

> *"Yes, there used to be a review meeting like what happened today? Was there any problem or not? At last, we used to review, how many vaccines were used and how many were left. Is there anything missing or not?" IFP-KII_14*

> *"During the review, we are the focal person reviewing at our hospitals with charge initially. Then sometimes there would be in health department but there is not the focal person in the district." IFP-KII_6*

Only a few participants shared their experience of data sharing during COVID-19 vaccination.

> *"Yes, recording was done by hand. Reporting was done via the Messenger group." HI-KII_8*

> *"No, then I used to click a picture of it and send it via Messenger to the Municipality official who would adjust it. After a month when it would be time to submit the report, then they would be sent it." V-KII_12*

In addition, many participants shared their ideas on data tracking during COVID-19 Vaccination.

> *"According to the target given by the district. We used to see how much the vial was spent and how many people used it and how much was wasted because some time while putting it, whether the syringe fell or not." HSC-KII_13*

> *"Yes, we did. We go through household as well in case we miss someone. We used to count for the people if I missed anything. I used to be conscious that from the side I complete everything." IFP-KII_17*

> *"We asked for the data by phone. Through HMIS 9.3, we used to fill and ship once a month. In that way, we had done entry." IFP-KII_21*

Few participants reported that they had performed certain activities for data security and accuracy.

"During the calculation of expenses, we verified the data by comparing the number of reports and sent vaccine and returned vaccine. ICDHO-KII_15

"In the beginning, there was nothing like that, After that, along with the DHIS tools, the vaccine was initially supposed to be done monthly reporting but later a software was developed by which the daily reporting can be done from our municipality, health institution and we received information about it and received training and through the DHIS tools, we had managed to report the vaccine from all nine institutions, first from the municipality and then from all nine institutions." IFP-KII_12

14. Preparedness for Future pandemic like COVID-19

There are certain strategies like early detection, early capacity building, Resource identification and management, community involvement, and vaccine preparedness. These steps will be fruitful in preparation for the pandemic in the future.

Many participants shared their ideas about early capacity building for future pandemics.

"According to me when I was the chairperson of a rural municipality by seeing their work I felt it was sufficient. In our area even though it was pandemic our collaboration of public representatives and health workers managed the pandemic very well." FC-KII_19

"It used to come every time before conducting the vaccination program and we used to provide training to all the health workers and start the program." HSC-KII_13

Few participants shared their ideas to detect cases in the pandemic period.

"According to the data provided by FCHV, we come to know the target population of the elderly and others. According to that, we distributed the vaccine in different wards." ICDHO-KII_14

"In one quarantine center, it was 100-150 people whose food, shelter, and water had to be managed. Isolation was to be maintained. Security personnel were placed. This management was done by us." FM-KII_5

According to participants, community involvement is a vital step in fighting with pandemic in the future.

"The general public also supported us greatly. I feel like we did good work from the beginning, setting up a 200-bed quarantine facility, including one for women." FDM-KII_4

"People representatives increase the trust of the people." V-KII_16

Conclusion

The study explores the complexities of the COVID-19 vaccination process at the local level, focusing on information dissemination, distribution, and management. Most participants received formal information from authorized government agencies, supplemented by community health workers like Female Community Health Volunteers (FCHVs). Vaccine delivery relied on various transportation methods, with effective planning and communication playing crucial roles. Safety measures were generally followed, though there were challenges with personal protective equipment (PPE) availability. Training for health workers was common, but support staff often received limited training, leading to capacity challenges during the initial rollout. Key obstacles included vaccine supply shortages, hesitancy, logistical issues, and geographical accessibility, particularly affecting vulnerable populations.

Vaccine distribution involved managing storage and delivery, typically supported by district health offices. While cold chain facilities existed, limitations in space and backup systems were noted. Coordination among various government levels was essential, and regular monitoring by organizations like WHO and UNICEF ensured vaccination activity and cold chain maintenance. Local authorities tailored vaccination strategies based on community needs, yet lacked distinct written protocols. Budget allocations focused on transportation and community information, with participants recognizing the importance of securing additional resources. Strategies for future pandemic preparedness were also highlighted, emphasizing early detection, capacity building, and community involvement.

Recommendation

Develop comprehensive training initiatives for all health workers and support staff involved in vaccination efforts. This should include ongoing education on safety protocols, logistics, and community engagement to strengthen capacity and preparedness for future vaccination campaigns.

Invest in expanding cold chain facilities and backup systems to ensure reliable vaccine storage and distribution. Adequate infrastructure should be established to meet demand, especially in remote or underserved areas.

Increase efforts to engage community health workers and volunteers, such as FCHVs, in information dissemination and vaccination campaigns. Addressing misinformation through targeted communication strategies can help build public trust and reduce vaccine hesitancy.

Establish Clear Protocols: Develop and document clear written protocols for vaccine distribution and management, including contingency plans for shortages or logistical challenges. This will facilitate better coordination among health authorities and streamline the vaccination process.

Secure Sustainable Funding: Advocate for sustained budget allocations and additional resources from government and non-governmental organizations. This should focus on enhancing logistics, community outreach, and pandemic preparedness initiatives to ensure effective responses to future health crises.

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Annex-1

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