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Reaching the unreached through building trust: a mixed-method study on COVID-19 vaccination in rural Lao PDR

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ABSTRACT

Introduction The global COVID-19 vaccine rollout has been impacted by socioeconomic disparities and vaccine hesitancy, but few studies examine reasons for changed attitudes. In Lao People's Democratic Republic (Lao PDR), a nationwide government-led initiative was developed in response to COVID-19, focused on community health ownership and trust in primary healthcare. The intervention team including health and governance sectors conducted capacity-building workshops with local staff and community representatives and visited villages for vaccination outreach. This study investigates the impact of this intervention on COVID-19 vaccine acceptance in rural communities.

Methods Conducted in Xiengkhuang province, Lao PDR, from December 2022 to February 2023, the study employed a sequential mixed-methods research design. Data on vaccinated individuals from 25 villages were collected from 11 primary healthcare units; pre-post analysis was applied. Qualitative data, gathered through interviews and focus group discussions with villagers, village authorities, health staff and local government (n=102) in six villages, underwent inductive thematic analysis.

Results First-dose vaccine uptake after the intervention increased significantly (6.9 times). Qualitative analysis identified key reasons for vaccination hesitancy: (1) mistrust due to rumours and past experiences; (2) poor communication and inconsistent messaging and (3) challenges in access for priority groups. Influencing factors during the intervention included (1) effective local-context communication; (2) leveraging existing community structures and influential individuals in a multisectoral approach and (3) increased community motivation through improved satisfaction, ownership and relationships.

Conclusion This study highlights the impact and methods of building trust with unreached populations in health interventions, emphasising locally led solutions. Successful reversal of vaccine hesitancy was achieved by addressing root causes and fostering ownership at community and local government levels through a 'positive approach'. This diverges from conventional supplemental immunisation activities and holds potential for systematically building trust between unreached populations and health systems. Further research could explore the impacts of routine vaccination for sustained improvements in health equity.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ The COVID-19 vaccine rollout has suffered from significant disparities in uptake and access across national and socioeconomic contexts worldwide and is impacted by poor trust towards health services and governments.

⇒ Lao People's Democratic Republic (Lao PDR) has experienced many logistical and sociocultural challenges in conducting immunisation, including effective communication within an ethnolinguistically diverse society.

⇒ Multisectoral engagement, strong local governance and community engagement are important foundations for sustainable health interventions.

WHAT THIS STUDY ADDS

⇒ Provides case study evidence that vaccination uptake significantly increased through directly addressing the root causes of low confidence, such as fears about vaccine safety and poor relationships with health staff.

⇒ Demonstrates that changes in attitudes towards vaccination are due to the impact of trusted people creating confidence through two-way, effective communication and through understanding and building on local governance and community structures.

⇒ Provides novel evidence that using a positive, relational, culturally sensitive approach to engaging with communities for health results in increased motivation at an individual, community and local government level for sustainable improvements.

INTRODUCTION AND BACKGROUND

COVID-19 vaccination expanded at an unprecedented speed globally, but significant

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Other interventions could employ a similar approach to engaging with (especially rural and ethnic minority) populations in low-income and middle-income countries effectively for building vaccine confidence.

⇒ Supplementary immunisation campaigns can potentially be used to strengthen routine immunisation through creating a favourable 'vaccine culture'.

⇒ Provides a foundation for developing greater contextual sensitivity within health interventions and contributes to the development of government policy on health equity in Lao PDR and elsewhere.

disparities remain; by 2022, only 16% of the population of low-income countries had received first-dose vaccines compared with 80% in high-income countries.[1] Vaccine acceptance in Southeast Asia has been higher in general compared with other regions.[2] However, rural, older populations with lower incomes and education levels were far more likely to be unvaccinated[3] while attitudes towards COVID-19 vaccination may also change over time.[4] Despite the global health policy significance, few studies have explored the reasons for changes in vaccine acceptance and hesitancy, mainly in high-income contexts.[5 6]

The Lao People's Democratic Republic (Lao PDR) government-led response to low vaccine uptake in underserved communities offers unique insights into this research gap. Lao PDR was the last country in Southeast Asia to register COVID-19 cases with the lowest confirmed number by mid-2021 (2825 on 13 July).[7] Vaccine rollout officially began in February 2021 and urban fixed-site large vaccination events followed in April 2021. Vaccination activities subsequently expanded to all provinces through fixed vaccination sites and outreach and mobile strategies, reaching 76.2% of the population with a complete primary series and 31% with one booster by December 2022.[8] Initial uptake was high on average but dominated by urban centres, while Vientiane Capital had over 90% of the population fully vaccinated by June 2022, the mountainous and ethnically diverse areas characterising much of the Lao countryside registered vaccination rates as low as 50%.[9] Logistical constraints such as transportation and staff shortages and difficult road conditions impeded access to remote communities.[10]

The rural–urban disparities in COVID-19 vaccine uptake highlighted challenges impacting the Lao PDR routine vaccination programme. On the health system side, this included limited human resources and lack of training, difficult geographical accessibility, access to funding, lacking capacity for policy and planning, and vaccine supply chain and storage logistics.[11–13] From the demand side, routine immunisation further struggled with low antenatal care attendance, high homebirth rates, poverty and caregivers' low level of education.[14 15] Ethnic diversity is also a factor in vaccine uptake; less than 30% of children aged 0–3 belonging to the Hmong-Mien ethnolinguistic category were fully vaccinated in 2017, compared with almost 60% of lowland Lao children.[16] COVID-19 vaccination brought additional challenges to these fundamental structural problems, such as rumours about vaccine side effects on social media or the need to reach priority groups.[17]

The response to the challenges posed by the COVID-19 pandemic and recovery in Lao PDR provides important lessons about factors influencing vaccine uptake—and policy-makers' ability to influence them. The CONNECT Initiative (Community Network Engagement for Essential Healthcare and COVID-19 responses through Trust) is led by the Ministry of Health (MoH) and Ministry of Home Affairs (MoHA) with support from the WHO. It aims to build trust between communities and healthcare providers, or more widely, health systems, through participatory workshops and village planning towards better community health such as increasing facility births and vaccine uptake. By encouraging the community to support vulnerable members, it aims to build health equity through engaging with unreached populations. It also develops the capacity of district authorities and officials from the health and governance sectors to engage village authorities and support communities to scale up and sustain good practices through multisectoral action including the social determinants of health and improved communication for health.[18–21]

A key opportunity to explore the ability of the CONNECT Initiative to overcome the barriers of COVID-19 vaccine hesitancy arose in late 2022 when Lao PDR organised the first national sporting event since the beginning of the COVID-19 pandemic. The event was expected to gather 20 000 people in Pek district (more than 50% of the district's population) in Xiengkhuang province. As part of outbreak preventive measures, COVID-19 vaccination outreach visits to villages with low COVID-19 vaccine coverage were conducted in Xiengkhuang province. The government used the CONNECT Initiative to develop district and village participatory planning as an approach to increase uptake of COVID-19 vaccination, particularly for those who had not yet received any doses of COVID-19 vaccination. The aim of this study is to explore whether and how this intervention improved vaccination uptake among hard-to-reach populations in Lao PDR and the potential impact on health equity.

METHODS

Study site

This study was carried out in all seven districts of Xiengkhuang province which is located 400 km northeast of Vientiane, the capital of Lao PDR (figure 1). Xiengkhuang is characterised by ethnically diverse rural communities—the majority belong to the Hmong-Mien ethnolinguistic family, with other Mon-Khmer groups present. The province has 44 000 households with approximately 244 684

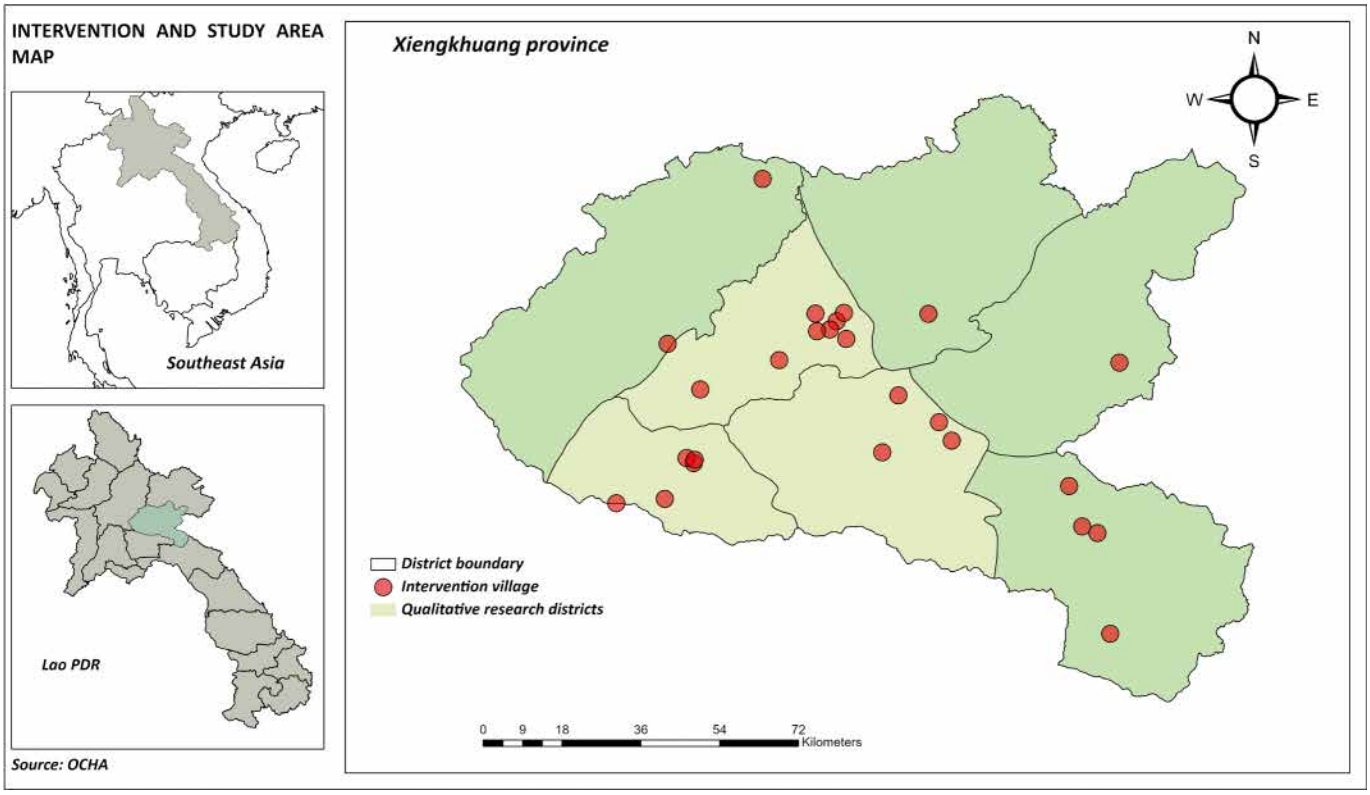

Figure 1 Map showing the location of the intervention and study area (source: UN Office for the Coordination of Humanitarian Affairs). Lao PDR, Lao People's Democratic Republic.

inhabitants, of which women and men represent similar proportions. The literacy rate of the population aged 15 and above is lower among females (79%), in contrast to 90% for males. About 62% of the Xiengkhuang population live in rural areas.[22] The main livelihood in this area is shifting agriculture (upland rice farming), and production of cassava, bananas, watermelon, and rubber plants, livestock keeping, and trading, so villagers often spend many weeks or months away from their village during cultivating and harvesting season.

Intervention

In preparation for outreach activities prior to the national games, a planning meeting was conducted with provincial and district-level officials from the health and governance sectors, led by MoHA with support from MoH. This aimed to clarify the objectives of the intervention and identify target villages with low uptake of first-dose COVID-19 vaccination, weak engagement with authorities in previous vaccination outreach visits and potential risk of outbreak. It built on the existing governance structure to ensure commitment from district officials, leading to a set of plans agreed by each district (vice-)governor. Following this, central, provincial and district staff from MoHA and MoH, with WHO support, organised a 2-day workshop in each district with village chiefs from target villages and health centre staff (figure 2). This aimed to build collaboration and trusting relationships among village representatives, healthcare providers and other relevant officials to jointly visit target villages to increase COVID-19 vaccine coverage. It also introduced key principles: (1) non-hierarchical, two-way, respectful communication—participants were encouraged to have genuine care and interest in individuals in understanding their fears, concerns and perspectives; (2) identifying influential people to

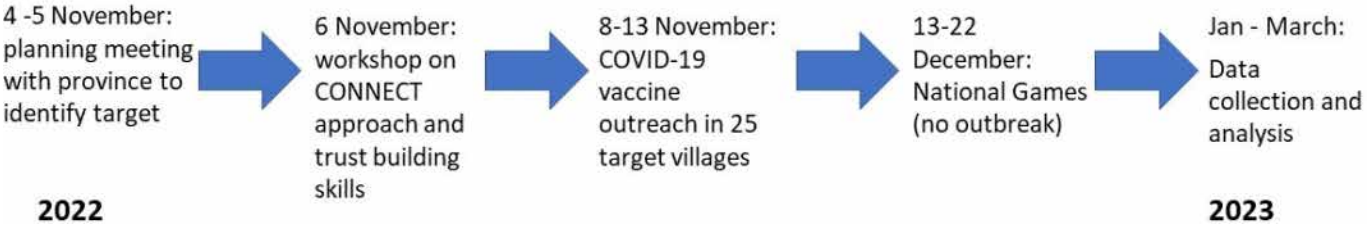

Figure 2 Timeline of the intervention and research. CONNECT, Community Network Engagement for Essential Healthcare and COVID-19 responses through Trust.

engage villagers as a collective team, such as village authorities (including village chief or deputy, village health volunteers, Lao Women's Union, Lao Front for National Development, Lao Youth Union), cultural or religious leaders, or friends and families and (3) a 'positive approach,' focusing on finding the specific resources and strengths of each village, as opposed to the traditional problem-based approach. During the workshop, central staff, with support from WHO, conducted games and roleplays for team building, understanding the principles and capacity development of communication skills through a participatory approach.

Visits to the 25 target villages took place simultaneously over a week by teams including district officials from health and home affairs, governor's office staff, health centre care providers from selected districts and central facilitators. Together with village representatives, they visited households who had not yet received any doses of COVID-19 vaccines. People who met the criteria (>6 years old, no fever) and especially priority groups (>60 years/chronic health conditions/pregnancy) and agreed were vaccinated at home or in a village outreach site. Throughout the household visits, central facilitators demonstrated and encouraged the use of CONNECT principles in their communication with villagers.

Data collection and analysis

This study adopted a mixed-methods sequential explanatory design. Quantitative research was first conducted to evaluate the trend in vaccine coverage before and after the intervention, followed by qualitative research to understand why the change in coverage occurred.

Quantitative component

Data were collected from 25 villages in 7 districts of Xiengkhuang province which were included in the intervention. Data were collected from four vaccine campaigns; three visits prior to the intervention (visit -3, visit -2 and visit -1), and from the visit with intervention between 9 November 2022 and 16 November 2022 (Figure 2). For visit -3, data were obtained from 13 villages only. Two villages in one district (villages 5 and 6) were excluded from further analysis because they used a different approach (school-based vaccination) and had outlier data, which were considered not comparable to the other villages that did not apply the same strategy.

Health staff from eight health centres and three district hospitals in Xiengkhuang province recorded the number of people who received the COVID-19 vaccine during vaccination campaigns. The existing data management platform only has access to aggregated data from each health centre. Therefore, the administrative vaccination records were obtained from each participating health centre via telephone calls and the data was collated for analysis.

The quantitative analysis involved a precomparison and postcomparison to evaluate whether the number of people who received the COVID-19 vaccine changed in target villages after the intervention. Data on the total number of people who received the COVID-19 vaccine at each campaign visit were summarised to trace changes over time in each village. The median number of people vaccinated per campaign visit across all villages was then calculated. We used the Wilcoxon rank-sum test to compare the numbers, as the data distribution was skewed. We used a significant level of 0.015 (two sided) in the statistical analysis after applying the Bonferroni correction adjustment. We also performed the same analyses including the two villages with outlier data.

Qualitative component

Qualitative data collection took place January–February 2023, 2 months after the intervention (figure 2). Among the 25 villages included in the intervention, 6 villages in 3 districts of Xiengkhuang province were selected based on the criterion of showing a significant increase in people who had received the COVID-19 vaccine for the first time after the intervention (guided by results from the quantitative component). People from these villages were selected for the study according to one or more of the following criteria:

- Villagers who received the COVID-19 vaccine for the first time after the intervention.
- 60+ years old or with a physical disability.
- Member of village authorities and mass organisations (village chief or deputy, village health volunteer, Lao Women's Union, Lao Front for National Development, Lao Youth Union).
- Cultural or religious role (Hmong ethnic clan leader, church leader).
- Health staff (nurses, primary healthcare doctors, midwives) in health centres which served these villages.
- District and provincial health officials who had been involved in the intervention.

Data were collected through semistructured interviews (16) and focus group discussions (11) of between 4 and 21 participants; a small number were also interviewed by phone. Focus group discussions included either (a) community members and representatives or (b) health staff. Interviews were conducted with (a) individuals holding a community, healthcare or local government leadership role and involved in the intervention and (b) people who had received a first vaccine dose after the intervention to gather more in-depth information on their experiences.

The questions aimed at gathering sociodemographic information and learning about previous experiences with health services including vaccination, the main reasons why people had not been vaccinated in the past and why they had chosen to receive the COVID-19 vaccine after the intervention. The questions further aimed to identify the people with the most influence on

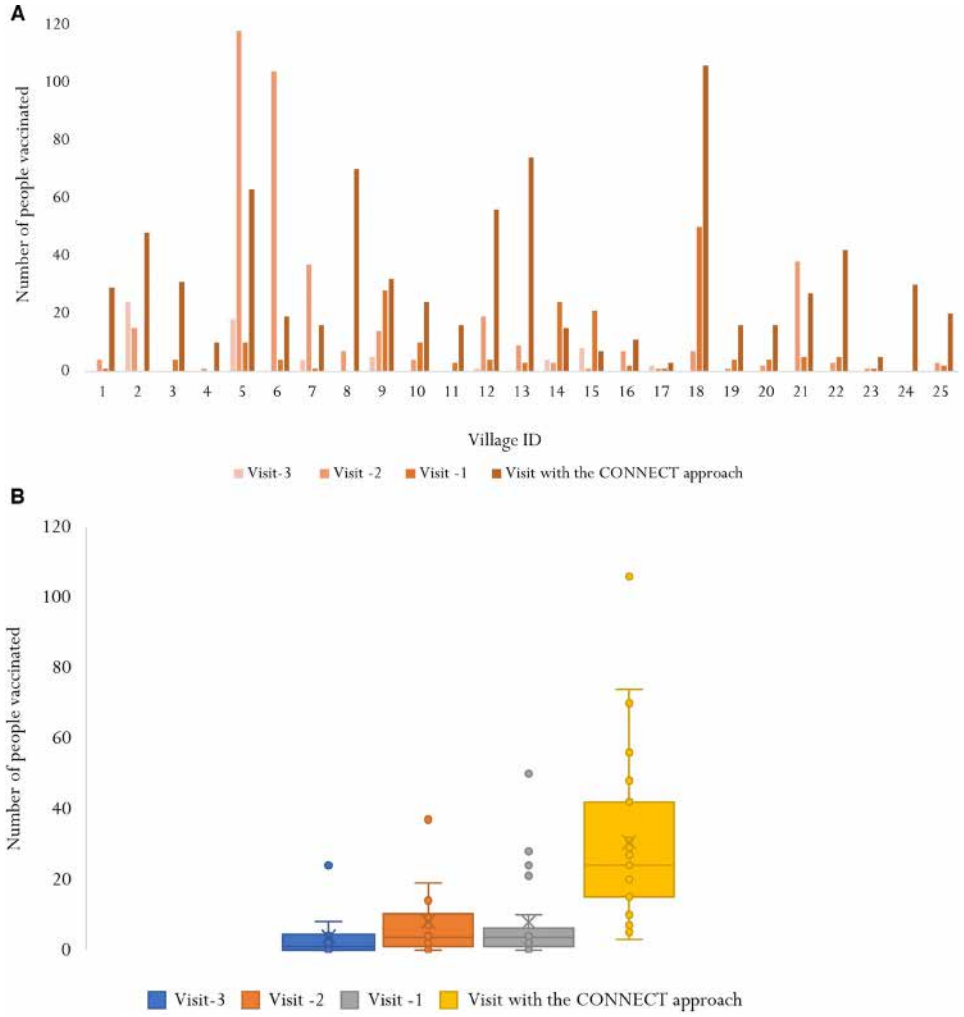

Figure 3 (A) Change in the number of people receiving the first dose of COVID-19 vaccine by village. Villages 5 and 6 that implemented school-based campaigns were excluded from the main analyses as outliers. (B) Box plot showing the number of people vaccinated over 4 campaigns. Number of villages included in Visit-3, Visit-2, Visit-1 after intervention were 13, 22, 22 and 23.

decisions about vaccination and note ideas and suggestions for improvements in future campaigns. The interviews and focus group discussions were conducted in a mixture of Lao and Hmong language, depending on the proficiency of the interviewees, with the assistance of a Hmong speaker. All interviews and focus group discussions, lasting between 20 and 90 min, were audio recorded. Those conducted in Lao language were transcribed and translated to English, and those conducted in Hmong language were summarised in Lao language and translated to English.

Verbal consent was sought from each study participant who received information about the study and were assured that discussions were kept confidential. In the interviews and focus group discussions, the interviewers asked permission to audio record and take notes. They were informed that their participation was voluntary and they could withdraw from the interview or discussion at any time without consequences. Special consideration was given to gender, cultural and language aspects—all participants were invited to discuss in the language they felt most comfortable with, and women were encouraged to speak or interview separately when deemed appropriate. As many participants did not have Lao language literacy, written consent was not requested—this was approved by the ethics committee.

The data were compiled in Excel, analysed by comparing question responses and manually coded for themes using iterative inductive thematic analysis. The main themes and subthemes are reported in the results, supported by verbatim quotes extracted from the data and shown in a table. Data saturation was judged sufficient when no new information emerged from the different data collection methods, and in analysis after no new themes emerged after multiple reviews of the data.

Patient and public involvement

Patients and the public were closely involved; the qualitative portion aimed to first capture their main concerns and perspectives on vaccination and the intervention, which was used to inform further questions and outcomes. The selection of study sites and

Table 1 Factors which influenced people being vaccinated for the first time after the intervention

Main factors	Specific reasons	Examples given by research participants	Example supporting quote
Effective communication and advocacy methods and information dissemination tailored to the local context	Active and well-coordinated approach by vaccination team	Liaising with village authorities to locate houses of unvaccinated people	'(I)f some people don't come, he (village chief) will call them and share information about who exactly didn't get it yet so we can visit their houses.' (health centre staff)
		Earlier and more coordinated planning made it easier to organise and notify people	'The purpose was clear and they coordinated with many people – before we didn't even know it was happening, and so we weren't in the village.' (villager)
	Providing clear, consistent, and comprehensible information about vaccination	Holding well-planned information sessions prior to outreach	'We held a 2 day village meeting before the intervention to explain and share information. Because we planned this in advance, 70 people came and then they had more trust in the vaccination team.' (local government staff)
		Tailoring information given to address concerns of specific groups, for example, elderly, disabled	'Before we heard that old people should not get the vaccine. But now I learnt that elders and people with chronic diseases are at high risk from COVID-19, and we will be safer if we get vaccinated.' elderly villager)
		Providing and referring to evidence and encouraging people to make informed decisions	'We want the vaccinators to first ask us about our health, and then after we have information, give us the choice whether or not to be vaccinated.' (village ethnic leader)
		Giving consistent messages and communicating honestly without withholding or misrepresenting information	'To communicate better with Hmong people, we must be sincere and honest. These things can truly build trust, only one lie can break trust forever.' (Lao Women's Union representative)
	Vaccination team using active listening and one-to-one communication	Respectful communication to build trust	'If villagers don't follow our instructions it means they do not trust us, so we kindly provide them with enough information and reasons to get vaccinated, but never in a threatening way – if even one of us expresses unkindness to them, next time they will not talk to us. So we talk with them softly and help them to understand.' (village chief)
		Talking to people one-to-one, listening to concerns and responding in a caring, personal way	'Even after they came to my house I was still afraid… But when I talked one to one with (CONNECT team member) she explained that even if I have a chronic disease I can still get vaccinated, and she waited with me to see if I'm ok, and called me after 2 days to ask me how I'm feeling. This never happened in the past, it's because she used motivating words and was so kind.' (woman with disability)
		Providing follow-up and reassurance about side effects	'We explained to the people that if they got any bad effects from the vaccine, they can call us – in the next round I believe people will come easily because the fear has gone.' (health centre staff)
	Cultural sensitivity and adaption of messages to the local context	Speaking to people in their language and/or asking trusted people to assist in translation and advocacy	'They didn't answer even when we tried to motivate them because they were not confident to speak Lao. But when we spoke in Hmong the situation totally changed. That's why we should involve the singsao (ethnic leader) because usually they can speak Lao and can help explain.' (local government staff)
		Learning which communication methods are preferred by different groups	'Sometimes, the villagers didn't come even they were invited by head of village or health centre staff, so we used the megaphone to explain about the benefits of vaccination in Hmong language… The villagers were interested in the audio story – it was like a documentary about our work and it was loud enough for all villagers to hear. In only 1 day almost 200 people received vaccination.' (local official)
		Understanding how different religious or ethnic groups within communities interact to improve communication	'In my experience, the church leaders aren't against vaccination, but the issue in the past has been wrong information and poor communication, so we need to think of better ways to involve them.' (CONNECT team member)
	Finding supportive motivational factors	Finding and focusing on sources of positive motivation rather than using fear or threatening non-compliance	'I wanted to go to the National Games and the Hmong new year celebrations, and they (vaccination team) explained to me that it would be safer for my family if I got vaccinated first.' (villager)
Utilising existing community structures and identifying influential people in a multisectoral approach	Identifying and involving people with influence	Identifying the most influential person(s) in the community on a case by case basis	'I found the head of the village was the person whom the villagers trust the most, and also the ethnic leader is usually the most respected leader among the Hmong; we learnt that if the ethnic leader gets vaccinated others will follow.' (local health official)
		Advocating to and involving influential people, especially those who have been sceptical	'We trust what the village chief tells us. In the past he never got vaccinated, so we didn't either – but now he did and he also explained the benefits to us, so we followed him.' (villager).
	Involvement of governance sector and especially high-level support	Presence of many people and sense of significance	'It (the intervention) felt like a big event – so many people came to the village that it gave me confidence.' (villager)
		High-level government officials visiting the community, especially from same ethnic background	'We believed the doctor who came (from the provincial health office). We trusted him and wanted to listen to him, because he's Hmong and also has a high position – he explained well and we understood.' (villager)
	Gaining confidence from experience of peers and past experience	Seeing peers being vaccinated without adverse effects	'I was afraid, until I saw my neighbour being vaccinated and she told me she felt fine. Then I agreed to be vaccinated.' (villager)
		Previous positive experiences of vaccination or stories from others	'I have five children, one didn't get vaccinated – he got sick and couldn't get treated even though he went to the hospital, after 3 months he died. My other children recovered easily from illness.' (villager)

Continued

Table 1 Continued

Main factors	Specific reasons	Examples given by research participants	Example supporting quote
Shift towards a more people-centred and positive approach	Improved motivation and ownership at community level and relationships with the health sector	Sense of satisfaction and enjoyment in work by village authorities	'I felt I could do my job well, and I was happy that many people understood and came for vaccination, so it will be easier next time.' (Lao Women's Union representative)
		Increased motivation and inspiration for future activities	'From joining the workshop I learnt how to integrate our activities and it helped us to understand how we should work together, authorities with the communities. Now it is so clear and we know what we have done well and what we should improve in the future.' (head of village cluster)
		Improved relationships and trust between community and health services	'I feel the relationship between the community and health centre has improved a lot – the most important thing for people to use services is trust.' (health centre director)
	Change in attitudes and behaviour of government staff	Personal experience of intervention method leading to changes in attitude about their role and responsibility for community health	'I feel motivated to continue supporting CONNECT because I see can see the real situation, the changes in people's perspectives and motivation to do something for their own community, instead of someone going there and asking them to do it.' (local government staff)
		Changes in behaviour towards vulnerable community members, such as making home visits	'It's very different, because before they told us to go to the hospital, but this time for people like me who cannot go there, they came to our houses to give us the vaccination and talk with us.' (woman with disability)

inclusion of participants was led by local government staff and community leaders who were also a key part of the data collection process.

RESULTS

Quantitative results

Increase in first dose vaccine uptake after intervention

The number of people vaccinated per village and the median over four campaign visits in 23 villages are summarised in figure 3A–C. The number of people vaccinated at the visit with the intervention was highest in all except four villages (excluding villages 5 and 6) (figure 3A). The total number increased over time, being highest at 704 after the intervention, followed by visit -2 with the total number of 177. The median number after the intervention was increased from 3.5 at visit -1 to 24 at visit after the intervention, a 6.9 times increase (figure 3B). The Wilcoxon rank sum test showed that the number of vaccinated people after the intervention was higher than at visit -3 ($p<0.001$), visit -2 ($p<0.001$) and visit -1 ($p<0.001$), respectively. No other activities were implemented to increase COVID-19 vaccine coverage in the target villages during the study period.

Sensitive analyses including the two villages with outlier data are compatible with the results of the main analysis and are presented in online supplemental figure 1.

Qualitative results

Background characteristics of participants

In total, 107 people were included in the study, aged from 16 to 92 years old. 15 in-depth interviews were conducted with villagers (2M, 2F), village authorities (2M, 1F), religious or ethnic leaders (3M), village health volunteers (3F), district health officials (1M) and provincial health officials (1M). Focus group discussions included 92 people: villagers (36M, 40F), village authorities (7M, 2F) and health staff (4M, 2F). While the village focus group discussions had an even gender balance, the higher proportion of men included in the other groups was reflective of the higher proportion of men who had roles as village, district or provincial authorities. The majority of the participants identified as Hmong ethnicity (95 people, 88.5%), with others identifying as lowland Lao (10, 9.3%), Khmu (1, 0.1%) and Phuan (1, 0.1%). The majority religion was animism (87, 81.3%), followed by Buddhist (12, 11.2%) and Christian (8, 7.5%).

Use of healthcare and knowledge of vaccination

The villagers commonly used government health facilities including local health centres and district and provincial hospitals. In all villages, some people also used traditional medicine, including herbal remedies made at home and conducted spiritual rituals. In most Christian villages, the church leader also visited people to offer prayers when they were sick. The majority of people interviewed were aware that COVID-19 outreach had been conducted in their village at least once before the intervention and appeared to have a good understanding of the general purpose of vaccinations, giving explanations such as *'It's like an army in the body to protect against diseases coming in.'* Village health volunteers and others involved in childhood vaccination could name vaccine-preventable diseases such as measles.

Reasons why people had not been vaccinated prior to the intervention

Three main reasons contributed to villagers being unvaccinated prior to the intervention, and after intervention for the small proportion who did not receive the vaccine. The first and most common reason was mistrust. This was partly fuelled by rumours of severe side effects shared through social media, confusion over why some vaccines needed more doses and accusations of preferential treatment. Mistrust also stemmed from concerns of vaccine safety due to lack of information about the quality of the medicines and a previous clause in the consent form which stipulated that the government had no responsibility for any adverse effects. Mistrust was further fuelled by more fundamental relationships with the healthcare system. This was especially pronounced among women—one of whom expressed, '*If we trust the health centre staff*

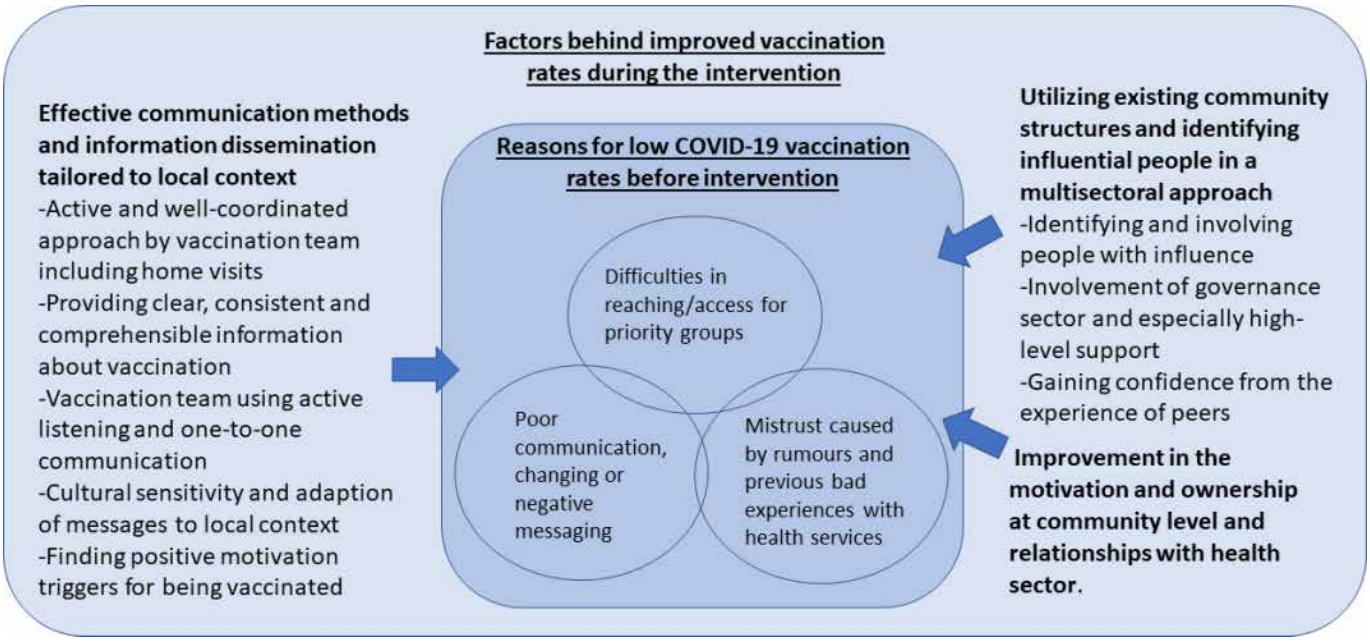

Figure 4 Factors influencing the decision to be vaccinated and how these were addressed by the intervention.

we'll vaccinate, if not, we won't'—and shaped by such experiences as being scolded, painful injections, negative childbirth experiences or perceived discrimination directed at the Hmong ethnic group: *'Some Lao staff don't pay attention to Hmong children, even after we brought them many times.'* Second, poor communication or changing information created conflicting messages and confusion, for example, over whether people could be vaccinated because of underlying health conditions like hypertension and why some vaccines needed more doses than others. Third, priority groups for the COVID-19 vaccine were difficult to reach or could not access vaccination, especially in remote villages. Elderly people or people with disabilities were not able or willing to go to the outreach site or health centre, and also said the vaccine should rather be given to younger people who travel more than themselves, or had been told by their more educated children not to be vaccinated. Lifestyle, work, ethnicity and religion were also influencing factors—people were away in the fields or worried about not being able to work if they or their children had a fever after being vaccinated, and migrant workers were not registered. Health staff also mentioned that it had been more difficult to reach some Hmong ethnic clans and Christian families; village authorities noted vaccination information did not cross different religious communities in the target villages due to lifestyle differences.

Reasons why people were vaccinated for the first time and vaccination uptake increased after the intervention

The results show a high level of consistency around the reasons why people had agreed to be vaccinated, which can be grouped into three main categories: (1) effective communication and advocacy methods and information dissemination tailored to the local context; (2) using existing community structures and identifying influential people in a multisectoral approach and (3) improved motivation and ownership at the community level and relationships with the health sector. Table 1 shows each of these factors with a breakdown of specific reasons and examples illustrated by quotes from research participants, and online supplemental table 1 shows additional detail. Figure 4 shows how these factors directly addressed the reasons behind low vaccine uptake.

Effective communication and advocacy methods and information dissemination tailored to the local context

Active and well-coordinated approach by vaccination team

When asked what was different about this vaccination outreach compared with past efforts, most respondents mentioned the active approach of the vaccination teams, including liaising with village authorities to locate unvaccinated people. Improved coordination and planning also impacted the ability of vaccination teams to be more active and efficient. For example, village authorities in one village explained how the official documents from the district arrived five days before the intervention, much earlier than usual, making it easier to plan and advocate and allowing time to hold information sessions.

Providing clear, consistent and comprehensible information about vaccination

The quality, clarity and consistency of information and how it was delivered was cited as a highly important factor by both people receiving and delivering vaccination. Holding information sessions prior to outreach was demonstrated as effective, and village authorities commented that attending the planning workshop had helped confidence in advocating to village members. Villagers vaccinated for the first time after the intervention noted a clear difference in both the message and

method of delivery. It was also important for people that the message was consistent (eg, agreement on when the second vaccine dose should be given) and felt to be the full truth without withholding information. People receiving the vaccine also emphasised that providing factual evidence was necessary for them to feel they were making an informed decision, rather than being pressured.

Vaccination team using active listening and one-to-one communication

A significant difference to past campaigns was the emphasis on one-to-one respectful communication and active listening to understand and address people's concerns in a caring, personal way by the vaccination team. This was especially impactful for the elderly, people with disabilities or other vulnerable community members. It was also important to directly address potential side effects, follow-up and reassure people that they could call on health staff if they had issues.

Cultural sensitivity and adaption of messages to the local context

Most of the villages included in the intervention were of Hmong ethnicity and followed animist practices. Some also contained people who identified as Christian, a minority (but growing) religious group in Lao PDR. These identities were commonly associated with vaccine hesitancy. However, the experience of the team showed that this was not a barrier if they used culturally appropriate methods and adapted their messages to the local context. Among the Hmong, a common issue was language, combined with distrust of lowland Lao health staff, which was improved when a Hmong language speaker joined the team. As this was not always possible, alternative methods suggested were Hmong language videos or other audio-visual methods featuring trusted people to give information about vaccination. Hmong people interviewed emphasised the sources of information they used which differed from Lao language speakers, especially information received from relatives abroad (mainly the USA) and Hmong radio channels. The importance of following the village hierarchy, especially incorporating elder men such as the clan leaders when holding any kind of information session was also frequently mentioned.

Finding supportive motivational factors for being vaccinated

Both people receiving vaccination and vaccination teams mentioned the importance of finding personal sources of motivation in decision-making. A significant factor in people's decision to be vaccinated was the upcoming National Games and Hmong New Year celebrations and bullfighting events, for which they had to be vaccinated to attend. Rather than threatening people with consequences for non-compliance, the team used positive motivation, building on people's excitement about the events. Others mentioned their wish to travel as a motivating factor.

Using existing community structures and identifying influential people in a multisectoral approach

Identifying and involving people with influence

The impact of influential people on decision-making was the most frequently mentioned reason for increased uptake after the intervention. Rated from most to least influential were the village chief and Hmong clan leader (singsao), or other village authorities; local officials such as district and provincial health office and governor's office staff; families, relatives and peers (especially for elderly people and women who usually followed the decision of the male household head); religious leaders (of high importance among specific communities such as Christians) and lastly health centre staff influence was judged to be much lower in comparison, perhaps because of poor trust. The vaccination team emphasised the need to understand how community power structures operated and to be clear on a case-by-case basis who the most trusted persons are. Influential people changing their stance towards vaccine acceptance had a powerful impact. For example, in a majority Christian and Hmong ethnic village where health staff had found it previously difficult to reach people, almost all were vaccinated during the intervention outreach. Team members explained how they visited on a Sunday when people were at church, and first spoke with and encouraged the church leader to get vaccinated through giving clear information. The church leader then advocated to his congregation, backed up by a Hmong provincial health staff member who could speak their language.

Involvement of governance sector and especially high-level support

Both villagers and staff members mentioned the presence of high(er)-level officials, such as district, provincial, and central health and home affairs staff, as impacting vaccination uptake. Those receiving the vaccine appreciated high-level people visiting them as it made them feel the government cared about their health and commented that the larger number of people gave them confidence. When government officials visited communities, possessing good technical knowledge, communication skills and the ability to speak the same language increased their impact on decision-making. The health staff involved in the campaign likewise said that explanations from high-level officials, such as the deputy district health office director and the deputy district governor, had much greater impact compared with when they themselves tried to convince people.

Gaining confidence from the experience of peers

Learning from the experience of peers, such as family members, neighbours or friends, was another key factor. Seeing others vaccinated without adverse effects and talking to them about their experience gave people confidence to be vaccinated, especially when the majority of community members had already done so. Past experiences and stories about vaccination, such as less children dying from infectious

diseases, could also have a positive effect on decision-making, in comparison to stories about adverse effects discussed earlier which had a negative impact.

Shift towards people-centred and positive approach

A shift towards a more people-centred and positive approach was both an indirect cause of increased vaccination uptake and also an outcome of the intervention.

Improved motivation and ownership at community level and relationships with the health sector

Members of interviewed village authorities such as village chiefs, Lao Women's Union representatives and ethnic leaders described how they enjoyed taking part in the intervention. They explained it had improved their working relationships with health staff and local authorities, and they felt satisfied that community members had understood their message well and were willing to be vaccinated. Their testimonials demonstrate how this experience resulted in increased motivation and sense of ownership, providing inspiration for future activities and approaches. Health staff likewise described how they had observed improved relationships and trust with community members, such as through increased use of essential services.

Change in attitudes and behaviour of government staff

The local government and health staff involved in the intervention explained how they had been personally impacted and motivated by taking part. In describing the workshop and village outreach, they expressed surprise at the determination and commitment of village authorities to work together with them, which was a change from past experiences. This led to reflection about their own roles and responsibilities in taking action for community health. People who had received the vaccination also noted changed behaviours of staff during the outreach campaign, such as making greater efforts to actively visit vulnerable community members at home, especially the elderly, people with disabilities or others unable to reach the outreach site, and more empathetic listening.

DISCUSSION

Addressing the main factors influencing vaccine uptake through CONNECT intervention

As shown in the quantitative analysis, vaccination coverage significantly increased after the intervention, and we could not identify any other factors contributing to the increase. There were no other activities or events, and the number of reported COVID-19 cases was much lower than at the time of the first vaccine outreach (457 reported cases in November 2022, in comparison to 22 835 in January 2022). The subsequent qualitative analysis showed that the intervention directly addressed the reasons behind low vaccine uptake (figure 4). This was primarily achieved through developing stronger trust, motivation and coordination mechanisms at a community and local government level, and finding better ways to reach previously unreached people through tailored approaches and improved communication to build knowledge and confidence.

The first identified method leading to higher vaccination acceptance—effective communication and advocacy methods and information dissemination tailored to the local context—included the provision of clear, consistent, and comprehensible information about vaccination, the use of active listening and one-to-one communication, cultural sensitivity, and adaption of messages. This finding is supported by previous studies in Lao PDR showing that vaccine acceptance is strongly impacted by language, communication methods, culture and beliefs, trust, and social networks.[23 24] This is especially relevant to ethnic minority populations such as the Hmong, the focus of this intervention. For example, in 2019, during a resurgent measles outbreak in Lao PDR, approximately 90% of cases were recorded among Hmong children. This was attributed to low vaccination coverage, difficulties in access, lack of knowledge about vaccination, socioeconomic inequalities and 'linguistic and cultural barriers'.[25] Regionally, access to information and perceptions about vaccines and COVID-19 were also influential factors affecting vaccine acceptance. In rural Indonesia and Thailand, COVID-19 knowledge and perceived usefulness significantly affected acceptance.[26–28] In Bangladesh, the most important factor for rural and remote populations was good communication and access to trustworthy information on the safety, side effects and effectiveness of vaccines.[29] Likewise, using supportive motivational factors rather than negative messaging facilitated COVID-19 vaccine acceptance among returning Lao migrants, such as the desire to keep themselves and their families safe and wanting to be able to return to work.[30]

The findings of our study are significant because they demonstrate that culturally appropriate communication methods do lead to increased vaccine acceptance. A clear methodology is provided for more effective communication, emphasising the importance of interpersonal contact and listening skills to build confidence.

The second identified factor—a shift towards a multisectoral approach, especially through engagement of MoHA and local government, using existing community structures and identifying influential people at community and higher levels—facilitated confidence building through peer-led mediation. Regionally, several studies emphasise the importance of multisectoral collaborations and community engagement to leverage combined resources and improve public trust, such as in the Philippines[31] and Cambodia.[32] In rural India, cocreating interventions with religious leaders led to the development of vaccine positive messaging that community members relate with, motivating increased vaccine confidence,[33] and in Bangladesh, using community influencers led to improved uptake.[29] This approach has not previously been demonstrated in research on community health interventions in Lao PDR. Our study shows how an increased understanding of patterns of influence within communities and the role of different sectors has the potential to relieve pressure on the health sector for taking sole responsibility for vaccination.

A positive and people-centred approach, developing community motivation and ownership for sustainability and the potential to strengthen routine vaccination

While the first two factors have been discussed widely in studies of COVID-19 vaccination, the third factor is a relatively novel finding of this study. As an influencing factor and an outcome of the intervention, using a 'positive' or 'people-centred' approach led to increased satisfaction for the people involved. This improved the motivation, ownership and trust of community members and leaders, and shifted the attitude of government staff towards a greater sense of responsibility and empathy for community health. This is especially important for future vaccination outreach by increasing ownership at a community and local level.

While the study sample is small, the method thus has the potential to build trust more systemically between unreached populations and health services. This kind of systematic shift through the development of public trust has been termed 'favourable vaccine culture'[34] and demonstrates the importance of understanding the underlying drivers and sociocultural context behind the actions of people using and administering vaccines.[35] It is notable that a study on COVID-19 vaccine acceptance showed positive emotions such as hope have a far greater role in mediating attitudes towards vaccines rather than fear or anxiety.[36] Among the village authorities interviewed in our study, the consistent use of positive terms such as 'proud,' 'warm-hearted,' 'happy' and 'satisfied' to describe their experience demonstrates how the emotional component of taking part in an intervention which achieved an immediately measurable outcome through building positive relationships contributes to increased motivation.

Therefore, could the adoption of the CONNECT approach also strengthen routine immunisation efforts in the longer term through sustained changes? The question of whether supplementary immunisation activities can positively impact routine immunisation in low-income and middle-income countries remains a topic of debate.[37] Although resource-intensive, previous mass campaigns in Lao PDR have shown limited impacts[38] and may have contributed to mistrust in vaccines due to the lack of accompanying information or advocacy. The CONNECT approach is initially time and resource-intensive. However, by laying a solid foundation for 'favourable vaccine culture' through effective advocacy, building trust through personal interaction, and leveraging local coordination mechanisms, it aims to save wasted time and resources in future due to vaccine non-acceptance. This must be tested in future studies, and it would also be beneficial to conduct further research with people remaining unvaccinated to identify potential areas of improvement of the intervention.

Impact of findings on health (in)equity

The CONNECT approach contributes to narrowing the health equity gap by increasing coverage among previously unreached sociodemographic sectors. The population in this study were majority Hmong ethnicity. As well as a low routine immunisation rate among children associated with recent measles outbreaks, Hmong women have high adolescent pregnancy and home birth rates, and low Lao language literacy. This makes communication with health staff and providing health education challenging, and may be associated with negative experiences for women using services.[39] This population are also less likely to use national health insurance to access care.[40 41] Through home visits, the intervention methods also increased contact between the vaccination teams and community members who were elderly, had disabilities or chronic illnesses and were less able to access health services. Home visits, therefore, both increased equity in vaccine coverage and also provided opportunities for increased support for vulnerable community members by identifying additional health needs. Other changes associated with the intervention include anecdotal increases in deliveries with skilled birth attendants in areas where COVID-19 vaccine uptake had also increased. This demonstrates how improved relationships with health providers has a wider effect on health equity.

Limitations of study

	Limitation	Possible impact and mitigation efforts
Quantitative component	Only villages that received the intervention included, therefore, only pre-post comparison was possible.	May have missed other factors, but no other activities or events could have contributed to the increase in the vaccine coverage during the study period, and there was no increase in reported COVID-19 cases during this time or other infectious diseases.
	Did not take seasonal impact (eg, rice planting/harvesting seasons) into consideration.	May have impacted how many people were available to be vaccinated.
	Target villages were purposely chosen as a part of preparation for the national games.	Might have made this round unique, hence less comparable.
	No data by age/health condition available so we cannot state what proportion of people vaccinated were in the priority groups.	Priority groups (elderly, health conditions, pregnant) were included in the qualitative study.
Qualitative component	Conducted with populations where the majority had received vaccination already (although a few had not), which may have created a positive bias towards the intervention methods.	Included in-depth questions about previous experiences and perceptions of vaccination and the reasons behind any change.
General	Difficult to know how widely these results can be extrapolated as this study was conducted with a specific population.	The approach is also being used in other parts of the country with anecdotal success.

CONCLUSION

This study has demonstrated that using the CONNECT approach significantly increased uptake of COVID-19 vaccines among difficult-to-reach populations through building trust, improving communication, harnessing

local governance, and enhancing the ownership and motivation of village representatives for community health. While it has been well established that trust is extremely important in vaccine acceptance, this study outlines the specific methods through which this shift was achieved and the immediate outcomes. The intervention approach directly addressed the reasons behind low vaccine uptake and the influencing factors identified in previous studies on vaccination in Lao PDR. This study shows the importance of tailoring health interventions to the local context and finding culturally appropriate solutions which are identified together with the community, away from a top-down or one-size-fits-all approach. Important findings and outcomes of the intervention are increases in motivation and ownership by village authorities through a 'positive approach', and improved relationships between villagers and health systems which shows potential for sustainable change beyond COVID-19 responses. Furthermore, it shows how a process of trust-building can be effectively developed and led by state actors from the health and governance sectors, which may facilitate broader shifts in government culture and ways of engaging with communities. Future studies are needed to measure whether this has a long-term impact on uptake of and satisfaction with vaccination and other essential health services.

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