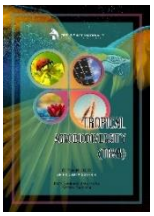
ZIBELINE INTERNATIONAL™ PUBLISHING

ISSN: 2716-7046 (Online)
CODEN: TARGCA

Tropical Agrobiodiversity (TRAB)

DOI: http://doi.org/10.26480/trab.01.2025.50.56



RESEARCH ARTICLE

DETERMINANTS OF PESTE DES PETITS RUMINANTS VACCINE ADOPTION AMONG FEMALE GOAT KEEPERS IN DHADING DISTRICT, NEPAL

Mahesh Dutta Chaulagain[*a], Padma Pokhrel[b], Suryamani Dhungana[c], Kevin Rohan[d]

[a] *Himalayan College of Agriculture Science and Technology (HICAST), Kathmandu, Purbanchal University, Nepal.*
[b] *Ministry of Agriculture and Livestock Development, Singhdurbar, Kathmandu, Nepal.*
[c] *Agriculture and Forestry University, Chitwan, Nepal.*
[d] *Memorial Eco Foundation.*
Corresponding Author E-mail: maheshchaulagain358@gmail.com

ARTICLE DETAILS

Article History:

Received 15 June 2025
Revised 23 July 2025
Accepted 27 August 2025
Available online 29 September 2025

ABSTRACT

A study titled "determinants of Peste des Petits (PPR) vaccine adoption among female goat keepers in Dhading district, Nepal" was undertaken. We selected a sample of 120 household using random sampling technique. Altogether, 120 households were selected using the random sampling technique. Primary data were collected using a semi-structured and pre-tested household questionnaire, focus group discussion (FGD) and key informant interviews (KII) while secondary information was collected from different published records. Descriptive and inferential statistical tools were used to assess the collected information. We used the probit model, t-test, and chi square test were used to establish statistical relationships between variables. The probit model revealed that the heard size (27%) and income from goat rearing (51.15%) were significant at the 1% level of significance, while the education level of the respondents and their membership in a cooperative organization were significant at the 5% level of significance. However, ethnicity did not significantly influence the result. Among the ethnic groups; Brahmin and Chhetri women possess a greater understanding of the PPR vaccine, while Kumal and Dalit women are the least knowledgeable. A pairwise comparison revealed that among the 10 determinants, farmers with higher communication and education levels are more likely to adopt the PPR vaccine. Empowering women from marginalized tribes like Kumal and Dalit, involving them in cooperatives, and promoting the activities of animal health service providers and education are crucial factors in the adoption of PPR vaccines in goat farming

KEYWORDS

Determinants, Gender, PPR vaccine, intersectionality

1. INTRODUCTION

Livestock rearing is important contributor in economy of Nepal. Specially goats are valuable sources of income and serve as a security and liquid asset in times of need for resource poor farmers and women (Neupane et al., 2018; Sapkota et al., 2017). Goat farming not only provides food and nutrition for people, but also aids in reducing poverty among small-scale farmers, earning it the nickname "poor man's cow". According to the Food and Agriculture Organization, more than 50% of women farmers who support poverty alleviation rely on livestock farming (FAO, 2012). Women specifically prefer goat rearing because it's manageable and allows them to keep the income from selling these small ruminants, even when men conduct the sales (Gangga, 2019). In Dhading, Nepal, women have taken the lead in livestock-keeping activities and initiatives as men migrate to urban areas or abroad in search of employment. As a result, the migration trend of young males has feminized agriculture and livestock rearing in Nepal, as noted by Neupane in 2018.

Estimates place Nepal's goat population at 11,225,130, with the Bagmati province holding the highest number (2,484,855), and Dhading district ranking third (317,827) after Makwanpur (344,338) and Morang (329,800) districts (MoLD, 2017). Unfortunately, only 1,526,928 goats were vaccinated with Peste des Petits Ruminants (PPR) in 2017. This means that more than 85% of goats are still susceptible to the disease. On the one hand, women play a crucial role in goat rearing, while on the other hand, the majority of goats are yet to be vaccinated. Gangga found that vaccinators organize vaccination campaigns at central points in the village with large animal herds, neglecting households with fewer goats (Gangga, 2019). As a result, women from these households do not adopt vaccination. Given those ruminants, particularly goats, are critical to rural livelihoods, particularly those of women, and current interventions for preventing or controlling PPR are inadequate, there is an urgent need to identify and prioritize factors influencing female goat keepers' adoption of the PPR vaccine (Serra et al., 2022).

The National Census of 2011 revealed that Nepal has 1.8 million Dalit women, accounting for 13% of the total female population, who used face discrimination due to the country's caste system. Women from economically deprived backgrounds and those of so-called lower castes; dalit, reside in remote corners of villages, far away from roads, and often do not attend vaccination drives, as highlighted (Gangga, 2019). Therefore, it is crucial to comprehend the role and perception of these women regarding vaccinating their goats against Peste des Petits Ruminants (PPR). In Nepal, women are crucial in managing goats, which plays an essential role in enhancing family wellbeing. Women account for 70-90 percent of goat rearing and caring work (FAO, 2016). Despite the fact that the national average family in Nepal owns 3.3 goats, and 49.8% of the population engages in goat-keeping, it is essential to determine

Quick Response Code	Access this article online	
	Website: www.trab.org.my	DOI: 10.26480/trab.01.2025.50.56

Cite The Article: Mahesh Dutta Chaulagain, Padma Pokhrel, Suryamani Dhungana (2025). Determinants Of Peste Des Petits Ruminants Vaccine Adoption Among Female Goat Keepers In Dhading District, Nepal. *Tropical Agrobiodiversity, 6(1): 50-56 .*

whether PPR vaccinated goats generate higher profits for female goat keepers (ABPSD, 2011). Additionally, identifying specific agricultural interventions and strategies that can maximize profit and increase PPR vaccination adoption is necessary.

It is important to recognize the significant contributions that women make to household well-being, food security, and society's stability through their roles in reproductive, productive, and community activities, even when their contributions are not well recognized (Poudel et al., 2009). This is particularly true in subsistence farming, where thirty percent of women often play a critical role in managing goats (Sapkota et al., 2017). This research aims to provide stakeholders with evidence that can be used to develop interventions to increase women's participation in the livestock sector and to understand the magnitude of women's contributions to animal health and goat production. By identifying the barriers that affect women's empowerment in livestock production and vaccine value chains, this research can help stakeholders develop strategies that increase women's participation in these areas, including increased adoption of the PPR vaccine among female goat keepers. Hence the objectives of the research were to access the determinants of Peste des Petits Ruminants (PPR) vaccine adoption and rank them among female goat keepers in Dhading district of Nepal.

2. Materials And Methods

2.1 Study site and Time

The study was carried out in Dhunibesi and Nilkantha Municipalities located in the Dhading District, Nepal. We randomly selected the respondents from the goat keepers in the study area. Data collection took place in two phases from May to June 2022, and the research instruments were adapted to the local context to ensure understanding by the local people. The first phase took place from May 1st to May 14th, while the second phase started and ended in the last week of June 2022, to avoid the effect of local elections on respondent participation in Nepal.

2.2 Study Design and Respondents

The study employed a cross-sectional descriptive research design. We conducted six focus group discussions (FGDs), each involving 9 to 12 female goat keepers from Adivasi/jamaati communities in each site. We also conducted 120 household surveys (60 in each municipality) and 14 key informant interviews engaging government officials, Agro-veterinary practitioners, experts from Veterinary Hospital and Livestock Service Expert Centres (VHLSEC), and public and private vaccine suppliers in

Dhading and Kathmandu district as respondents.

2.3 Statistical Analysis

We encoded and scrutinized utilizing the data using SPSS, R-Stat and Excel. Logistic regression analyses were performed to ascertain the relationship between various factors and women's roles, perceptions, attitudes, and practices concerning the Peste des Petits Ruminants (PPR) vaccine. The logistic regression approach was employed to identify predictors linked to the three stages of household adoption, namely, awareness of PPR vaccines, previous vaccination, and up-to-date vaccination, as per veterinary protocols. We conducted pairwise ranking exercise to rank the determinants.

2.4 Identifying role of female goat keepers in PPR vaccination

The study aimed to investigate the involvement of female goat keepers in PPR vaccination and their attitudes towards vaccinating their goats against PPR through both individual interviews and focus group discussions. We then subjected the qualitative data obtained from these sources to a descriptive analysis to identify any variations in the roles and perceptions of female goat keepers belonging to different cast/ethnic groups with respect to PPR vaccination activities.

2.5 Identifying the determinants of adoption of PPR vaccine

We used Probit model to study factors affecting adoption of PPR vaccine through R-stat. Probit is used to estimate binary variable regression models (Gujarati, 1978). The marginal effect on the probability of adoption was also calculated. We expressed the model mathematically as follows:

$$\text{Adoption (Yes=1)} = \beta 0 + \sum_{k=0}^{k=11} \beta i x i + e i$$

This can be extended into,

$$Y(yes=1) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_n X_n + \varepsilon_i$$

In this scenario, Y is the dependent variable and X1, X2, and X2 are the independent variables.

Table 1: Determinants of Adoption of PPR vaccine

Variables	Type	Description	Value	Expected sign
Dependent variable Y	Dummy	Determinants of PPR vaccine Adoption among Female goat keepers	If Adopter=1 Otherwise =0	
Independent variables				
Age	Continuous	Age of respondent	Years	+/-
Gender	Dummy	Gender of respondent	Female=1 otherwise=0	+/-
Education	Continuous	Years of Schooling of respondent	Years	+
Ethnicity	Dummy	Cast of Respondent	Brahmin/chhetri=1 otherwise 0	+
Training	Dummy	Training received or not	If yes=1 Otherwise =0	+
Communication	Dummy	Prior information given to goat farmers	Communicated prior to vaccination=1 otherwise =0	+
Size of Herd	Continuous	Number of goats in the herd Number of goats vaccinated in the herd by farmers. Number of goats regularly vaccinated.	Numbers	+
Membership on cooperative	Dummy	Cooperative member	If yes=1 Otherwise =0	+/-
Income	Continuous	Income from goat farming	NPR	+

2.6 Ranking determinants of adoption of PPR vaccine

The process for pairwise ranking was involved to rank the determinants of adoption of PPR vaccine. We used the Pairwise Ranking matrix template (FAO, UN, Participatory Rural Appraisal Manual, 2009). Six FGDs, three in each municipality, conducted the PWR exercise with 63 women participants ranging in age from 21 to 72 years.

3. Results

3.1 Participation in PPR Vaccine Adoption

The study's findings reveal that individual from the Kumal ethnic group, both men and women, encounter challenges in obtaining PPR vaccination. Conversely, men from other ethnic groups have better access to the vaccination. Additionally, women from the Newar, Kumal, and Dalit ethnic groups face obstacles in accessing PPR vaccination. During a personal interview in Palpabhanjyang, a Dalit woman conveyed that she had not received information about vaccination campaigns because she was not involved in the cooperative organization, resulting in a missed opportunity to vaccinate her goats. Moreover, in Ratomate, Nilkantha municipality, a lack of information and the government's failure to implement a vaccination program has prevented residents from acquiring PPR vaccination for their goats.

On the other hand, in Dhunibesi municipality and other wards of Nilkantha municipality, Dalit women face difficulty accessing vaccination since they are frequently away from home during vaccination periods.

In an individual interview in Maidan, Dhunibesi, a female goat keeper stated that she wanted to vaccinate her goats, but her daytime employment prevented her from doing so. Unlike women from other ethnic groups, Dalit and Kumal women commonly participate in daily wage-based work, but vaccinators perform vaccinations throughout the day, leading these women to miss out on PPR vaccines.

In the Gurung, Magar, and Tamang ethnic groups, both men and women have the financial capacity to pay for animal health services, as men allow women to keep the money after selling their goats. However, in the Brahmin ethnic group, women prefer to give the money to their husbands, who then pay for animal health services. In cases where women receive Pewa, which is a gift goat from their maternal house, Brahmin women are able to keep the money from selling their goats and use it to pay for vaccines and other health services.

Table 2: Participation in PPR Vaccine Adoption

Indictor	Vaccination Facets (Exogenous Latent Variables)	Ethnicity						
		N	G	K	T	M	D	B/C
Participation In PPR vaccination	**Purchasing**							
	Who participate in Purchasing of Vaccine (if Purchased)	Available for free no specific role of either men or women of any ethnic group.						
	Woman participation in purchasing Vaccine (other than PPR) either alone or with men (Men-0 Women- 1)	1	1	0	1	0	0	1
	Both Men and Women(Yes-1, No-0)	1	0	0	0	0	0	1
	Paying for Vaccinator							
	Women only	1	1	0	1	1	1	1
	Men only	0	0	1	0	0	0	0
	Both Men and Women pay for vaccine	1	0	0	0	1	0	1
	Hospitality Management to Vaccinator							
	Women serve snacks and water to vaccinator (Yes-1, No-0)	1	1	0	1	1	0	1
	Men serve snacks and water to vaccinator (Yes-1, No-0)	0	1	0	0	1	0	0
	Roles at vaccination time (Yes-1, No-0)							
	Women actively participates in the vaccinating against PPR	1	1	1	1	1	1	1
	Men actively participate in the vaccination against PPR	0	0	0	1	1	0	0
	Women Hold the goats	1	1	1	1	1	1	1
	Men Hold the goats	0	0	0	1	1	0	0
	Both men and women hold the goats during Vaccination against PPR	0	0	0	1	1	0	0
	Care after Vaccination (Yes-1, No-0)							
	Men care goats after vaccination against PPR	1	1	1	1	1	1	1
	women care goats after vaccination against PPR	1	1	0	1	1	0	0
	Both men and women care goats after vaccination against PPR	0	0	0	1	1	0	0
Adoption of Vaccination	**Access of PPR vaccine (Yes-1, No-0)**							
	Men	1	1	0	1	1	1	1
	Women	0	1	0	1	1	0	1
	Both	0	1	0	1	1	0	1
	Adopt Vaccination (Yes-1, No-0)							
	Men	1	1	0	1	1	1	1
	Women	0	1	0	1	1	0	1
	Both	0	1	0	1	1	0	1
	Ability to pay for vaccines/ vaccination (Yes-1, No-0)							

Table 2 (Conts): Participation in PPR Vaccine Adoption								
Indictor	**Vaccination Facets (Exogenous Latent Variables)**	**Ethnicity**						
		N	**G**	**K**	**T**	**M**	**D**	**B/C**
	Men	1	1	0	1	1	1	1
	Women	1	1	1	1	1	0	0
	Both	0	1	0	1	1	0	0

3.2 Determinants of PPR vaccine Adoption

Using a binary probit model, the study area identified the parameters that influenced the adoption of the PPR vaccine. The regression coefficients were used to calculate the marginal effects, and the resulting output is presented in the table above. The dependent variable chosen for this study was the adoption of PPR vaccination, which was categorized as a binary response, with a value of 1 representing vaccinated goats and 0 indicating unvaccinated goats. The Wald test (LR chi2) conducted on the model suggests that the model has strong explanatory power, with a significance level of 1%. We found the model's Pseudo R2 value for the model to be 0.77. The goodness-of-fit test, Hosmer-Leme show, yielded a Chi-square value with a high P-value, indicating that the model fits the data well. Overall, the model correctly predicted 99.74% of the samples.

The findings from the probit regression analysis indicated that the adoption of PPR vaccination was influenced by two key variables, namely the herd size of goats and the income earned from goat keeping, which were statistically significant at the 1% level of significance. Additionally, two other variables, including the education level of the respondents and their membership in a cooperative organization were significant at the 5% level of significance. In contrast, other factors such as age, gender, training, and ethnicity did not exhibit any statistically significant association with the adoption of PPR vaccination.

Table 4: Determinants of PPR vaccine Adoption						
Variables	**Coefficients**	**Std. Error**	**P>|z|**	**dy/dx[b]**	**Std. Error[b]**	
Age	0.021	0.04	0.56	0.00	0.00	
Gender	-1.03	0.86	0.23	0.04	0.01	
Education	0.31	0.12	0.02	0.12	0.00	**
Training	0.30	0.62	0.62	0.08	00	
Membership on cooperatives	1.88	1.50	0.05	0.14	0.21	**
Herd Size	0.30	0.12	0.00	0.27	0.00	***
Income from goat	4.00	1.17	0.00	0.51	0.21	***
Ethnicity	-0.13	0.66	0.84	0.00	0.00	
Constant	-7.55	3.34	0.02	-	-	
Summary Statistics						
Number of observations (N)	116					
Log likelihood	15.48					
LR $chi^2(8)$	105.69					
Prob> chi^2	0.00					
Pseudo R^2	0.77					
Cases predicted correctly%	99.74%					
Goodness of fit test	Pearson chi^2 (105) = 39.95. Prob> chi^2 = 1.00					

*** Significance at p= 1%; ** Significance at p= 5%;

The pairwise comparison matrix results reveal that communication among farmers regarding the vaccination campaign is the most important determinant of PPR vaccine adoption. According to the findings from the six FGDs, communication was identified as the foremost determinant for PPR vaccination adoption, as reported by five out of six groups, while education of the farmer ranked first in one of the FGDs. Additionally, four out of six FGDs reported that the farmer's education came first, followed by traditional medication and knowledge of traditional medication, respectively.

The size of the herd and vaccination points also proved to be influential factors in PPR vaccination adoption, each being mentioned in two out of six FGDs. However, the complexity of taking a large number of goats to vaccination points has been mitigated through the door-to-door

vaccination facility, wherein the Community Animal Health Workers (CAHW) visit farmers' houses to vaccinate their goats in coordination with local-level government. Notably, the ethnic makeup of the community had little impact on vaccination adoption, as the CAHW vaccinated goats for all castes and ethnic groups. Farmers who had access to cooperative groups (89%) and local-level government were informed of the vaccination campaigns through the members of the cooperatives and local government bodies. However, those who were not members of any organization (11%) were unaware of such campaigns due to their lack of participation in various campaigns, including vaccination campaigns. It was observed that the farmers were not involved in PPR vaccination activities, and local-level governments and cooperatives did not have any provisions for involving them in such activities.

Table 5: Ranking of Determinants of PPR vaccine Adoption								
Determinants	**Scores**						**Total Scores**	**Rank**
	Nilkantha			**Dhunibesi**				
	W07	**W09**	**W02**	**W01**	**W02**	**W08**		
Communication	6	8	9	8	8	8	47	1
Education	7	7	6	6	7	7	40	2

Table 5 (Conts): Ranking of Determinants of PPR vaccine Adoption

Determinants	Scores						Total Scores	Rank
	Nilkantha			Dhunibesi				
	W07	W09	W02	W01	W02	W08		
Traditional Medication	3	5	7	7	6	5	33	3
Knowledge	7	6	5	4	5	6	33	3
Vaccination point	6	5	4.5	5	5	4	29.5	5
Size of Heard	5	1	6.5	6	4	6	28.5	6
Vaccinator's fee	4	2	3	3	4	4	20	7
Age	1	4	1	4	1	2	13	8
Gender	2	4	1	1	4	1	13	8
Cast/Ethnic make up	4	3	2	1	1	2	13	8

Table 6: Pairwise Ranking in Study Area

Determinants	Determinants number										Score	Rank
	1	2	3	4	5	6	7	8	9	10		
1.Age		0	0	0	1	0	0	0	0	0	1	9
2.Gender	1		0	1	0	0	0	0	0	0	2	8
3.Education	1	1		1	0	1	1	1	1	0	7	1
4.Ethnic make up	1	0	0		1	1	1	0	0	0	4	5
5.Vaccinator's fee	0	1	1	0		0	0	0	1	1	4	5
6.Communication	1	1	0	0	1		1	1	1	0	6	2
7.Size of Heard	1	1	0	0	1	0		1	1	0	5	4
8.Vaccination point	1	1	0	1	1	0	0		1	1	6	2
9.Traditional Medication	1	1	0	1	0	0	0	0		0	3	7
10.Knowledge	1	1	1	1	0	1	1	0	1		7	1

Nilkantha Minicipality-07 (Hiti)

Determinants	Determinants number										Score	Rank
	1	2	3	4	5	6	7	8	9	10		
1.Age		0	0	1	1	1	0	0	0	1	4	5
2.Gender	1		0	0	0	0	0	0	0	0	1	8
3.Education	1	1		1	1	0	1	0	0	1	6	3
4.Ethnic make up	0	1	0		0	0	0	0	0	0	1	8
5.Vaccinator's fee	0	1	0	1		0	0	1	0	0	3	7
6.Communication	0	1	1	1	1		1	1	1	1	8	1
7.Size of Heard	1	1	0	1	1	0		0	1	1	6	3
8.Vaccination point	1	1	1	1	0	0	1		0	0	5	5
9.Traditional Medication	1	1	1	1	1	0	0	1		1	7	2
10.Knowledge	0	1	0	1	1	0	0	1	0		4	5

Dhunibesi Minicipality-1 (Maidan)

Determinants	Determinants number										Score	Rank
	1	2	3	4	5	6	7	8	9	10		
1.Age		0	0	0	1	0	0	0	0	0	1	9
2.Gender	1		0	1	1	0	1	0	0	0	4	6
3.Education	1	1		1	0	1	1	1	1	0	7	2
4.Ethnic make up	1	0	0		0	0	0	0	0	0	1	9
5.Vaccinator's fee	0	0	1	1		0	0	0	1	1	4	6
6.Communication	1	1	0	1	1		1	1	1	1	8	1
7.Size of Heard	1	0	0	1	1	0		0	0	1	4	6
8.Vaccination point	1	1	0	1	1	0	1		0	0	5	4
9.Traditional Medication	1	1	0	1	0	0	1	1		1	6	3
10.Knowledge	1	1	1	1	0	0	0	1	0		5	4

Dhunibesi Minicipality-2 (Maheshphant)

Determinants	Determinants number										Score	Rank
	1	2	3	4	5	6	7	8	9	10		
1.Age		0	0	1	0	0	0	0	0	0	1	9
2.Gender	1		0	0	0	0	0	0	0	0	1	9
3.Education	1	1		1	1	0	1	0	0	1	6	4
4.Ethnic make up	1	1	0		0	0	0	0	0	0	2	8
5.Vaccinator's fee	0	1	0	1		0	0	1	0	0	3	7
6.Communication	1	1	1	1	1		1	1	1	1	9	1
7.Size of Heard	1	1	0	1	1	0		0.5	1	1	6.5	3
8.Vaccination point	1	1	1	1	0	0	0.5		0	0	4.5	6
9.Traditional Medication	1	1	1	1	1	0	0	1		1	7	2
10.Knowledge	1	1	0	1	1	0	0	1	0		5	5

Nilkantha Minicipality-03 (Tinpane)

Determinants	Determinants number										Score	Rank
	1	2	3	4	5	6	7	8	9	10		
1.Age		1	0	0	1	0	0	0	0	0	2	7
2.Gender	0		0	1	0	0	0	0	0	0	1	9
3.Education	1	1		1	0	1	1	1	1	0	7	2
4.Ethnic make up	1	0	0		0	0	0	0	1	0	2	7
5.Vaccinator's fee	0	1	1	1		0	0	1	0	0	4	5
6.Communication	1	1	0	1	1		1	1	1	1	8	1
7.Size of Heard	1	1	0	1	1	0		0	1	1	6	3
8.Vaccination point	1	1	0	1		0	1		0	0	4	5
9.Traditional Medication	1	1	0	0	1	0	0	1		1	5	4
10.Knowledge	1	1	1	1	1	0	0	1	0		6	3

Dhunibesi Minicipality-8 (Barthum)

4. DISCUSSION

Through the probit model, it was noted that both income and herd size exerted a significant and positive influence at the 1% significance level. This observation strongly corroborates the assertion made by a group researcher regarding the influence of socio-economic factors, such as income and education, on individuals' decisions to opt for the PPR vaccine (Saliu et al., 2008). According to a study, enhancing vaccine adoption involves various factors, including technical aspects, policy adjustments, private sector engagement (either local or international), social involvement, and innovative strategies such as farmer education on the vaccine's value, ensuring the availability of high-quality vaccines, and providing farmers with accessible information (Donadeu et al., 2019). These recommendations resonate with the finding that women's cooperative organizations have facilitated their access to veterinary training, enabling them to become Community Animal Health Workers (CAHWs). These CAHWs have actively participated in diverse PPR vaccination campaigns, administering vaccines to goats, encouraging cooperative members to join the vaccination efforts, and conducting awareness programs. However, as highlighted by non-member women, particularly Dalit women, often miss out on vaccination due to their peripheral status within the village, preferring not to engage with

cooperatives or private institutions (Gangga, 2019).

To be more specific, if the respondents possessed a larger herd size and obtained higher income from goat rearing, the likelihood of adopting PPR vaccination would increase by 51.15% and 27.00%, respectively, in comparison to those with a smaller herd size and negative earnings from goat keeping. Moreover, membership in a cooperative organization was found to be positively significant, implying that if the respondents were members of such a group, the probability of adopting PPR vaccination would increase by 14%. Conversely, the variables of gender and ethnicity were negatively significant, with male goat keepers being associated with a 4% decrease in the probability of adopting PPR vaccination.

In both pairwise ranking and Vaccination Facets (Exogenous Latent Variables) approaches, it is evident that insufficient communication and limited access to vaccines hinder the adoption of the PPR vaccine. This echoes findings from highlighting the persistent underprivileged status of women and their continued struggle with barriers to accessing veterinary vaccination services (Gangga, 2019; Sharma, 2019). Women often visit their maternal homes during various cultural festivals, while vaccinators frequently arrive at their sheds unannounced, disrupting the vaccination process. This observation aligns with the insights of a group researchers emphasizing the significant influence of social and cultural preferences and norms on vaccination uptake (Serra et al., 2022).

The Ministry of Agriculture and Livestock Development (MoALD) is working to integrate GESI throughout the design of the Agriculture Development Strategy (ADS). The discussants of FGD at Palpabhanjyaang said that "The membership of Dalit women should be made easier and other women should be encouraged to join the cooperatives so that we will focus them to drag in to mainstream of cooperative activities." This shows that women should be included in each and every activity of their cooperative organization. While working on GESI framework in incorporating climate information services (CIS) revealed that unless women are involved in designing and developing agricultural technologies, specifically climate information systems, they may not receive the benefits of these systems (Mapedza et al., 2022). Like in climate information services (CIS) incorporation of GESI in livestock health services will also increase in PPR vaccine adoption. This strategy will have a specific focus on improving the lives of women in agriculture.

Since communication, awareness, and education play a crucial role in the adoption of PPR vaccination, the government should conduct an awareness program regarding PPR vaccination before each campaign. This awareness program should be advertised via women cooperatives and CAHW of local level government. Similarly, we should encourage women from marginalized tribes such as Kumal and Dalit to participate in women cooperatives. This will simplify and enhance awareness and educational activities, leading to a higher adoption rate for PPR vaccination. The farms with the greatest numbers of goats have the best chances of implementing the PPR vaccine and are better able to benefit from economies of scale since they can use the same number of goats to accomplish the same amount of work as smaller farms. Subsistence farmers continue to overlook immunizing their goats, nevertheless. Hence it is recommended to gather a small herd of a certain cluster at a location. As a result, the Vaccinator is able to cover the entire cluster while also ensuring that the vaccine's cold chain is kept intact by ensuring that each dose is consumed on schedule.

To conclude, comprehending the factors of PPR vaccine adoption amongst goat keepers in Nepal's Dhading District is crucial in curbing disease transmission and enhancing the livelihoods of farmers, particularly women. Policies and interventions aimed at enhancing access to veterinary services, minimizing vaccine costs, and augmenting female farmers' understanding and awareness of PPR and vaccination can elevate vaccine adoption rates, resulting in positive outcomes for both female farmers and the livestock industry in the research area. Ten factors influence the adoption of PPR vaccine, including age, gender, farmers' educational level, ethnicity, the vaccinator's fee, farmers' communication about vaccination campaigns, the size of the goat herd, the vaccination point, traditional knowledge of goat treatment, and farmers' own knowledge. Based on the pairwise comparison of ten determinants, it was found that effective communication between goat keepers and Community Animal Health Workers (CAHW) and the level of education of farmers are the key factors that positively influence the adoption of PPR vaccine. Using the probit model, it was observed that both income and herd size exhibited a substantial and positive effect, significant at the 1% significance threshold.

Acknowledgement

The authors would like to express their sincere appreciation to Dr. Nargiza Ludgate (University of Florida, USA, IDRC) and Ram Prasad Mainali (NARC) for their invaluable mentorship from the research planning phase to the completion of the study.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

References

Acharya, K.P., Phuyal, S., Acharya, N., 2020. PPR control program in Nepal: what next? virus disease, Available at: https://www.researchgate.net/publication/338384373_PPR_control_program_in_Nepal_What_next (Accessed: 17 February 2021), pp: 229-234.

Adhikari, K., 2019. Dhading farmers sell goats worth Rs. 250 million during Dashain [online], ThehimalayanTimes.com, available at: https://thehimalayantimes.com/business/dhading-farmers-sell-goats-worth-rs-250-million-during-Dashain (Accessed: 15 October 2022).

Aesa. 2019. Agriculture extension service delivery in federal Nepal: issues and challenges, Available at: https://www.aesanetwork.org/blog-95-agriculture-extension-service-delivery-in-federal-nepal-issues-and-challenges (Accessed: 24 July 2020).

Bahta, S., Baker, D., 2015. Determinants of profit efficiency among smallholder beef producers in Botswana, Food Agribus, Manang, Rev., 18 (3), Pp. 107-130.

Bharati, S., Bc, L., and Sharma, A., 2021. A report on the value chain analysis of goats in smart goat villages and non-smart villages of Banke district.

Collins, P.H., 2015. Intersectionality's definitional dilemmas, Annu. Rev. Sociol, doi: 10.1146/annurev-soc-073014-112142.

Donadeu, M., 2019. Strategies to increase adoption of animal vaccines by smallholder farmers with focus on neglected diseases and marginalized populations, PLoS neglected tropical diseases. U.S. National Library of Medicine.Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6366725/ (Accessed: February 27, 2023).

FAO & OIE, 2015. International conference for the control and eradication of Peste des petits ruminants (ppr), Abidjan, 31 March–2 April 2015. Available at: http://www.fao.org/3/a-av222e.pdf.

FAO & OIE. 2018. Peste des retits ruminants, OIE.

FAO. 2019. Country gender assessment of agriculture and the rural sector in Nepal, Kathmandu, pp. 76, License: CC BY-NC-SA 3.0 IGO

Farnworth C.R., Kantor P., Kruijssen F., Longley C., and Colverson K.E., 2015. Gender integration in livestock and fisheries value chains: emerging good practices from analysis to action, International Journal of Agricultural Resources, Governance, and Ecology, doi: 10.1504/IJARGE.2015.074093.

GON. 2013. National sample census of agriculture, Kathmandu: Central Bureau of Statistics.

GON. 2018. Livestock statistics of Nepal, 1st edition, Lalitpur, Nepal : Government of Nepal, Ministry of Agriculture, Land Management and Cooperatives, Department of Livestock Development, pp. 46.

Hansen, Paul, Ombler, and Franz. 2008. A new method for scoring additive multi-attribute value models using pairwise rankings of alternatives, Journal of Multi-Criteria Decision Analysis, pp. 87–107.

Hazari, B.R., and Kumar, A., 2003. Caste, land, and livestock holdings in India: an analysis, International Forestry Review, Pp. 364-369.

Heffernan, C., Thomson, K., and Nielsen, L., 2010. Caste, livelihoods, and livestock: An exploration of the uptake of livestock vaccination adoption among poor farmers in India, Journal of International Development, available at: https://doi.org/10.1002/jid.1643, 23 (1), Pp. 103–118.

Heifer International Nepal. 2012. A study on goat value chain in Nepal,

Lalitpur: Heifer International Nepal, Pp. 1.

IDRC - International Development Research Centre. 2020. Advancing women's participation in livestock vaccine value chains, [online], Available at : https ://www.idrc.ca/en/research-in-action/advancing-women-participation-livestock-vaccine-value-chains, (Accessed: 9 June 2020).

Ludgate, N., and Russo, S., 2021. Training of Trainers: A Facilitation Manual for Animal Health Worker Trainers Working with the Livestock Vaccine Value Chain Focused on Gendered Intersectional Transformative Approaches. Advancing Women's Participation in Livestock Vaccine Value Chains in Nepal, Senegal, and Uganda. University of Florida: Gainesville, FL

Mapedza, E., 2022. Framework for incorporating gender equality and Social Inclusion (GESI) elements in Climate Information Services (CIS), MDPI. Multidisciplinary Digital Publishing Institute. Available at: https://www.mdpi.com/2071-1050/15/1/190 (Accessed: February 11, 2023).

Miller, B., 2011. The gender and social dimensions of livestock keeping in South Asia: implications for animal health interventions, Pp. 6, Pp. 25-35.

Mutua, E., 2019. A qualitative study on gendered barriers to livestock vaccine uptake in Kenya and Uganda and their implications on Rift Valley fever control, MDPI, Multidisciplinary Digital Publishing Institute, Available at: https://www.mdpi.com/2076-393X/7/3/86 (Accessed: 15 February 2022).

Neupane, N., Neupane, H., and Dhital, B., 2018. A socioeconomic view of goat farming's status and prospects in rural Nepal, Journal of the Institute of Agriculture and Animal Science, available at: https://doi.org/10.3126/jiaas.v35i1.22508, 35 (1), Pp. 1-8.

Nirmal, B.K., and Poudel, S., 2017. Situation assessment of PPR and way forward for SAARC countries, SAARC_GF-TADs/Session.

Njuki, J., and Sanginga, P., 2020. Gender and livestock: issues, challenges and opportunities, IFAD.

Nuvey, F.S., Arkoazi, J., Hattendorf, J., 2022. Effectiveness and profitability of preventive veterinary interventions in controlling infectious diseases of ruminant livestock in Sub-Saharan Africa: a scoping review, BMC Vet Res18, 332, Available at: https://doi.org/10.1186/s12917-022-03428-9.

OECD. 2021. Enhancing public trust in Covid-19 vaccination: the role of governments, OECD, Available at: https://www.oecd.org/coronavirus/policy-responses/enhancing-public-trust-in-covid-19-vaccination-the-role-of-governments-eae0ec5a (Accessed: 21 October 2022).

OIE. 2019. Strengthening veterinary services through the OIE PVS pathway: the case for engagement and investment, Paris: OIE.

Oie.int. 2020. PPR portal: OIE, World Organization for animal health, [online], Available at: https://www.oie.int/en/animal-health-in-the-world/ppr-portal (Accessed: 25 July 2020).

Panth, B.P., and Dhakal, S.C., 2019. Determinants of Mandarin productivity and causes of citrus decline in Parbat District, Nepal, Acta Scientific Agriculture, 3 (10), https://doi.org/10.31080/ASAG.2019.03.0638, Pp. 14–19.

Pica-Ciamarra, U., Otte, J., Chilonda, P., 2007. Livestock policies, land and rural conflicts in Sub-Saharan Africa, Rome: FAO, Contract No., Pp. 07–04.

Plotkin, S.A., 2005. Vaccines: past, present and future, Nature Medicine, 11(4), doi: 10.1038/nm1209, Pp. S5–S11.

Poudel. 2018. Goat meat industry in Nepal: opportunities and challenges, Biruwa Advisors, Available at: http://biruwa.net/2018/03/goat-meat-industry-nepal-opportunities-challenges (Accessed: 1 February 2023).

Pradère, J.P., 2014. Improving animal health and livestock productivity to reduce poverty, Rev sci tech Offint Epiz., Pp. 33 (3), Pp. 735–44.

Questionpro.com. 2021. Pairwise ranking and rairwise romparison, [online], Available at: https://www.questionpro.com/tour/pairwise-ranking-and-comparison.html (Accessed 3 July 2021).

Qushim, B., Gillespie, J., and McMillin., K., 2015. Efficiency analysis of Southeastern US meat goat production, 2015 Annual Meeting, Southern Agricultural Economics Association, Atlanta.

Sapkota, S., 2017. Role of women in goat farming in mid-hills of Nepal, doi: 10.5281/zenodo.1182992.

Seré, C., Steinfeld, H., and Groenewold, J., 1996. World livestock production systems, Food and Agriculture Organization of the United Nations.

Serra, R., 2022. Beyond the gender of the livestock holder: learnings from intersectional analyses of PPR vaccine value chains in Nepal, Senegal, and Uganda, Animals: an open access journal from MDPI:, Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8833455 (Accessed: 21 October 2022).

Shetty, S., and Philip, S., 2022. Making agriculture viable for small and marginal farmers: IDR, India Development Review, Available at: https://idronline.org/article/agriculture/making-agriculture-viable-for-small-and-marginal-farmers (Accessed: 18 February 2023).

State Institute of Rural Development. 2017. Factors facilitating participation of women in MG NREGS in Himachal pradesh, Available at: https://himachal.nic.in/WriteReadData/l892s/15_l892s/1511325913.pdf (Accessed: 13 February 2023)

Stats.oarc.ucla.edu. 2022. Probit regression | stata annotated output, [online], Available at: https://stats.oarc.ucla.edu/stata/output/probit-regression (Accessed: 16 October 2022).

UN Women. 2020. Intersectional feminism: what it means and why it matters right now, [online], Available at: https://www.unwomen.org/en/news/stories/2020/6/explainer-intersectional-feminism-what-it-means-and-why-it-matters (Accessed: 17 February 2021).

USAID, 2020. Nepal Gender Equality and Social Inclusion Analysis 2020. Available at: https://pdf.usaid.gov/pdf_docs/PA00Z96G.pdf.

Valbuena, D., Tui, SH-K., Erenstein, O., Teufel, N., Duncan, A., Abdoulaye, T., 2015. Identifying determinants, pressures and trade-offs of crop residue use in mixed smallholder farms in Sub-Saharan Africa and south Asia, Agric Syst., 134, Pp. 107–18.