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Factors affecting animals' health management practices among women livestock keepers in rural areas: insights from district Faisalabad

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ABSTRACT

Pakistan is an agrarian economy in which livestock plays a pivotal role, contributing 62.68% to agriculture and 14.36% to GDP. In rural areas, women are actively engaged in livestock management; however, they face significant challenges, particularly in animal health management, leading to economic losses. This study aimed to identify factors affecting animal health management practices among women livestock keepers in District Faisalabad. A multi-stage sampling technique was employed, selecting Tehsil Faisalabad Sadar purposively, followed by two union councils and two villages from each council, and finally 120 respondents through simple random sampling. Data were collected using a semi-structured interview schedule and analyzed using SPSS. The results revealed that 63.3% of respondents were illiterate, while 88% perceived a lack of government support. A considerable proportion demonstrated awareness of zoonotic diseases (80%) and breeding-related issues (75%), and most could identify diseases such as lumpy skin disease (83%), respiratory infections (72%), and foot-and-mouth disease (84%). Despite this awareness, 95% relied on traditional or religious practices for treatment. Although 75% acknowledged the importance of vaccination, only 44.2% reported using vaccines and modern veterinary care. Bivariate analysis showed that age, education, income, and livestock-keeping experience had significant associations with animal health management practices, whereas government support was not statistically significant. The findings suggest that while women possess practical knowledge, limited education, financial constraints, and weak institutional support hinder effective adoption of improved practices. Strengthening extension services, improving access to veterinary care, promoting education and training, and providing financial support are essential to enhance livestock health management among rural women.

1. Introduction

South Pakistan, being an independent nation since 1947, has witnessed agriculture as a crucial element contributing to its economic growth over the years, accounting for 24% of the total GDP (gross domestic product). Agriculture is an essential source for rural communities and plays an important role in sustaining food security for the population. Being a developing country, agriculture is a vital sector for most of the population, 67% of the population is involved, either directly or indirectly (Govt. of Pakistan, 2023).

In agrarian economics, livestock play a crucial role in rural development and national economic development. In developing countries where agriculture is a primary economic activity, livestock enhances rural livelihoods by creating employment opportunities in rural areas where job prospects may be limited (FAO, 2015).

The contribution of women in agriculture and livestock ensures household food security and income generation, yet their role remains under-recognized in official statistics (Nath *et al.*, 2024). Socioeconomic factors like education, family income, and decision-making have a real significance for women's role in their management of livestock. Due to the financial constraints and general illiteracy, women still prefer home-based traditional medicine instead of modern veterinary practices (Afzal *et al.*, 2024).

Women have more limited mobility and few or no veterinary services in many rural regions; that makes the process of adopting preventive practices related to animal health significantly more difficult for female farmers. It is also difficult for them to reach livestock extension services and contemporary information constraints (Ali Khan *et al.*, 2025; Farah *et al.*, 2024).

2. Literature review

Many women have practical knowledge and years of experience about health care of animals and prevention of their disease. Women livestock keepers rely on herbal remedies and folklore practices like *dam* and *mannat*, etc. (Kimaro *et al.*, 2015). Knowledge about animal health care is still uneven, and a large number of people use traditional animal health management practices (Hussain *et al.*, 2021). At the international level, a number of studies found that when women livestock keepers are supported through training sessions and good extension services, they both control and improve animal diseases and productivity. For example, in Kenya, women who are joined and participate in cooperatives session get more awareness about animal health management practices, diseases, and vaccination (Mukeku *et al.*, 2025).

Similarly, in Bangladesh studies shows that educated women livestock keepers play a role about understanding of animal health care (Nath *et al.*, 2022). In Punjab province of Pakistan, a comparable pattern exist which shows that education enable to women to get more knowledge about animal vaccination status, schedules regularly is very important for animal's health (Luqman *et al.*, 2018). International organization (FAO, 2022; World Bank, 2023) promote gender equality in livestock program that is link to women involvement in livestock management resilience and poverty reduction.

Despite this evidence, women livestock keepers in Pakistan still face a lot number of hurdles to adopt modern animal health practices. Many women easily identify diseases like that foot and mouth diseases, lumpy skin disease, respiratory issues, reproductive issues, yet there understanding zoonotic and vaccination remains limited (Asghar *et al.*, 2024). Religious culture such as *dam*, *taweez* or making vows also shape their animal health management strategies (Anwar *et al.*, 2025). Women have gotten years of hand on experience with strong observation skills, that access to veterinary service or remain treatment by mobility and institutional gaps (Akhtar *et al.*, 2018).

Research gap

In the backdrop, most prior studies focused on how women participate in livestock management but paid less attention to critical socio-economic factors such as education, income, government support, and veterinary support; these are all things that affect their decision-making on animal health management practices.

Significance of the study

To address this research, gap the present study explores factors affecting animals' health management practices

among women livestock keepers in District Faisalabad. According to the gender development perspective (SDGs 5), the aim of this research is to guide future policies and empower women. The study encourages women decision-making in rural livelihoods, access to veterinary services, access to education to get more knowledge through training sessions about animal health management practices, and integration of traditional practices with scientific knowledge for more sustainable development of livestock.

3. Materials and Methods

This study followed a descriptive research design to explore how socio-economic characteristics relate to animal health management practices among women livestock keepers in rural Punjab. This design was considered suitable because it allowed the researcher to meet the objectives of the study in a structured yet flexible way, providing dependable insights into women's daily livestock activities. The research was conducted in District Faisalabad, which is among the largest districts of Punjab and known for its population size as well as significant livestock production. Tehsil Faisalabad Saddar was deliberately chosen as the study area because it represents agricultural settings and has a large number of households engaged in livestock rearing.

A multi-stage random sampling technique was used. At first stage, Tehsil Faisalabad Saddar was selected purposively. At second stage, two union councils were randomly chosen, and two villages was selected from each council purposively. After the selection of villages, the list of women livestock prepared with the assistance of agriculture extension staff. From these lists women livestock keepers chosen randomly to ensure unbiased selection. At last stage, 30 women livestock keepers were randomly selected from each village. According to the central limit theorem, a sample of 30 respondents from each village is enough for the statistical analysis. Therefore, this number was considered appropriate for the present study (Bujang *et al.*, 2024). A total of 120 respondents were selected from the selected villages.

Data were collected through a semi-structured interview schedule, using a simple random technique. They were interviewed to capture information about the Socio-economic attributes and knowledge of women livestock keepers in animal health management practices The interview consisted of three parts: (i) socio-demographic characteristics (age, education, income, family type, experience), (ii) knowledge related to animal health management (disease identification, vaccination, treatment, and preventive measures), and (iii) traditional remedies for the treatment of animals.

Pre-testing involves trying out the interview schedule to identify and fix any issues before collecting the actual data. It helps detect and resolve unforeseen problems in administering the interview schedule (Goode and Hatt, 1952). In this research, 10 interviews were conducted prior non-sample respondents to ensure clarity and accuracy. This process ensured that the interview schedule was clear and functional before being used in the full study. The Cronbach's Alpha value (0.81) strongly reflected internal consistency, confirming the reliability of this interview. Ethical rules were strictly followed during the study, respondents' participation was voluntary, and the data were recorded in a confidential way that did not record the respondents any personal name or identifying information.

Collected data were analyzed using SPSS software. Simple statistics like frequencies and percentages were used to describe the socio-economic information, while to find out the relationship between women and socio-economic factors and their animal health management practices chi-square (χ^2) and gamma tests were applied.

The chi-square test was calculated as:

$$\chi^2 = \sum \frac{(O_i - E_i)^2}{E_i} \quad 1$$

Where E_i is the expected frequency and O_i is the observed frequency.

The gamma coefficient was calculated as:

$$\gamma = \frac{N_c - N_d}{N_c + N_d} \quad 2$$

where N_c is the number of concordant pairs and N_d is the number of discordant pairs.

4. Results and Discussion

Results

Socio-economic characteristics of women livestock keepers (Table 1). The results revealed that most of the respondents (49.2%) under the age of 41–50 years', the second age category 29.2% was 31–40 years', while 10.8% of respondents were below 20 years. Marital status was categorized into three groups: married, unmarried, and widow, the majority (65.0%) were married, while unmarried were 19.2% and 15.8% were

widows. These findings highlight that livestock management responsibilities often fall on married women.

In terms of educational attainment, respondents were divided into four categories: Illiterate, Primary, Matric, Intermediate. The largest group 63.3% and 27.5% having only primary education. While a smaller percentage had Matric 2.5% or intermediate 6.7%. This breakdown highlights most of surveyed population are lack of formal education. This implies that most of the rural areas have no educational facilities. Regarding monthly income among the respondents, 10% earned less than 15,000 per month, while 21.7% fell into the income bracket of 15,000 to 20,000 currency units monthly. A slightly higher 22.5% earning between 21,000 and 25,000. However, the most prominent group, 45.8%, was those earning more than 30,000.

The family structure of the respondent's analysis showed that 67.5% lived in nuclear families, while 32.5% had a joint family unit. These results make it clear that the nuclear family system is increasing in Pakistani rural societies. In terms of experience, the distribution of respondents on their years of experience in livestock management. A mere 1.7% women have less than one year of experience. While approximately 23.3% fell into both the 1-5 years and 6-10 years categories. More than half of the women (51.7%) had over 10 years of experience.

When asked about livestock management, 80.8% had a great extent to primarily manage the livestock within the household. While 10.8% of the respondents sometimes manage the livestock within the household, 3.3% of the other respondents do this very little, and 5.0% of the respondents do not at all manage livestock within the household. In terms of decision-making, results show that 45.8% of women had not made decisions on their own; their husbands made decisions, 38.3% made decisions regarding livestock management themselves, and 15.9% reported that they made decisions jointly with their spouse.

Finally, results revealed that government support regarding livestock keeping is surprisingly low; a vast majority, 88.3%, of respondents reported no support at all. This high percentage suggests a significant gap between the perceived need for government assistance in this sector. With only 6.7% largely receiving support and 5.0% somewhat.

Table 1. Socio-economic characteristics of women livestock keepers

Variable	Categories	Frequency	Percentage (%)
Age	Less than 20	13	10.8
	21–30	13	10.8
	31–40	35	29.2
	41–50	59	49.2
Marital status	Married	78	65.0
	Unmarried	23	19.2
	Widow	19	15.8
Education level	Illiterate	76	63.3
	Primary	33	27.5
	Matric	3	2.5
	Intermediate	8	6.7
Monthly income (PKR)	Less than 15,000	12	10.0
	15,000–20,000	26	21.7
	21,000–25,000	27	22.5
	More than 30,000	55	45.8
Family type	Nuclear family	81	67.5
	Joint family	39	32.5
Experience in livestock keeping	Less than 1 year	2	1.7
	1–5 years	28	23.3
	6–10 years	28	23.3
	Above 10 years	62	51.7
Extent of livestock management	To a great extent	97	80.8
	Somewhat	13	10.8
	Very little	4	3.3
	Not at all	6	5.0
Decision-making in livestock management	Myself	46	38.3
	Spouse	55	45.8
	Jointly with spouse	19	15.9
Government support for livestock keeping	Not at all	106	88.3
	Somewhat	6	5.0
	To a great extent	8	6.7

Knowledge about animal health management and animal diseases (Fig. 1): Most respondents (86.7%) can recognize signs of sickness in animals, and 83.3% give a treatment to their animal when they get hurt. For most respondents, 75% know that vaccination is necessary for animal health. Around 80% of respondents have great knowledge about finding bugs and dealing with zoonotic diseases. The results showed that knowledge of reproductive health and management of

offspring loss was reported by 75% of respondents. Recognition regarding lumpy skin disease and foot-and-mouth disease in animals was high, at 83% and 84%, respectively. The great majority of respondents, 92.5%, know about animals suffering from fever, and 72.5% show that they have great knowledge about animals suffering from respiratory issues.

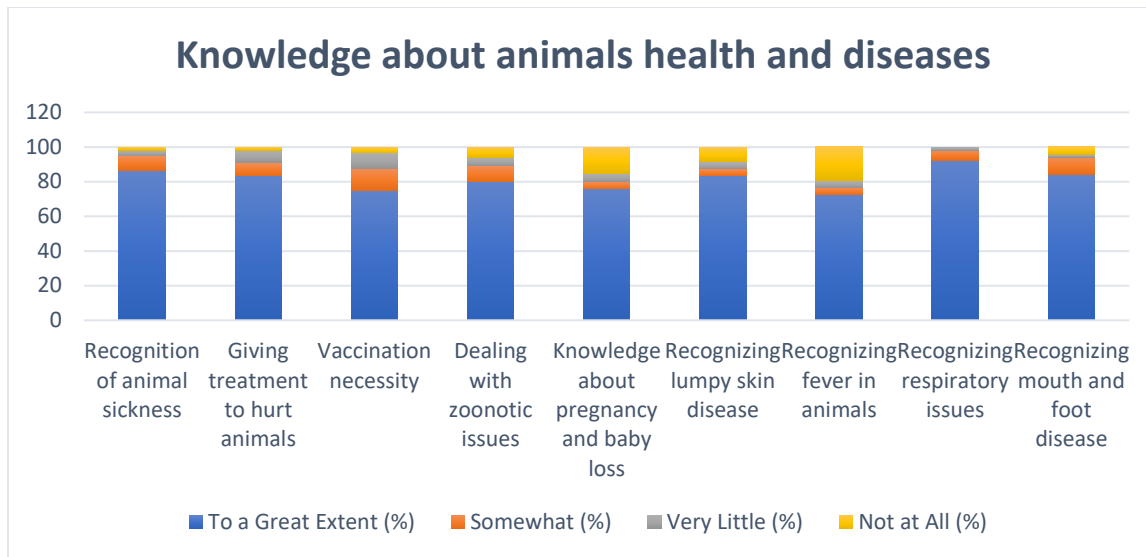


Figure 1: Respondent's knowledge about animal health and diseases

Practices and traditional remedies of women livestock keepers about animal health management (Table 2): The results showed that women livestock keepers in the study area heavily relied on traditional remedies for managing animal health. An overwhelming majority, 65%, of respondents use Parra for the treatment of livestock. Most people, about 77.5%, use this mix, "Garlic + Ginger + Green Chili + Onion," and use salt in the animal's food, and 60% of respondents use salt water when the animal gives birth to their babies. Most respondents 89.2% used lassi and sarson oil for animals; most

respondents 82.5% during the colder winter months used "Gurr + Ajwain + Sonf" when animals suffered from fever. Other remedies, such as the use of black pepper (53.3% for animals), predict that 555 respondents used neem leaf water for the treatment of animal diseases. The results of this research showed that the most widely practiced method was the use of folklore and spiritual remedies (dam, taweez, mannat), reported by 95.0% of respondents, indicating the strong cultural and religious role of such practices in rural livestock care.

Table 2: Traditional Remedies of respondents about animal health management practices.

Traditional Remedy	Not at all (%)	Very little (%)	Somewhat (%)	To great extent (%)	Total (%)
Use of Parra	27.5	0.0	7.5	65.0	100.0
Use of Garlic + Ginger + Green Chili + Onion	10.8	0.0	11.7	77.5	100.0
Use of Salt	24.2	5.8	9.2	60.8	100.0
Use of Salt Water	7.5	0.0	3.3	89.2	100.0
Use of Sarsoon Oil + Lassi	7.5	3.3	0.0	89.2	100.0
Use of Gurr + Ajwain + Sonf	7.5	3.3	3.3	82.5	100.0
Use of Black Pepper	40.8	2.5	3.3	53.3	100.0
Use of Neem Leaves	27.5	9.2	8.3	55.0	100.0
Folklore practices (e.g., Dam, Taweez, Manat)	5.0	0.0	0.0	95.0	100.0

Association between socio-demographic factors and animal health management practices (Table 3): The Chi-square results revealed that age ($\chi^2 = 21.341$, $p = 0.02$), which indicates an association between age and women livestock keepers. Education ($\chi^2 = 20.801$, $p = 0.002$), and income ($\chi^2 = 18.689$, $p = 0.05$)—these low p values indicate a significant

relationship between education, income, and women livestock health management practices. The result of the chi-square test ($\chi^2 = 19.33$, $p = 0.004$) showed that there is a significant relationship between experience and animal health management practices, and ($\chi^2 = 7.364$, $p = 0.118$) this higher p-value greater than 0.05 suggests there is no significant

relationship between government support and animal health management practices.

Table 3: Impact of Socio-Demographic Factors on Animal Health Management Practices

Hypothesis	Chi-Square Value	Degree of Freedom	p-value	Gamma Value	Cramer's V
Age and animal health management	21.341	6	0.002	-.356	0.22
Education and animal health management	20.801	6	0.002	.286	0.118
Income and animal health management	18.689	6	0.005	-.144	0.20
Experience and animal health management	19.336	6	0.040	-.216	0.19
Government support and animal health management	7.364	4	0.118	-.063	0.23

Discussion

The results of this study highlight that women livestock keepers in district Faisalabad play a crucial role in maintaining the animal health, but their traditional practices are shaped by a complex interaction of knowledge, gender relations, and hurdles. The majority of respondents fall under the age of 41-50 years. These findings are consistently related to previous studies that were conducted in district Faisalabad, which show that 66% of women are involved in livestock-keeping activities. Indicating that middle-aged women are very active in livestock management due to their experience and knowledge and also play an active role in household activities (Munawar *et al.*, 2013). A large number of women livestock keepers 65% are married, showing that married women are more actively working to manage their livestock. Likewise, in the study of Afzal *et al.* (2024), it was found that married women actively work to manage their animals and also work their daily chores.

The majority of women, 63.3%, were illiterate, which shows that they had no access to modern knowledge about animal health. These results align with Vijayamba and Madhura Swaminathan (2024): educated women are less likely to manage livestock for rising. Most respondents earn more than 30,000 PKR per month through livestock; this shows that livestock is the major source of their income and their family expenditures are relying on this income. These results are consistent with Shirwany *et al.* (2025) in Southern Punjab. Only 22.5% earned PKR 21,000–25,000 and 21.7% earned PKR 15,000–20,000, while only 10.0% of women earned less than PKR 15,000. This shows that livestock contribute substantially to household income.

The large number of women 67.5% live in nuclear families; these women take more responsibilities for the care of animals. Patil *et al.* (2023) found that the majority of respondents belonged to the nuclear family type, and mostly women had small families (up to 4 members).

Over half of the respondents, 51.7%, had more than 10 years' experience, these results showing that women have strong knowledge about animal health management practices. "Women who look after their animals develop strong bonds with their animals. This connection arises from their personal interest as well as the practical roles animals play in their lives" (Filed, observation during the data collection). These results showed that women livestock keepers gain practical knowledge through long-term engagement on the basis of their experience years, similarly to Wagan, *et al.* (2024), who explained that the old knowledge about animal health management practices transfer generation to generation in rural areas.

Most women 80.8% had a great extent to manage the livestock with their household. According to one study (FAO, 2015), rural women work about 15 hours each day and spend 5 hours caring for animals. Women livestock keepers actively manage their animals' care by milking cows, cutting fodder, monitoring herd health, and cleaning sheds.

The findings show that only 38.3% of women are making decisions on their own. The research findings of Naz *et al.* (2022) highlighted that women had no control over the revenue and resources from livestock care regardless of making significant contributions. A large majority of women, 88.3%, said that they do not receive government support to manage their livestock activities. This gap limits women access to training sessions, credit, and veterinary services.

Bahri *et al.* (2023) explained that women's decision-making power, negotiating, or further weak institutional and financial restrictions always impact their decision-making process. These results are similar to the findings of Mukeku *et al.* (2024), who describe that women livestock keepers often participate actively in livestock rearing but usually do not have the power to make decisions because men still control the household matters.

The results revealed that a large number of women 90% were able to recognize the sickness in animals, showing that women have strong knowledge about animal health management practices. Similarly, 83.3% of women give treatment to their animals when they get hurt. Mostly women say that they have used traditional methods when animals get hurt. While 75.5% of women know that vaccination is necessary for animal health, they do not get support from society and veterinary officers. Which is consistent with findings by Awan *et al.* (2021), who find out that women in rural Punjab do not have access to veterinary services. Similarly, Iqbal and Sial (2023) noted that women livestock keepers not get veterinary services

The majority of women (80%) have knowledge about finding bugs and dealing with zoonotic diseases. Women are vulnerable to zoonotic infections. Every year 2.2 million people die from this infection (Amanat *et al.*, 2015). A substantial majority (75.8%) of respondents have knowledge about animal pregnancy and the risk of baby loss. The majority of women, 83.3%, indicate they identify the symptom of lumpy skin disease, and 84.2% of respondents know that the animal is suffering from foot and mouth disease. These results match with Koyun *et al.* (2023), who noted the widespread prevalence of LSD and FMD in Pakistan, as well as who highlighted the continuing threat of brucellosis in Southern Punjab.

Women livestock keepers depend on traditional remedies for the treatment of animal diseases; around 65% showed that they use Parra (a dough made of flour) in case of fever and less milk production. Many people 77.5% use a mix of garlic, ginger, green chili, and onion for the treatment of stomach issues. Many women 60.8% use salt water when animals give birth to their baby. Depicts that 89.2% of respondents use salt in animals' food, and 89.2% of women use sarson oil and lassi for reducing animal heat stress or having ingested insects. The results show that 82.5% use Gurr+Ajwain+Sonf during the colder months when animals suffer from fever. The results show that 53.3% of respondents use black pepper when addressing swollen udders in animals, involving a remedy consisting of a mixture of black pepper and butter (ghee). The results predict that 55% of women used neem leaves water to

clean wounds on animals. Too much interesting results 95% women use folklore practices for their animals Farooq *et al.*, (2024) discovered that spiritual healing is still prevalent in rural South Punjab. Similar patterns have been reported across different research: Khan *et al.* (2024) documented them in the riverine areas of Punjab, Rehman *et al.* (2022) in North Waziristan, Shahen (2024) in Haripur, and Rafique Khan *et al.* (2021) in Neelum Valley, Kashmir Himalaya. The necessity of gender-development livestock programs that guarantee women's participation in training and resource access was also emphasized by Begum *et al.*, (2025). When taken as a whole, this research show that women's work and knowledge are still underappreciated and unpaid in patriarchal systems, which restricts their ability to successfully manage animal health.

Bi-variate analysis showed that women livestock keepers age ($\chi^2=21.341$, $p=0.002$), and education ($\chi^2=20.801$, $p=0.002$), levels significantly influence their health management practices. The gamma value of education (0.286) indicates a moderate positive association, suggesting that as education level increases, so does the likelihood of employing higher-level health management practices, while there is a tendency towards employing lower-level health management practices among women livestock keepers. While in contrast the gamma value of age (-0.356) shows a moderate negative association and indicating that older women livestock keepers employ to lower-level animal health management practices as compared to young women livestock keepers.

This analysis highlights the impact of age and education on the health management practices of women livestock keepers Afzal *et al.*, (2024) reported that 78.2% women livestock keepers were uneducated and leading poor animal health knowledge and practices.

This result showed the importance of education in improving the health of animal. The chi square results of income ($\chi^2=18.689$, $p=0.005$), and livestock-keeping experience ($\chi^2=19.336$, $p=0.04$) show a significant relationship between income and experience with animal health management practices Gizaw *et al.*, (2021) explained that experience women rely on traditional practices. The gamma value of income (-0.144) and the gamma value of experience (-0.216) suggests a weak negative association, indicating that while higher income correlates with higher-level practices, the effect is not as strong, and indicating that as experience increases, the likelihood of employing higher-level practices decreases.

While government support ($\chi^2=7.364$, $p=0.118$) suggested that there is no significant relationship between government support and animal health management practices (Nixon *et al.*

(2023) highlighted the need for formal education training sessions for women livestock keepers rather than direct government support, in this study suggesting that only government support is insufficient. The gamma value of -0.063 suggests a very weak negative association, indicating that government support does not strongly influence the choice of health management practices among women livestock keepers. Those receiving no government support predominantly use lower-level practices.

5. Conclusion

After investigating the study Socio-economic attributes and knowledge of women livestock keepers in animal health management practices: insights from district Faisalabad, in conclusion the study revealed significant insight into the demographics, knowledge about animal health and diseases, and traditional practices of female livestock keepers in the study area. Women livestock keepers play a crucial role in sustaining household income and well-being of their animals. There is a clear need to empower women livestock keepers with knowledge, resources, decision-making authority, and government support. This improves animal health outcomes and contributes to the overall development of rural communities. More effort to improve gender equality, which is also in our sustainable development goal, increase women's access to veterinary officers, and provide modern livestock training sessions are essential for sustainable growth in Pakistan's agriculture sector.

Recommendations

Short-term priorities: In the short term, women livestock keepers should be provided an opportunity for education and training sessions in rural areas to enhance their knowledge about animal health management practices. The government provides financial support for those women who have been keeping animals. This support enables women to invest in better animal care and purchase necessary vaccines or medicine that is necessary for animal health.

Long-term priorities: In the long term, follow the SDGs' 5th goal and make policies for the development of women; do not just make these policies, but also make strategies for the implementation of these policies. These steps will not only improve animal health but also improve our economy and enhance the empowerment of women, income security, and their rural livelihood resilience.

Implications for future research: Future research is recommended that compares urban and rural areas, how women livestock keepers work differently, and how their animal health management practices differ due to their different regions. By implementing these recommendations,

policymakers, NGOs, and agriculture stakeholders can work together for empowering women livestock keepers, improving animal welfare, and fostering sustainable agriculture development in Pakistan.

6. References

- Afzal, S., Manzoor, A., Jabeen, N., & Khan, I. A. (2024). Socio-economic and demographic determinants of women livestock managers' participation in decision making: A study of Punjab, Pakistan. *Southern Journal of Social Sciences*, 2, 1–16.
- Akhtar, S., Ahmad, S., Yousaf, H., Zafar, A., & Raza, Q. A. (2018). Role of women in social and agricultural decision-making in the rural areas of Southern Punjab (Pakistan). *International Journal of Humanities and Social Science*, 5, 34–38.
- Ali Khan, E., Rizwan, M., Wang, Y., Munir, F., & Hua, J. (2025). Challenges and future prospects of Pakistan's animal industry: Economic potential, emerging trends, and strategic directions. *Veterinary Sciences*, 12, 7–33.
- Amanat, T., Nawaz, N., Maann, A. A., Ch, K. M., Ashraf, I., Akhtar, S., & Hasan, G. (2015). Women's participation: Livestock management and its harmful effects on their health: A case study of Toba Tek Singh. *Professional Medical Journal*, 22, 1091–1095.
- Anwar, N., Rattani, S. A., Shams, S., Mughal, F. B., & Jalaluddin, S. (2025). Exploring religious, spiritual, traditional, and folk healing practices for oncological disorders. *BMC Complementary Medicine and Therapies*, 25, 2–52.
- Asghar, T., Mohiuddin, A., Hameed, H., Shabbir, T., Ihsan, A., Shahzadi, S., & Javaid, U. (2024). Lumpy skin disease: A global threat to livestock health and economy. *Frontiers in Microbiology and Biotechnology*, 2, 1–13.
- Awan, Z. A., Akhtar, K., Khan, L. A., & Imran, A. U. (2021). Women's participation and their constraints in livestock management activities: A case study of District Bahawalpur in Punjab, Pakistan. *International Journal of Veterinary Science and Research*, 7, 83–87.
- Bahri, A., López, D., & Remy, J. (2023). *Trade policy and gender equality*. Cambridge University Press.
- Batool, S., Muhammad, M., Fatima, M., Waheed, M., Batool, M., Dawood, M. F., & Abbas, K. (2025). Harnessing traditional ethnoveterinary practices and medicinal plants for sustainable livestock health in arid rangelands. *Genetic Resources and Crop Evolution*, 2, 1–23.
- Begum, K. (2025). Empowering women in agriculture: Critical role of gender-intentional investments in Pakistan. *Women's Studies International Forum*, 112, 103–145.
- Bujang, M. A., Omar, E. D., Foo, D. H. P., & Hon, Y. K. (2024). Sample size determination for conducting a pilot study to assess reliability of a questionnaire. *Restorative dentistry & endodontics*, 49, 1–15.
- Creswell, J. W. (2008). *Research design: Qualitative, quantitative, and mixed methods approaches* (2nd ed.). Sage Publications.

- Food and Agriculture Organization of the United Nations. (2015). *Women in agriculture in Pakistan*.
- Food and Agriculture Organization of the United Nations. (2022). *Gender-responsive livestock programs for sustainable rural livelihoods*.
- Farlex. (2010). *The free dictionary: Definition of methodology and research*.
<https://www.thefreedictionary.com/methodology>
- Farooq, U., Idris, M., & Rashid, H. (2024). Conservation and upgradation of indigenous Cholistan cattle breed of Pakistan: A pathway to sustainable livestock. *Tropical Animal Health and Production*, 56, 1–57.
- Gizaw, S., Woldehanna, M., Anteneh, H., Ayledo, G., Awol, F., Gebreyohannes, G., & Wieland, B. (2021). Animal health service delivery in crop–livestock and pastoral systems in Ethiopia. *Frontiers in Veterinary Science*, 8, 601–878.
- Goode, W. J., & Hatt, P. K. (1952). *Methods in social research*. McGraw-Hill.
- Government of Pakistan. (2014). *Economic survey of Pakistan 2013–14*. Ministry of Finance.
- Government of Pakistan. (2023). *Pakistan economic survey 2022–2023*. Finance Division, Economic Adviser’s Wing.
- Hussain, S., Hussain, A., Zia, U. U. R., Naqvi, S. M. R., Zahoor, M. Y., Bilal, M., & Sparagano, O. A. (2021). Knowledge, attitude, and practices associated with brucellosis among livestock owners and its public health impact in Punjab, Pakistan. *Biologia*, 76, 2921–2929.
- Iqbal, M., & Sial, A. (2023). Exploring women’s involvement in agriculture and livestock sectors: A study of Punjab Province, Pakistan. *Qlantic Journal of Social Sciences*, 4, 139–147.
- Khan, J., Sadiq, A., Basharat, N., Ali, S., Khan, H., Dabiellil, F., & Shah, T. A. (2025). Seroprevalence and associated risk factors of brucellosis in human and animal blood. *Journal of Applied Animal Research*, 53, 1–9.
- Khan, R. T., Nasim, K., & Ahmed, M. J. (2024). Ethno-veterinary practices for animal healthcare from Sudhnutti, Azad Kashmir, Pakistan. *Ethnobotany Research and Applications*, 28, 1–17.
- Kimaro, E. G., Lyimo-Macha, J. G., & Jeckoniah, J. N. (2015). Gender roles in smallholder dairy farming: Pertinent issues on access and control over dairy farming resources in Arumeru District, Tanzania. *AGE*, 18, 3–8.
- Koyun, O. Y., Balta, I., Corcionivoschi, N., & Callaway, T. R. (2023). Disease occurrence and the transfer of zoonotic agents by North American feedlot cattle. *Foods*, 12, 1–18.
- Luqman, M., Saqib, R., Shiwei, X., & Wen, Y. (2018). Barriers to gender equality in agricultural extension in Pakistan: Evidence from District Sargodha. *Sarhad Journal of Agriculture*, 34, 136–143.
- Mukeku, C. M. (2024). *Women’s participation in Kenya dairy cooperative decision-making processes* (Doctoral dissertation, Walden University).
- Munawar, M., Safdar, U., Luqman, M., Butt, T. M., Hassan, M. Z. Y., & Khalid, M. F. (2013). Factors inhibiting the participation of rural women in livestock production activities. *Journal of Agricultural Research*, 51, 213–220.
- Nath, T. D., Rahman, M. S., Biswas, A., & Juice, R. A. (2024). Livestock farming and women empowerment in rural Bangladesh: A mixed method approach. *CABI Agriculture and Bioscience*, 5, 86–100.
- Naz, S., Arif, M., & Ali, A. (2022). Women’s participation and its determinants in livestock management across the developing world: A systematic review. *Journal Name*, 2, 338–396.
- Nixon, R., Ma, Z., Birkenholtz, T., Khan, B., Zanotti, L., Lee, L. S., & Mian, I. A. (2023). The relationship between household structures and everyday adaptation and livelihood strategies in northwestern Pakistan. *Ecology and Society*, 28, 1–77.
- Patil, A. L., Thorat, K. S., & Shinde, V. B. (2023). Role of women in farm decision making. *Young*, 16, 13–33.
- Rafique Khan, S. M., Akhter, T., & Hussain, M. (2021). Ethno-veterinary practice for the treatment of animal diseases in Neelum Valley, Kashmir Himalaya, Pakistan. *PLoS One*, 16, 1–18.
- Rehman, S., Iqbal, Z., Qureshi, R., Rahman, I. U., Sakhi, S., Khan, I., & Ijaz, F. (2022). Ethnoveterinary practices of medicinal plants among tribes of North Waziristan, Khyber Pakhtunkhwa, Pakistan. *Frontiers in Veterinary Science*, 9, 1–14.
- Shahen, M. A. (2024). Cattle fattening and its roles in socio-economic development of fatteners: Learning from northern Bangladesh. *Journal of Rural Sociology, Microfinance, and Poverty Studies*, 1, 7–15.
- Shirwany, A. S. A. K., Awais, M. M., Masood, S., Riaz, A., Akhtar, M., El-Adawy, H., & Chaudhry, M. (2025). A snapshot of brucellosis as an occupational health hazard in animal handlers of an agroecological zone of Southern Punjab, Pakistan. *Journal of Agromedicine*, 9, 1–14.
- Vijayamba, R., & Swaminathan, M. (2024). Women’s work in livestock raising: Evidence from time use surveys in India. *The Indian Journal of Labour Economics*, 67, 709–729.
- Wagan, H., Memon, B., Solangi, A. W., Wagan, G. H., Bajkani, J. K., & Rais, N. (2024). Empowering rural women: Examining their role in agriculture and livestock in Taluka Hyderabad Rural, Sindh, Pakistan with a focus on sustainable development goals. *The Asian Bulletin of Green Management and Circular Economy*, 4, 1–20.
- World Bank. (2023). *Women’s empowerment in livestock for poverty reduction and community resilience*. World Bank