



Training need analysis for prompt and efficient delivery of para-veterinary services at farmers doorstep from stakeholders' perspective: An exploratory and comparative study in four States of India

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ABSTRACT

This study provides a comprehensive analysis of the training needs for para-veterinarians (para-vets) in India, based on a multi-stakeholder perspective, conducted across four states (Maharashtra, Rajasthan, Haryana, and Uttar Pradesh), involved surveys with 160 para-vets, 60 veterinarian trainers, and 160 dairy farmers. The objective was to identify and prioritize critical skill gaps and ultimately develop an effective and responsive training curriculum. Using a structured methodology that included task analysis, skill gap assessment, and training need analysis, the findings reveal a consistent pattern of deficiencies across diverse agro-climatic zones. While core competencies such as artificial insemination and vaccination were found to be well-established and highly prioritized, significant and urgent skill gaps were identified in crucial areas related to animal health, public health, and productivity. Key areas consistently requiring urgent capacity building include: knowledge of the latest therapeutic drug trends (particularly with respect to antimicrobial stewardship), control of zoonotic and contagious diseases, prophylactic healthcare measures, fodder enrichment and ration formulation, and the use of rapid diagnostic kits. The analysis confirms that the challenges facing the para-vet workforce are not isolated to specific regions but represent a systemic issue requiring a consolidated national response. The study highlights the imperative for a national framework to redesign para-vet training curricula to address these specific gaps, thereby enhancing their effectiveness in supporting livestock health, improving productivity, and ensuring food safety in rural India.

Keywords: Animal husbandry; Curriculum, Para-vets; Paravet Schools; Training need analysis

The livestock sector is a cornerstone of India's rural economy, providing livelihoods to millions of small and marginal farmers. At the forefront of animal healthcare delivery are para-veterinarians (para-vets), a workforce that operates at the grassroots level, providing crucial services to farmers in remote areas. Their role has expanded significantly beyond traditional tasks to include a wide range of services that are vital for sustaining livestock health and productivity. Recent initiatives by the Government of India have focused on enhancing veterinary service delivery through skill development programs and short-term courses, recognizing the immense potential of the para-vet workforce (Agrawal *et al.* 2024). However, a significant portion of these animal health workers, particularly in the private sector, have traditionally acquired their skills through on-the-job training rather than formal institutional programs, leading to inconsistencies

in their knowledge and capabilities (Rajendran and Malik, 2024; Haddy *et al.* 2022). This highlights the necessity for standardized training and credentialing to professionalize the workforce and improve their technical efficiency and role performance (Barbaruah, 2019).

The professional literature underscores the importance of a comprehensive approach to para-vet training (Pereira *et al.* 2023). Suitable training programs must be designed to align with the specific needs of these professionals and the communities they serve. Studies have pointed to priority training areas such as disease reporting, judicious therapeutic drug use, and breeding management (Rao and Gupta, 2024). Furthermore, skill enhancement in minor surgeries and community engagement is considered essential for their effectiveness (Kumar and Jha, 2024). The establishment of a National Regulatory Authority under the Veterinary Council of India (VCI) has also been proposed to oversee training and work conditions, ensuring a uniform standard of service delivery under NSQF (Barbaruah and Weaver, 2020).

Given the evolving nature of animal healthcare and the increasing complexity of livestock management, a thorough and data-driven assessment of para-vet training needs is imperative. This study aims to address this critical need by

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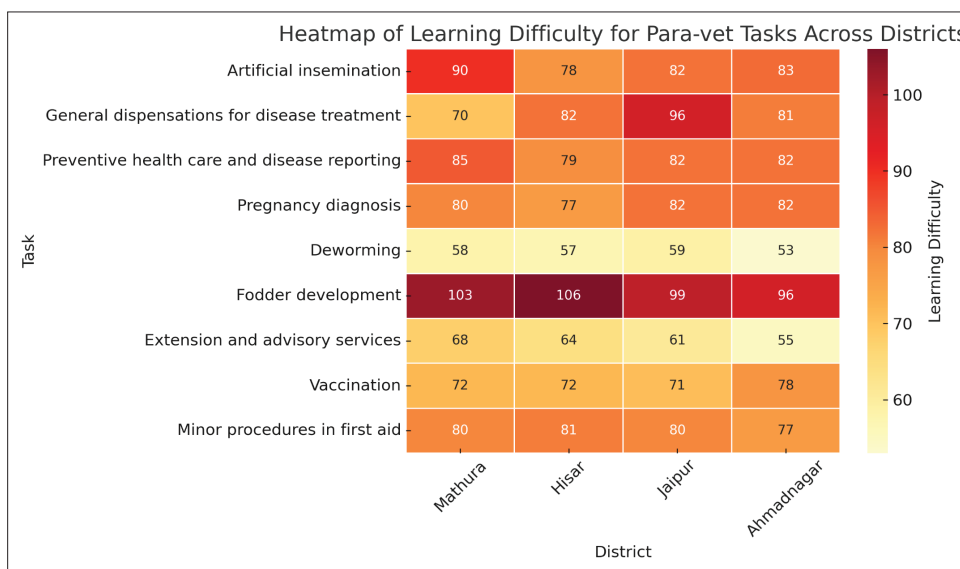


Fig. 1 Learning difficulty of para-vet tasks across four districts (as perceived para-vets) (n=160)

conducting a comprehensive training needs analysis from a multi-stakeholder perspective, incorporating the views of para-vets, trainers, and farmers. The objective is to identify existing skill gaps and prioritize areas for future curriculum development to enhance the efficiency and effectiveness of para-veterinary services at the farmers’ doorstep.

MATERIALS AND METHODS

The study was conducted across four states in India—Maharashtra, Rajasthan, Haryana, and Uttar Pradesh—which were selected based on having a high number of para-vet schools, a substantial livestock population, and a high rank in milk production. One district from each state was chosen based on the highest concentration of para-vet schools.

A total of 380 respondents were surveyed in the year 2022 using random sampling: 160 para-vets, 60 trainers, and 160 dairy farmers. The criteria for inclusion were as follows: para-vets had to have at least one month of minor veterinary training and two years of field practice, and not be affiliated with any Non-Governmental Organization (NGO); trainers needed more than one year of experience; and farmers had to own at least two milch animals and have used para-vet services for at least two years.

The methodology for this study was based on the framework proposed by Vijayaragavan and Hansara (2001). This approach involves a three-phase sequential process to assess training needs:

1. Task Analysis: The tasks performed by para-vets were broken down into observable sub-tasks, and their frequency of performance (always, sometimes, never) and importance (high, moderate, low) were assessed.
2. Skill Gap Analysis: The proficiency of para-vets in performing these tasks was evaluated using a three-point scale (good, moderate, poor), through both self-rating and professional ratings from trainers and farmers. This phase also determined whether the proficiency issues

could be resolved through training.

3. Training Need Analysis: Following the skill gap assessment, the degree of training required for each task was assessed using a five-point scale (very much, much, moderately, little, not at all needed).

This systematic approach allowed for a robust and comprehensive evaluation of skill deficiencies and helped in prioritizing areas for curriculum enhancement based on a multi-stakeholder perspective.

RESULTS AND DISCUSSION

Learning Difficulty of Para-Veterinary Tasks Across Districts as Perceived by Paravets themselves: The heat map shows that fodder development is the most difficult task to learn across all districts, especially in Hisar and Mathura, while deworming is the easiest with consistently low difficulty scores. Technical tasks like artificial insemination, pregnancy diagnosis, preventive healthcare, and minor first aid procedures fall in the moderate difficulty range compared to routine services like vaccination and advisory work (Figure 1). District-wise, Hisar faces the greatest challenge in fodder development, Jaipur in disease treatment, and Mathura in artificial insemination, whereas Ahmadnagar shows relatively lower learning difficulty overall.

Assessment of Para-Veterinary Tasks by Frequency, Importance, Difficulty, and Priority as Perceived by Trainers of Para-vet Schools: The heat map shows that artificial insemination and vaccination are the most frequent, important, and highly prioritized para-veterinary tasks, reflected in their highest total scores. Pregnancy diagnosis, general dispensations, and deworming also hold significant importance and are widely practiced, though they are not considered very difficult to learn (Figure 2). In contrast, silage-making, while rated as the most difficult to learn, is rarely practiced and carries no real priority in the field. Extension services and minor procedures rank

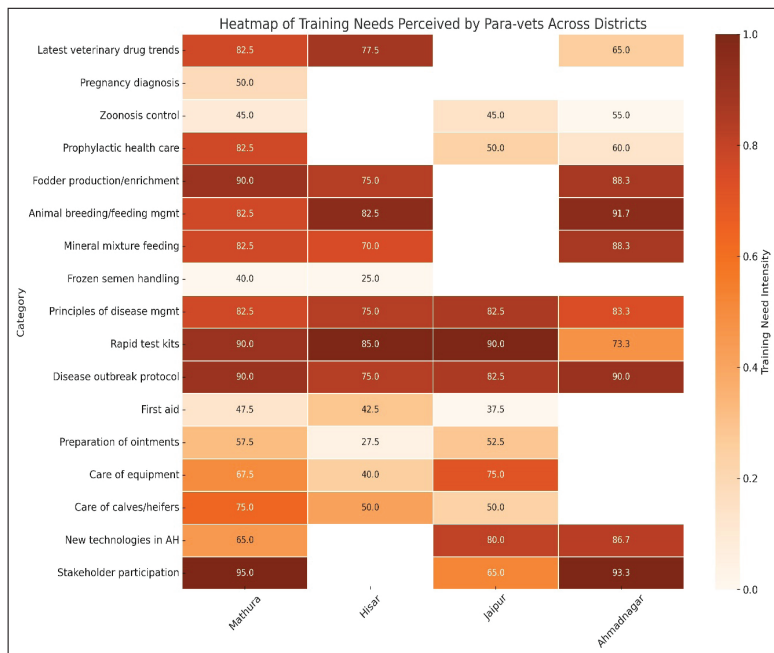


Fig. 2 Assessment of para-veterinary tasks by frequency, importance, difficulty, and priority as perceived by the trainers of the para-vets schools

lower in frequency and importance, with minor procedures still maintaining a moderate overall score compared to extension work.

Task analysis for major roles of para-vets as perceived by farmers: There exist requirements for assessing the training need because it needs to be well formulated and involve the stakeholder’s initiative along with the readiness of para-vets to attain training. Naik et al. (2016) conducted a study in Telangana state and revealed that nearly half of the respondents were having a medium attitude towards training followed by a high 29.33 per cent with high and 22.67 per cent with a low attitude towards training. A perusal of Table 4 depicted that 78.88 per cent of respondents perceived that learning difficulty was highest

for silage-making and enrichment. More than 80.00 per cent of respondents assigned a high relative importance of the task to artificial insemination, general dispensation, pregnancy diagnosis, deworming, vaccination and minor procedures in first aid. With due consideration to the above findings, task priority was established for which artificial insemination, vaccination, pregnancy diagnosis, general dispensation, minor procedures in first aid and deworming ranked first to sixth in descending order. Silage making and enrichment ranked last while extension and advisory services ranked second last in the task priority table (Figure 3).

It shows a normalized comparison across different assessment metrics—frequency of performance, relative importance, learning difficulty, and total score—for key

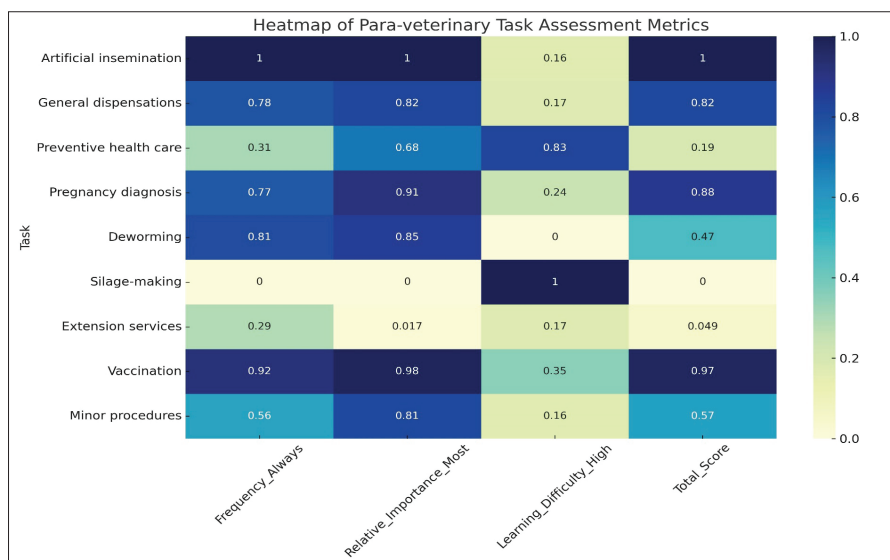


Fig. 3 Task analysis for major roles under para-veterinary services (as perceived by farmers) (n=160)

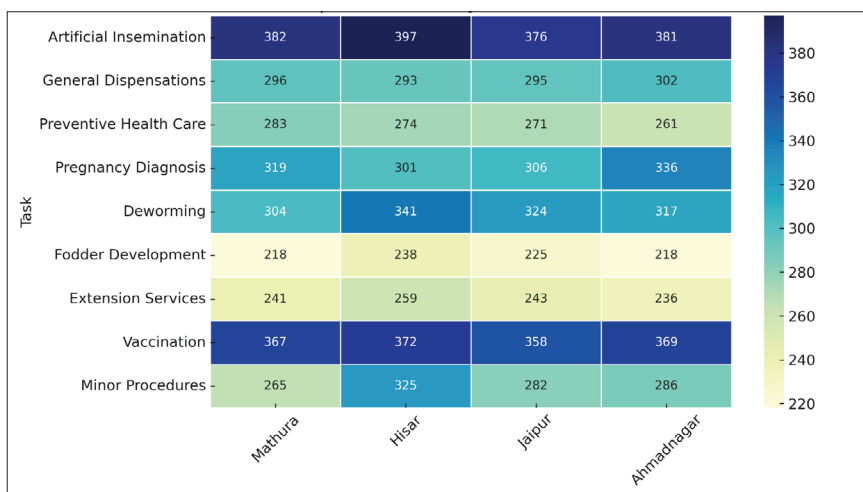


Fig. 4 Task priority scores across different districts

para-veterinary tasks.

Prioritization of Para-veterinary Tasks: The analysis of task prioritization reveals a clear consensus among para-vets and farmers on the most and least important services. Tasks such as artificial insemination (AI) and vaccination consistently ranked highest in priority, followed by general dispensations, deworming, and pregnancy diagnosis. These findings suggest that the traditional, high-frequency, and curative services are perceived as the most crucial components of a para-vet's role. For instance, the task priority scores for artificial insemination were 385, followed by vaccination at 365.67, and deworming at 323, indicating their top-tier importance (Table 1). The perception of high proficiency in these areas, particularly in frozen semen handling (76.87%), also suggests that training programs have historically focused on these core competencies, leading to a degree of mastery.

In contrast, services such as extension and advisory work and fodder development consistently received the lowest priority ratings from both para-vets and farmers. With a score of 227, fodder development ranked last among all tasks, and extension services were a close second-to-last

with a score of 247.67. This low prioritization indicates a significant gap in the perceived value of these services, which have immense potential to enhance livestock productivity and farmer income. The disparity between the perceived importance of these tasks and their actual potential underscores a need for a shift in focus for both the para-vet workforce and the beneficiaries of their services.

Skill gap perceived by para-vets in delivery of minor veterinary services in Mathura district: A perusal of Figure 4 shows that the highest scores are seen in Artificial Insemination (376–397) and Vaccination (358–372), indicating strong proficiency in these technical areas. In contrast, Fodder Development (218–238) and Extension Services (236–259) have the lowest values, suggesting weaker focus or adoption. Other tasks like Pregnancy Diagnosis, Deworming, and Minor Procedures show moderate performance, with district-level variations such as Hisar excelling in Deworming (341) and Ahmadnagar in Pregnancy Diagnosis (336).

District-wise Distribution of Veterinary Services: A perusal of Figure 5 delineates the distribution of veterinary services across Mathura, Hisar, Jaipur, and Ahmadnagar. Mathura leads with the most comprehensive service availability, especially in General Dispensation and Contagious Disease Control. Hisar performs well in General Dispensation and Pregnancy Diagnosis, but with slightly lower service coverage compared to Mathura. Jaipur excels in Minor Surgical Treatment and Knowledge about Latest Veterinary Drugs, indicating a focus on specialized care. Ahmadnagar has a more balanced but less concentrated spread of services, suggesting a need for greater emphasis on specific components like Gynaecological Treatment and advanced veterinary knowledge. Overall, Mathura is the well-served, while Ahmadnagar could benefit from more targeted improvements.

Skill gap analysis for various roles and services performed by para-vets (as perceived by farmers): Among curative services, proficiency in knowledge about therapeutic drug trends and treatment of contagious

Table 1. A consolidated view across Stakeholders towards training need prioritization

Task Category	Task	Overall Task Priority Score
Curative	Artificial Insemination (AI)	385.00
Preventive	Vaccination	365.67
Preventive	Deworming	323.00
Curative	Pregnancy Diagnosis	308.67
Curative	General Dispensation	294.67
Curative	Minor Procedures in First Aid	290.67
Miscellaneous	Extension and Advisory Services	247.67
Productive	Fodder Development	227.00

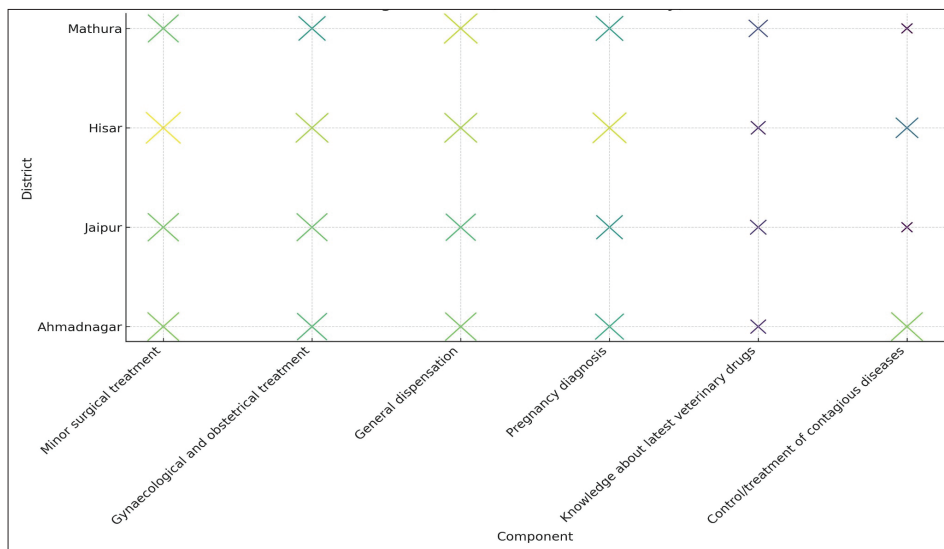


Fig. 5 District-wise Distribution of Veterinary Services (as perceived by para-vets)

diseases was low (Figure 6). As most para-vets used antibiotics, perceived a need for further training. Over half felt proficient in pregnancy diagnosis; and 36.87% felt the need of training per se, citing experience as a key factor. In preventive services, proficiency in vaccination, deworming, dehorning, and castration tools was better, so less training was needed. Chaturvedani *et al.* (2016) found that livestock owners were very much satisfied with vaccination. However, 73.75% perceived training need in prophylactic care due to low proficiency and risk of antibiotic resistance. High proficiency in frozen semen handling indicated low training need. In diagnostic services, low proficiency was noted in calf management, disease control, rapid test kits, and outbreak protocol,

with high training need. For miscellaneous services, low proficiency in livestock management and participation roles led to 70%–87.50% training need towards it (Naik *et al.* 2016). Training need analysis is vital for improving para-vets’ field competencies.

Training needs e perceived by trainers of para-vet schools: Over 60% of trainers perceived moderate to very high training needs for minor surgical treatment, while 65% reported high to very high need for knowledge of therapeutic drug trends (Figure 7). In preventive services, high to very high needs were seen for zoonoses control by half of the respondents and quarantine measures by 93.33% of the respondents. Productive services showed high needs for fodder production (88.34%), breeding trends (91.67%),

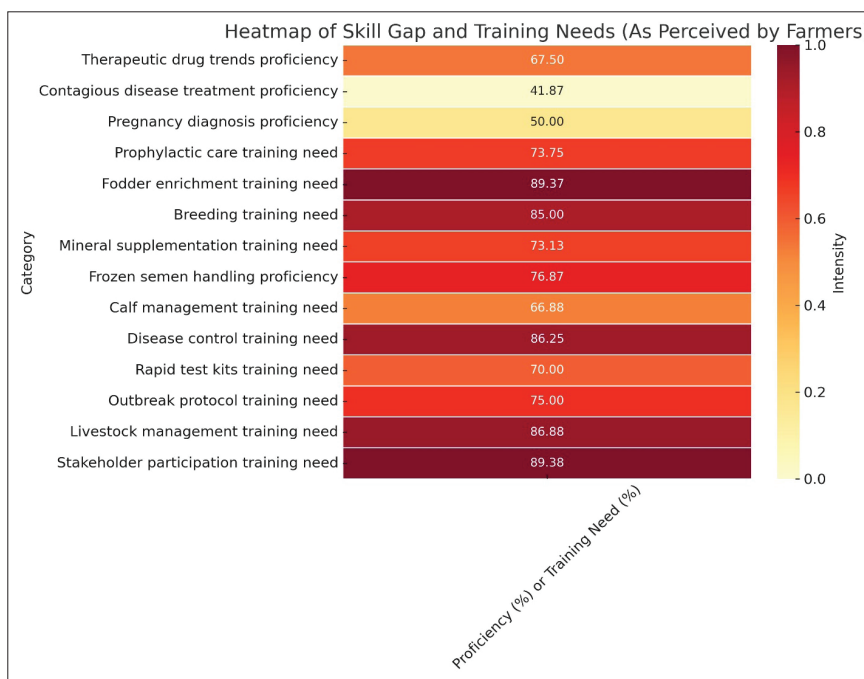


Fig. 6 Skill gap analysis for various roles and services performed by para-vets (as perceived by farmers)

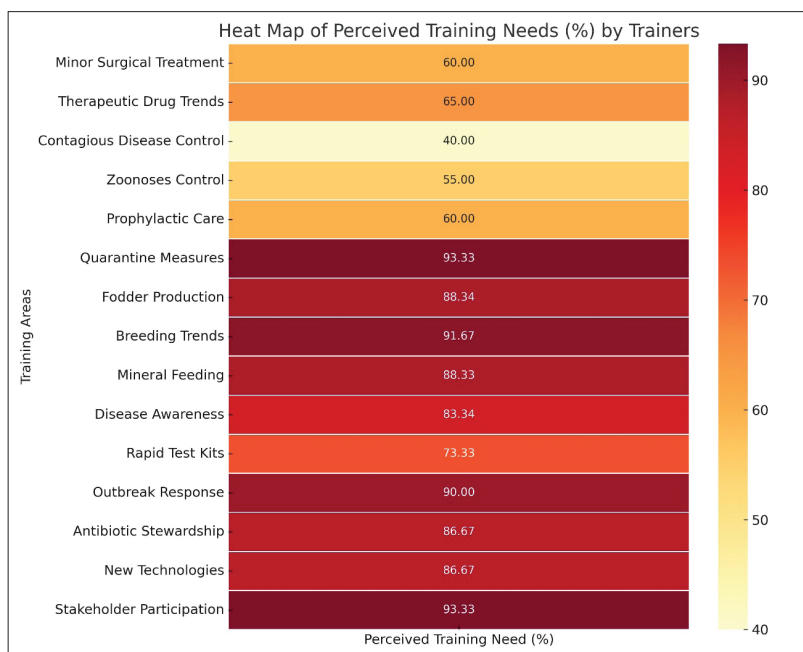


Fig. 7 Training needs to be perceived by trainers of para-vet schools

and mineral feeding. Diagnostic roles with high needs included disease awareness, rapid test kits and outbreak response.

THEMATIC ANALYSIS OF SKILL GAPS AND TRAINING NEEDS

The skill gap analysis, while revealing some regional variations, consistently identified systemic deficiencies across all four states. The data points to a critical disconnect between the skills para-vets are proficient in and the skills that are most crucial for addressing modern challenges in animal and public health.

CURATIVE AND PREVENTIVE SERVICES

While para-vets demonstrated a high weighted mean for proficiency in routine curative services like general dispensation, minor surgical treatment, and gynecological treatment, a significant lack of proficiency and a high training need was consistently reported for more complex tasks. For instance, a staggering 87.50% of para-vets in Mathura and 75% in Ahmednagar reported low proficiency in the latest trends in therapeutic drug use (Table 2). The use of antibiotics by para-vets without proper knowledge of their implications is a well-established problem, leading to a high perceived need for training in this area, with 64.38% of farmers and 82.5% of para-vets in Mathura reporting a strong need for such training.

This deficiency extends to critical public health domains. A large proportion of trainers (over 80%) identified high training needs for the control of zoonoses (diseases transmissible from animals to humans), prophylactic care, and quarantine measures. The weighted mean for the perceived problem in proficiency for zoonoses control and prophylactic care was 94.67 and 92.00, respectively,

from the trainers' perspective, and a high training need was perceived by 45% of para-vets in Jaipur. This indicates that while para-vets are competent in what they do most frequently, they are critically unprepared for managing the public health consequences of their actions. Their limited knowledge of antimicrobial stewardship and disease control protocols poses a significant risk not only to livestock health but also to human health due to the increasing threat of antimicrobial resistance.

PRODUCTIVE AND DIAGNOSTIC SERVICES

The analysis revealed a consistent pattern of low proficiency and high training needs in productive and diagnostic services. Across all districts, para-vets reported low proficiency in fodder enrichment and ration formulation, with over 80% of para-vets in Ahmednagar and Hisar expressing low skills in this area (Table 2). Similarly, proficiency was found to be low for almost all diagnostic roles. Over 80% of para-vets in Hisar and Jaipur reported low proficiency in awareness of disease management principles. There was a very high training need perceived for the use of rapid diagnostic kits and adherence to outbreak reporting protocols. For example, 95% of para-vets in Mathura perceived low proficiency in following standard operating procedures for disease outbreaks, and over 70% of respondents in Hisar and Jaipur also reported a lack of proficiency with rapid test kits. The inability to accurately diagnose diseases and report outbreaks in a timely manner hinders effective disease surveillance and management, leading to delayed responses and potentially larger economic losses for farmers. This lack of diagnostic proficiency moves the para-vet's role from a proactive one to a reactive one, where services are sought only after a problem has already manifested.

Table 2. Consolidated Skill Gaps and Training Needs by Service Category

Service Category	Key Skill Gap Areas	Percentage of Respondents Perceiving Training Need	Stakeholders
Curative	Therapeutic Drug Trends, Contagious Diseases	87.50% (Mathura), 65% (Ahmadnagar)	Para-vets, Trainers
Preventive	Zoonoses Control, Prophylactic Care, Quarantine Measures	94.67% (Trainers), 73.75% (Farmers)	Trainers, Farmers
Productive	Fodder Enrichment, Ration Formulation, Breeding Trends	90% (Mathura), 91.67% (Trainers)	Para-vets, Trainers
Diagnostic	Rapid Test Kits, Outbreak Protocols, Disease Management	90% (Mathura), 85% (Hisar)	Para-vets
Miscellaneous	Antimicrobial Resistance, Stakeholder Participation	86.67% (Trainers), 95% (Mathura)	Para-vets, Trainers

A synthesis of skill gap and training need from the Stakeholder's perspective: The findings of this multi-state, multi-stakeholder study underscore a critical imperative for the modernization and professionalization of the para-veterinary workforce in India. The data consistently demonstrates a clear dichotomy: para-vets are highly competent in the high-frequency, traditional tasks like artificial insemination and vaccination, yet they possess significant and widespread deficiencies in more complex, high-impact areas that are vital for both livestock productivity and public health. This structural gap is not a regional anomaly but a systemic challenge that is present across diverse agro-climatic zones, suggesting a fundamental need for a unified national response.

The low proficiency in areas such as fodder enrichment, ration formulation, and modern breeding trends reveals a missed opportunity to elevate the para-vet's role. A workforce that is well-versed in these areas could transition from being a reactive service provider, treating diseases after they occur, to a proactive consultant who can improve the overall efficiency and profitability of livestock farming. Improving skills in these areas is directly linked to enhancing animal productivity and, by extension, the economic well-being and food security of rural communities.

Similarly, the pervasive lack of knowledge concerning antimicrobial stewardship, zoonotic disease control, and the use of modern diagnostics represents a serious public and animal health risk. The indiscriminate use of antibiotics, a well-documented problem, is directly addressed by this finding. A lack of training in these areas not only undermines the health of animal populations but also contributes to the global threat of antimicrobial resistance. The study's results highlight a pressing need for a revised curriculum that prioritizes these public health-oriented skills. It is not enough for para-vets to treat diseases; they must be equipped to prevent them, respond to outbreaks, and use therapeutic drugs responsibly.

This research highlights the profound value of a multi-stakeholder approach. While para-vets may prioritize training in tasks they perceive as having the highest immediate utility, such as first aid and minor procedures, the perspectives of trainers and farmers reveal that the most significant problems lie in more technical areas, such as

judicious use of antimicrobials and advanced management techniques. This divergence in perception is critical for curriculum designers, as it suggests that training content must be informed by objective needs rather than merely by the preferences of the trainees. A holistic curriculum must integrate technical skills with an understanding of their broader implications for public health, food safety, and livestock economics.

The comprehensive assessment of training needs for para-veterinarians in India highlights substantial and systemic skill gaps, emphasizing the urgent need to reprioritize training. The study, which incorporated perspectives from para-vets, trainers, and farmers across four diverse states, revealed that while core competencies in high-frequency tasks such as artificial insemination and vaccination are relatively well established, significant deficiencies persist in critical areas related to animal health, public health, and productivity. The findings strongly advocate for the design and implementation of targeted, needs-based training modules and continuous professional development programs for para-vets. In particular, the curriculum requires revision to strengthen practical knowledge and skills in antimicrobial stewardship for the judicious use of veterinary therapeutics, modern strategies for disease control and outbreak management, the application of advanced diagnostic tools such as rapid test kits, animal nutrition including fodder enrichment and ration formulation, and extension and advisory services to improve farmer engagement. Addressing these gaps through structured training is essential not only for enhancing the professional competence of para-vets but also for strengthening the animal healthcare delivery system, improving livestock productivity, ensuring food safety, and supporting rural livelihoods in India. Achieving this goal necessitates a collaborative effort among training institutions, veterinary authorities, and other stakeholders to ensure para-vets are adequately prepared to meet the evolving challenges of the livestock sector.

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