An Analytical Study on Mobile Veterinary Unit (MVU) Access to Animal Health Care and Livestock Extension Service Delivery in Hindol Block of Dhenkanal District, Odisha

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10.18805/BKAP889

ABSTRACT

Background: This study presents a comprehensive analysis of the operation, achievements and challenges of MVUs in the Hindol Block of Dhenkanal, Odisha. Drawing upon primary field data and 10 years of secondary operational records, the research addresses two core objectives: (1) Evaluation of the performance and achievements of MVUs with respect to access to animal health care and extension services; and (2) Investigation of key constraints faced by MVUs in service delivery, offering policy-relevant recommendations for improving the mobile livestock health system in rural Odisha. Primary data was collected from villages as per the advance tour programme (ATP) prepared and approved by the Chief District Veterinary Officer, Dhenkanal In the next level, 150 farmers/ beneficiaries were selected from among those villages, who had availed MVU's services. To obtain the perspective from the supply side, 30 members of veterinary sector officials were also considered for the study. Yearly Secondary data on performance of MVU in Hindol block (both target and achievement) for 10 years from the year 2014-15 to 2023-24 was also deliberated for the study.

Methods: Total weighted mean score (TWMS) Analysis methodology was employed to analyze the study.

Result: The study revealed that limited frequency of MVU visits, inadequate manpower, insufficient diagnostic facilities and lack of follow-up services were the major constraints perceived by farmers, whereas Service providers identified staff shortages, inadequate availability of quality medicines and vaccines and limited diagnostic support as key operational challenges. 'Strengthening of staff in MVU activity' was given the first rank by the veterinary professionals, followed by 'Quality vaccine and Medicine in adequate quantity', 'Less Diagnostic Facility' and 'Frequent visit to the same Village'.

Key words: Animal health care, Livestock extension service, Mobile veterinary unit, Total weighted mean score.

INTRODUCTION

In India's agricultural system, livestock rearing is an important livelihood activity for rural households. It provides food, draft power, organic manure and, crucially, acts as a "bank on hooves", offering resilience against agrarian shocks (Mishra, 2012; National Bank for Agriculture and Rural Development, 2018). The sector is particularly vital for women, landless laborers and marginalized communities, often serving as their main source of income and nutrition. Livestock also contributes significantly to diversification of farm income and livelihood resilience among rural households in India (Birthal *et al*., 2014).

Despite India's vast livestock population, which exceeds 535 million as per recent estimates, the productivity of Indian livestock remains 20-60% lower than global averages due to persistent gaps in nutrition, genetics and animal health services (20th Livestock Census, DAHD, 2019). Similar trends in livestock population growth have been observed over successive livestock censuses in India (Department of Animal Husbandry and Dairying, 2012). In spite of possessing one of the largest livestock populations in the world, India continues to lag behind international productivity standards, primarily because of constraints related to feed and fodder availability, genetic improvement and access to veterinary and extension services (Ahuja *et al.*, 2008; DAHD, 2022). These gaps are exacerbated in regions like Odisha, where infrastructural, geographical and socio-economic barriers hinder access to quality veterinary care, particularly among smallholders and resource-poor farmers (Heffernan, 2002). Similar constraints related to diagnostic facilities and veterinary infrastructure have also been reported in other developing regions (Nakayima *et al.,* 2016). Hence, improving livestock service delivery is essential for increasing livestock productivity. Several studies have emphasized the need for efficient institutional arrangements and policy support to strengthen

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How to cite this article: Mishra, C. (2026). An Analytical Study on Mobile Veterinary Unit (MVU) Access to Animal Health Care and Livestock Extension Service Delivery in Hindol Block of Dhenkanal District, Odisha. *Bhartiya Krishi Anusandhan Patrika.* **41(2):** 227-233. doi: 10.18805/BKAP889.

Submitted: 27-09-2025 **Accepted:** 12-03-2026 **Online:** 28-03-2026

veterinary service delivery systems in developing countries (Sen and Chander, 2003; Pratap *et al.,* 2012). Though there is an ongoing global policy of economic liberalization, still the government is trying hard to hold its feet on livestock service delivery which continues to play a central role in livestock production. India has one of the largest animal healthcare infrastructure and technical proficiency in the world. India has built an extensive veterinary infrastructure comprising 67,889 veterinary institutions, including 13,173 veterinary hospitals and polyclinics, 30,184 veterinary dispensaries and 24,532 veterinary aid centers to support livestock health and productivity (DAHD, 2024).

India is also one of the foremost countries in terms of livestock population and milk production (176.30 million tonnes), (DAHD, 2022). For example, milk productivity of native breeds is very low (2.41 kg milk/day), when compared with exotic breeds (11.48 kg/day) (DAHD, 2018-19). The productive potential of animals mainly depends on quality of nutrition, genetic constitution and animal health system and, on all these counts, India has a poor record (Ahuja *et al.*, 2008). So a dynamic livestock service delivery system can play a major role to raise the productivity of this sector and to support Indian economy. The impetus behind the surge in demand for livestock products is a combination of population and income growth combined with urbanization. The livestock owners need veterinary services particularly preventive, curative and advisory services to improve their productivity. Access to veterinary services and farmers' willingness to utilize them often depend on service accessibility and perceived benefits to livestock production (Ravikumar *et al.,* 2007). With the rapidly increasing demand for livestock products and the priority given by the Government to improve livelihood through animal husbandry, this sector needs special attention to provide veterinary services at door steps of the rural farmers. Government initiatives such as the Livestock Health and Disease Control Programme have been introduced to strengthen disease prevention and veterinary healthcare services across the country (Department of Animal Husbandry and Dairying, 2021). To address last-mile delivery gaps, several Indian states such as Tamil Nadu, Karnataka, Arunachal Pradesh, Andhra Pradesh, Meghalaya, Rajasthan, Madhya Pradesh, Gujarat (in the name Pashu Dhan Sanjeevani) and Chhattisgarh have adopted Mobile Veterinary Units (MVUs) as an outreach mechanism. Similar initiatives in Odisha have demonstrated the potential of Mobile Veterinary Units to improve livestock service delivery and farmer access to veterinary care in remote areas (Jena and Chander, 2017a).

The effectiveness of livestock development programs largely depends on the accessibility and efficiency of veterinary and extension service delivery systems. Earlier studies have emphasized the importance of institutional reforms and improved outreach mechanisms in strengthening livestock health services, particularly in developing countries (Sen and Chander, 2003; Pratap *et al.*, 2012). Empirical research in the Indian context has also highlighted that improved veterinary infrastructure, farmer-oriented extension support and timely access to animal health services can significantly enhance livestock productivity and rural livelihood security. More recent studies have further stressed the importance of innovative service delivery approaches, capacity building of service providers and improved coordination between veterinary institutions and livestock farmers to address emerging challenges in the livestock sector. These studies collectively indicate the need for accessible and responsive livestock service delivery mechanisms, particularly in rural and remote areas where farmers face significant constraints in accessing veterinary care.

Mobile Veterinary Unit: A brief of Odisha scenario

Odisha is not far behind in that practice and in order to deliver the desired veterinary services to the farmers at their door step according to their preferred time and in a very nominal cost, in the interior villages where veterinary institutions are far away, the concept of Mobile Veterinary Unit (MVU) (Mukhyamantri Bhramyamana Prani Chikitsha Seva) was initiated in the state of Odisha, on 10th July, 2011, launched by the Hon'ble Chief Minister, Odisha at Umuri, Jeypore, in Koraput district. During the year 2011-2012, the MVU programme was initially started in 40 Blocks of 10 tribal districts of the state on a pilot basis under National Agricultural Development Scheme or Rastriya Krishi Vikas Yojana (RKVY). Later on it was extended to all the 30 districts and 314 blocks of the state in the year 2013-14. MVU is a state plan scheme through which farmers can get breeding and advisory services for their livestock at their doorstep. It is also helpful for providing animal healthcare services during natural calamity, outbreaks and emergency. Besides, the MVUs will provide emergency healthcare services for stray and destitute animals. As per the operational guidelines for Mobile Veterinary Units in Odisha (Government of Odisha, 2022), MVU is operated by a team of professionals consisting of one Veterinary Surgeon (V.S), one Livestock Inspector (L.I) and one attendant. Each MVU operates for 20 days in a month for conducting health camps. In every working day, the team arranges one camp, which accommodates to the livestock owners of a minimum of two villages. The camps are prearranged on normal working days *i.e.* Monday to Saturday as per the monthly health camp schedule chalked out in Advance (Advance Tour Programme). For rest of the days of the month, MVUs are being used for lifting of medicines, vaccine, compiling monthly report and attending meetings. The implementation framework of the scheme is guided by the state action plan developed for Mobile Veterinary Units (Department of Animal Husbandry and Veterinary Services, 2022).

Objective of the study

- To examine the primary limitations experienced in the execution of livestock services by MVUs in Hindol Block in Dhenkanal district, with the aim of providing policy recommendations to enhance the efficacy of the mobile livestock service delivery system.
- To analyze whether the existing infrastructure is adequate for achieving the objectives of the scheme.

MATERIALS AND METHODS

Study area

Hindol block, located in the south-central part of Dhenkanal district, is characterized by high livestock density, significant forest cover and challenging terrain. With a rural population exceeding 44,000, including a substantial proportion of Scheduled Castes (23.8%) and Scheduled Tribes (9.3%), the block faces pronounced infrastructural and social barriers to veterinary service access (Office of the Registrar General and Census Commissioner, 2011). The majority of the population is engaged in marginal farming or as agricultural laborers, making livestock a cornerstone of livelihood security.

The inaccessibility of many villages due to forests and poor road infrastructure makes Hindol a strategically important zone for mobile veterinary interventions. The block thus serves as an appropriate case for evaluating the efficacy and limitations of the MVU approach in bridging last-mile service delivery gaps. The Livestock Statistics of Hindol Block in a Nutshell is given in Table 1. In Hindol Block out of total population, 16,972 were engaged in agricultural work activities. 71.3% of workers describe their work as Main Work (Employment or Earning more than 6 Months) while 28.7% were involved in Marginal activities like dairy farming and poultry providing livelihood for less than 6 months. Of 16,972 workers engaged in Main Work, 2,479 were cultivators (owner or co-owner) while 4,270 were Agricultural labourers. Since a major part of the population is marginal farmer and agricultural labour, the scope of depending on livestock for their livelihood therefore becomes significant.

Sampling design

In the present study, twelve villages across seven Gram Panchayats and three NAC wards were selected as per the Advance Tour Programme (ATP) of MVU operations for January-March 2023. A purposive sampling approach was adopted, selecting 12 villages that had previously been served by Mobile Veterinary Units (MVUs). A total of 150 livestock farmers who had availed MVU services were selected from the twelve villages, with a minimum of twelve respondents from each village. Additionally, 12 Veterinarians and 8 Livestock Inspectors, who were posted in the district, were selected for the study to get the supply side point of view. In addition, the Block Veterinary Officer, Sub-Divisional Veterinary Officer, Assistant Veterinary Surgeons (AVS) of MVUs, ADVO (DC) and the CDVO of the district were also consulted to gather insights from the service provider side.

Data collection

Both Primary Data and Secondary Data were used in the study. Primary data were collected using pre-tested structured questionnaires administered to farmers and service providers (CDVO, ADVO (DC) at District Level, Sub Divisional Veterinary Officer, Block Veterinary Officer, AVS of VDs of the Block, AVS, MVU of the other Blocks of the district through two different questionnaires). Farmers and service providers were presented with structured statements, each targeting a specific constraint in accessing or delivering livestock services through Mobile Veterinary Units (MVUs). Both farmers and service providers (both LI's and VS's) were asked for giving score for each constraint on a four-point range as 'very serious constraint' (score of 3), 'serious constraint' (score of 2), 'less serious constraint' (score of 1) and 'not a constraint' (score of 0). The data placed in the Table 2 is the Secondary data collected from the office of the BVO, Hindol and AVS, MVU, Hindol on the performance of MVU in Hindol block on different parameters of MVU Operations.

Secondary data on MVU activities from 2014-15 to 2022-23 were obtained from the Office of the Block Veterinary Officer, Hindol.

Methodology

To evaluate the performance/achievements of Mobile Veterinary Unit (MVU) on Accessing to Animal Health Care and other veterinary extension services functioned in Hindol Block and to investigate the major constraints faced in delivery of livestock services by MVUs, Total Weighted Mean Score (TWMS) Analysis model was used. Respondents rated each constraint on a four-point scale: very serious (3), serious (2), less serious (1) and not a constraint (0).

Table 1: Livestock statistics of hindol block in a nutshell.

Name of the sub-division/block	Hindol
Total no. of GP	35
Total no. of village	185
Total NAC	01
Livestock population	
Number of large animals	55514
Cattle	52786
Buffalo	2728
Total breedable cattle	20609
Total number of small animals	33800
Goat	29626
Sheep	4090
Total no. of veterinary dispensaries (VD)	3
Total no. of livestock aid centers (LAC)	17
Mobile veterinary unit (MVU)	01
Go sadan	01

Source: 20th Livestock Census, DAHD-2019.

Similar approaches for assessing constraints in livestock service delivery through Mobile Veterinary Units have been adopted in earlier studies (Jena and Chander, 2017b). Constraints were ranked based on TWMS values.

The Total Weighted Mean Score (TWMS) Analysis model is utilized to assess the challenges encountered by both beneficiaries and service provider officials. In order to conclude this method, the total score for each constraint was calculated. The total weighted score (TWS) and total weighted mean score (TWMS) were calculated for each constraint. For each constraint, the total weighted score (TWS), which is the sum of the scores from all respondents, was calculated. The total weighted score (TWS) was again divided by the sample size to calculate the total weighted mean score (TWMS).

$$TWMS = TWS/N$$

To give the stakeholders (farmers and service providers) a final indication of the relative severity of each constraint, the restrictions were evaluated based on the TWMS values.

RESULTS AND DISCUSSION

The livestock statistics of Hindol Block are summarized in Table 1, providing an overview of the livestock population, species composition and key production indicators. The findings from the field survey regarding farmers' awareness of Mobile Veterinary Unit (MVU) services, prior information received about MVU visits and perceptions of service frequency and quality are presented in Table 2.

The detail of those parameters is estimated and calculated by using the total weighted mean score (TWMS) analysis which was collected during the time of collecting the primary data. Respondents rated each constraint on a four-point scale: very serious (3), serious (2), less serious (1) and not a constraint (0). Constraints were ranked based on TWMS values. Analytical framework: The Total score for each constraint was computed. From Each constraint, total weighted score (TWS) and total weighted mean score (TWMS) were computed by using weighted mean score analysis. Each respondent's score was added to determine the total score for a certain constraint, which is here indicated as total weighted score (TWS). The total weighted mean square (TWMS) was computed by dividing the total weighted score (TWS) by the sample size (in our example, 150).

$$TWMS = TWS/N$$

The constraints were prioritized according to the TWMS values, which provided the final indications for how seriously each constraint was viewed by the stakeholders (Both farmers and service providers).

Farmer's perspectives on the constraints in accessing or utilizing MVU services, ranked according to perceived intensity, are shown in Table 3, wherein the most severe constraints reported by farmers were lack of follow-up services, low frequency of MVU visits, limited diagnostic facilities and insufficient supply of free medicines. Very few of the farmers complained that the Services not delivered in preferred time of farmers. As per the TWMS score, we ranked the Farmers' Suggestions to improve Livestock Service Delivery by MVU, Hindol.

Farmers suggestions for improving livestock service delivery through MVUs are ranked in Table 4. This table produced the ranks given by the MVU service providers (Veterinary Surgeons/ administrative persons and Livestock Inspectors) to various problems they face while providing services through MVUs. Service providers ranked staff shortages as the most critical constraint, followed by inadequate availability of quality medicines and vaccines, limited diagnostic facilities and logistical challenges in

Table 2: Awareness, prior information and perceived/preferred periodicity of MVU visits (Hindol Block, Dhenkanal District).

Parameter	Number of respondents	Percentage (%)
Awareness of MVU services		
Aware	128	85
Not aware	22	15
Prior information about MVU visits		
Receive prior information	95	63
Do not receive prior information	56	37
Source of prior information: Local LI/Vet staff	62	-
Source of prior information: Village head/public representatives	33	-
Perceived frequency of MVU visits		
Once per year	58	45
Twice per year	40	31
Once per quarter	30	24
Preferred frequency of MVU visits		
Quarterly	49	38
Half-yearly	40	31
Annually	30	23
Monthly	10	8

Table 3: Various activities of MVU, Hindol from 2014-15 to 2022-23.

Various operations/parameters/activities of MVU, Hindol from 2014-15 to 2022-23									
Year	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23
No of camp days	259	240	240	240	206	225	240	242	172
No. of villages covered	461	473	484	487	414	451	480	484	344
No. of LA	6059	5219	5910	5665	5763	6700	6923	5600	4370
No. of SA	7575	5672	5247	4907	5362	5101	4734	5964	4473
Poultry	1406	230	902	329	875	960	220	1335	1386
No. of castration	146	230	458	292	70	23	171	137	139
No. of F/S/ done	199	362	547	568	1543	1096	1053	1000	704
Total cases treated	16105	12426	13788	12488	14233	14556	13821	14762	11588
Awareness camp conducted	424	232	125	120	139	145	175	151	101
No. of vaccination done	4000	3300	5800	4200	20100	24000	25900	23300	17450
User charges collected	31958	26974	31155	28808	50211	53113	47347	44545	33409

Source: Office of the BVO, Hindol.

Table 4: Ranking of farmers' suggestions to improve livestock service delivery by MVU, Hindol. N=150

Constraints	TWS	TWMS	Rank
Follow-up of cases	329	2.193	I
Less number of MVU Visit to a particular village	326	2.173	II
Limited diagnostic facility	313	2.086	III
More focus on preventive services	300	2.00	IV
Veterinary service from the local staff other than MVU (Less staff)	294	1.960	V
Less supply of free medicine	284	1.893	VI
Services not delivered in preferred time of farmers	275	1.833	VII
Service delivery limited to early morning only	254	1.693	VIII
More number of training programmes (Awareness camp)	236	1.573	IX

Table 5: Ranking of service providers' suggestions to improve livestock service delivery (N=30).

Constraints	TWS	TWMS	Rank
Strengthening of staff in MVU activity	85	2.833	I
Quality vaccine and medicine in adequate quantity	83	2.767	II
Less diagnostic facility	75	2.500	III
Frequent visit to same village	70	2.333	IV
Distantly located villages	64	2.133	V
Vaccination and deworming activity too often	62	2.067	VI
Limitation of vehicle as per the distant location	55	1.833	VII
Time limitation (A fix time table)	50	1.667	VIII
Determining achievable target	40	1.333	IX
More extension activity	35	1.167	X

covering distant villages. The main challenges that service providers experienced were a lack of transportation facilities and an inadequate supply of medications while extending the MVU services in Hindol Block. Other important constraints reported by the veterinarians are 'not having a fix time table for work' renders their delivery of services to farmers through MVUs more cumbersome; 'greater target level' set for them; due to management of additional charges for not having man power are the other major Constraints faced. 'Determining achievable target' and 'More extension activity' were ranked as the least important constraints for the service providers.

Correspondingly, the recommendations provided by service providers to enhance the efficiency and effectiveness of MVU operations are summarized and ranked in Table 5. The acute shortage of manpower in the block can be seen from the staff in position status of the block. Out of 5 VAS only 1 is present and remaining 6 are lying vacant. Out of 17 Sanctioned strength of LI only 6 are in position. This shortage of manpower affecting the MVU work seriously in the Block. Furthermore, VS's posted in MVUs are not exclusively attached to these mobile dispensaries. When MVUs relocate to far-off villages, they are often managed by the block-level Veterinary Officer (BVO) or additional

veterinary assistant surgeon (AVAS). As a result, these BVOs and AVASs are overburdened because they also have to manage their block-level veterinary dispensaries. This certainly has an adverse effect on the standard of services supplied by veterinary dispensaries and MVUs.

CONCLUSION

The analytical study of mobile veterinary unit (MVU) operations in Hindol Block of Odisha reveals that MVUs are a viable and effective strategy for bridging gaps in livestock health care and extension services in rural, hard-to-reach areas of Odisha. The study indicates substantial improvements in vaccination coverage, disease management and farmer awareness regarding animal health practices. However, persistent operational challenges such as limited staff, constrained diagnostic capacity, irregular service frequency and episodic service delivery continue to affect the efficiency of the programme. The study identified several key constraints including limited frequency of visits particularly during disease outbreaks, staff shortages leading to overburdened personnel, lack of advanced diagnostic tools at the field level and occasional shortages or quality issues in medicines and vaccines. These challenges also affect follow-up care and long-term management of livestock health conditions. Based on the findings, improving MVU coverage and visit frequency, strengthening human resources through recruitment and training, ensuring adequate supply of quality medicines and vaccines and improving field-level diagnostic capacity are important for enhancing service delivery. In addition, strengthening monitoring and feedback mechanisms and encouraging participatory approaches involving farmers and local stakeholders can improve responsiveness and accountability. The study therefore concludes that while MVUs have significantly improved livestock health service outreach in Hindol Block, addressing these operational constraints and strengthening institutional support will be essential to make the programme more effective and sustainable in the long run.

ACKNOWLEDGEMENT

The present study was carried out by self under the District Planning and Monitoring Unit, Dhenkanal, Govt. of Odisha

Disclaimers

The views and conclusions expressed in this article are solely those of the authors and do not necessarily represent the views of their affiliated institutions. The authors are responsible for the accuracy and completeness of the information provided, but do not accept any liability for any direct or indirect losses resulting from the use of this content.

Informed consent

All animal procedures for experiments were approved by the Committee of Experimental Animal care and handling techniques were approved by the University of Animal Care Committee.

Conflict of interest

The authors declare that there are no conflicts of interest regarding the publication of this article. No funding or sponsorship influenced the design of the study, data collection, analysis, decision to publish, or preparation of the manuscript.

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