

Research Article

Epidemiology Directorate of the Ministry of Agriculture In-Service Applied Veterinary Epidemiology Training (ISAVET) Program

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• Data Quality Audit; Surveillance; DOVAR; Completeness; Timeliness; Accuracy; Debre Markos City

Abstract

Background: Good quality information about animal health is important for finding out about disease outbreaks quickly and controlling them well. This study looked at the quality of Disease Outbreak and Vaccination Activity Reports (DOVARs) in Debre Markos city, Amhara Region, Ethiopia.

Methods: We checked the quality of 36 monthly DOVARs that were sent from July 2022 to June 2025. We looked at how complete, accurate, on time, consistent, stored, analyzed, and used the data were. We used document reviews, standard checklists, and interviews with the district veterinary coordinator to get the information. We used descriptive analysis to measure key points and summarized the system's processes and problems from the qualitative data.

Results: Out of the 15 reports we reviewed, 10 had missing data, which is 66.6% incomplete. Two reports had data errors, which is 13.3% inaccurate. Fifteen reports were submitted on time, which is 100% timely. Data is mostly stored in paper form with little digital backup. Routine analysis is simple (like tables and graphs) and used in meetings for supervision and review. Fifteen surveillance signals in the last quarter led to field investigations. There is a link to the Bahir Dar Regional Veterinary Laboratory, but sample submissions were limited during the review period.

Conclusions: The DOVAR system in Debre Markos city works, but there are gaps in how complete they are at the field level, georeferencing, documenting all outbreak report, and storing data properly. Specific steps like using standard forms, having digital backups, checking data for errors, adding geocoding, and giving feedback on performance can greatly improve the quality of the data and how useful the surveillance results are for making decisions.

ABBREVIATIONS

AHA: Animal Health Assistance; DOVAR: Disease Outbreak and Vaccination Activity Report; DVM: Doctor of Veterinary Medicine; EC: Ethiopian Calander; FMD: FOOT and Mouth Diseases; DMARDO: Debre Markos city Woreda livestock and fishery resource Development Office Annual Report; GC: Gregorian Calander; LSD: Lumpy Skin Disease; OB: Outbreak; MSc: Master of Science; DVM: Doctor of Veterinary Medicine; BVSc: Bachelor of Veterinary Science; AHA: Animal health assistants; VLT: Veterinary Laboratory Technician

INTRODUCTION

Data is a collection of items of information and that is gathered and translated for some purpose. It can be defined as the elements of measurements recorded during data collection. It is the collected data that creates information when it is further processed which will then improve

the knowledge of end users. Knowledge is then assessed to improve the understanding of the researchers which provides wisdom. Wisdom is required to make evidence-based decisions for action.

Data quality audit is the confirmation of the accuracy, completeness, consistency, and timeliness of data. The aim of a data quality audit is to improve the quality of the data by spotting and filling gaps, identifying and fixing mistakes, and weeding out duplicate records, to reduce errors and inconsistencies within the data collected, reported and used, to improve the quality of data to meet reporting requirements, provide accurate, consistent, complete, and timely data to all stakeholders and decision makers. Data auditing involves profiling the data and assessing the impact of poor-quality data. It is important to monitor data quality and thus ensure that the collected data are meaningful so they meet the objectives of local, national, and international surveillance systems. The quality of the

initial data may determine the data quality at all stages of the reporting process.

Animal disease surveillance encompasses systematic collection of long-term data on disease events, risk factors and other relevant parameters followed by analyzing the same with reference to temporal and spatial characteristics to arrive at a conclusion so that necessary preventive measures can be taken. In East Gojjam Zone, the animal disease surveillance is done through Regional laboratories Animal Disease Reporting System, which is a DOVAR (Paper-based) information technology system for disease reporting from National States with the aim to record, monitor livestock disease situation and to initiate the preventive and curative action in a swift manner during disease emergencies.

The livestock disease surveillance is planned with the objectives of early warning of disease events, to assess the effectiveness of intervention measures and to determine the disease-free areas or freedom from infection. The data obtained through such surveillance programme will provide sufficient evidence in evaluating the national disease control and eradication programmes [1]. Animal health surveillance is a crucial activity for detecting, monitoring, and controlling livestock diseases that can impact food security, public health, and rural livelihoods.

The Amhara Region of Ethiopia, where Debre Markos city is located, depends heavily on livestock production for socioeconomic sustainability. This assessment aims to conduct a comprehensive evaluation of animal health surveillance data quality, specifically examining completeness, accuracy, and timeliness of reporting. The evaluation utilizes standardized assessment frameworks adapted to the local context to identify key gaps and weaknesses in the current surveillance system. Beyond merely identifying problems, this assessment seeks to provide practical recommendations for strengthening the surveillance system, improving data quality, and enhancing the district's capacity to effectively monitor and control animal diseases. The findings will be valuable for district and zonal veterinary officials, regional health bureaus working to improve animal health surveillance in Ethiopia and similar settings.

General objective

To determine and describe the monthly data quality audit and related gaps as well as to generate recommendations.

Specific objectives

To evaluate how data is collected and managed in the City.

To evaluate the surveillance data and information flow.

To determine the quality of Data of Disease Outbreak and Vaccination Activity Reports (DOVARs) monthly.

To evaluate the awareness of the stakeholders about data use.

To evaluate the link of the laboratory with field investigation.

METHODOLOGY

Study Area

This assessment employed a mixed-methods approach combining quantitative and qualitative data collection techniques to comprehensively evaluate the quality of animal health surveillance data in Debre Markos city. The study was conducted from November 8 up to 21 2025 to align with the end of the Ethiopian fiscal year when data quality reporting processes are typically completed.

Debre markos city is one of the meteropolitan cities in the Amhara Region, Ethiopia. According to the most recent agricultural census, the district has a substantial livestock population comprising approximately 76,354 cattle, 31,177 sheep, 3,830 goats, 103,379 poultry, and various other animal species. The veterinary infrastructure in the district includes 1 District veterinary clinic, and 8 animal health posts staffed by 1 veterinarians, 6 animal health technicians, 7 Bachelor of Veterinary Science and several community-based animal health workers.

The study was conducted in Debre Markos town, one of the self-administrative towns of the Amhara National Regional State, which serve as the capital of East Gojjam Administrative Zone. The town is situated in the north west of the capital city of Ethiopia, AddisAbaba at a distance of 300 Km. Geographically, it is located at 1020'N latitude and 3743'E longitude. The town has a total area of 6,160 ha. Altitude and temperature: Its altitude range from 1302 to 17000 m above sees level and it receives annual rainfall that fall from 1300 to 1380 mm. The area has a Woina Dega climate. The temperature ranges from 15°C to 22°C with average temperature of the 18.5°C [2].

Population: According to CSA (2010) [3-8], the study area has estimated to be total population of 119,000 of which 97.07% Ethiopian orthodox Christian religion while 1.7% of population were Muslim and 1.1% were protestant.

The City Adminstration has one type D veterinary clinic but there is eight veterinary health post located in the meteropolitan city. In addition to government animal

health institute, there are private veterinary drug stores and one health post located at in different kebele and they serve by supplying veterinary drug to the livestock producer. The district office has a veterinary work force consisting of one DVM, seven Bachelor of veterinary sciences and Six animal health assistance (Table 1 and Table 2).

Source and Study Population

We defined our source population as veterinary coordinator working at Debre Markos city Livestock and fishery sector development office. The study population is all domestic/livestock animal reported by DOVAR as outbreak occurrence from the district.

Study Design and Time Period

We conducted retrospective study design for 36 months DOVAR data from July 2022 to June 2025.

Sample Size

For this study, I selected Debre Markos city and the sample size is taken as 36 DOVAR reports (July 2022-June 2025) as one district expected to report one report per month and I assess the data quality of 36 months reported from district but since the work was stopped in 2024 G.C due to the war, and most of the document was lost due to the war.

Data Collection Tools and Procedures

Document review: Assessment of 36 Disease Outbreak and Vaccination Activity Reports (DOVARs) expected from July 2021 to June 2025, focusing on completeness, accuracy, and timeliness indicators. The review also examined standard operating procedures, reporting forms, and data management protocols.

Table 1: Livestock population in Debre markos city

Livestock species	Population numbers
Cattle	76354
Goat	3830
Sheep	31177
Chicken	103379
Horse	6529
Donkey	11323

Source: Debre Markos city livestock and fishery resource Development Office Annual Report (DMCARD) (2025)

Table 2: veterinary workforce and infrastructure of Debre markos city Veterinary workforce.

Qualification	MSc+BVs	DVM	BVSc	AHA	VLT	Total
Number	-	1	7	6		14

MSc: Master of Science; DVM: Doctor of Veterinary Medicine; BVSc: Bachelor of Veterinary

Science; AHA: animal health assistants; VLT: veterinary laboratory technician;

Source: Debre Markos city livestock and fishery resource Development Office Annual Report (DMCARD) (2025)

I used 36 months DOVAR reports as secondary information for missing and error data reviewed, and for overall disease surveillance activities data collection. I used to interview veterinary coordinator working at the sampled City Administration Livestock office (Annex 1).

Annex 1

Data collection	
1.1	Who collects the surveillance data?
1.2	What are the sources of data?
1.3	Did data collectors receive training on surveillance in the last 12 months?
1.4	Is standard reporting format used at the data collection source?
1.5	How is the data submitted from the source to the woreda?
1.6	Identify missing values (assess completeness) in the data for each variable
1.7	Identify errors (assess accuracy/correctness) in the data for each variable
1.8	Describe any actions that have been taken by the woreda to correct late, absent, or incomplete reporting from the reporting sites/clinics/kelas?
1.9	Describe surveillance data storage mechanisms by the woreda
Data analysis	
1.1	Does the woreda analyze the data in animal-place-time?
1.11	Which display methods are used (table, map, graphs, charts)?
Surveillance data benefit (Usefulness)	
1.12	Describe the frequency and kind of reports used to share data from one level to the next (the farm or village to vet clinic/woreda; the vet clinic/post to woreda; and woreda to zone)
1.13	How many surveillance data reports led to conducting field investigations?
1.14	Describe the feedback mechanism by the woreda on surveillance data quality and performance to vet clinics/posts and farmers
Awareness of data use by stakeholders	
1.15	Does the woreda have clear objectives for collecting the surveillance data?
1.16	Do the data collectors have awareness on what will be done with the collected data?
Use of Laboratory in field investigation/surveillance	
1.17	Which veterinary laboratory does provide diagnostic support?
1.18	How many samples were submitted to the laboratory during the past week?
1.19	What is the minimum and maximum time (days, hours) required to collect and deliver samples to the laboratory during the past week?
1.20	What is the minimum and maximum time (days, hours) required to receive feedback about laboratory test results?
1.21	Describe if and how laboratory and field data are combined for analysis

Annex 2



Data Analysis

Information (raw data) about disease outbreaks was gathered and analyzed from the scanned DOVAR report.

RESULT

Description of the Surveillance System

Description of Surveillance System of the City Administration Surveillance data flow of the district in this report of data quality audit was found to be describing in the following diagram (Figure 1).

Data Collection

Data Collectors: Animal health experts, development agents (DAs), local administrator of farmer or model farmer at kebele level.

Sources of Data: Livestock disease cases reported by farmers, field investigations, vaccination campaigns, and clinical service records.

Training: none of data collectors received refresher training on disease surveillance in the past 12 months through ISAVET and regional capacity-building programs.

Reporting Format: No Standard reporting templates only collect by phone call (weekly and monthly disease surveillance forms) are used in all kebeles.

Data Submission: Data are submitted manually (monthly report or paper-based) from kebele to woreda veterinary office, usually on a weekly or monthly basis.

Data Completeness and Accuracy

Completeness: Around 100% of kebeles submitted reports in the last quarter; however, occasional missing data were noted for population at risk.

Accuracy: Minor data entry errors (e.g., mis information or document, inconsistent District or city names) were identified. Corrections were made during verification with city livestock office.

Corrective Actions: The city Administration livestock office provides feedback to clinics and kebeles to address missing and incorrect data, and conducts quarterly review meetings to improve quality.

Data Storage Mechanism

Reports are stored only in hardcopy files at the woreda livestock office. Digital backups are limited due to lack of consistent internet and computer access.

Data Analysis

Analysis Dimensions: Data are not analyzed by animal type, location (kebele), and time (months).

Display Methods: The city does not use tables, bar charts, and summary graphs and does not show disease trends and vaccination performance to quarter or annual performance evaluation meeting.

Surveillance Data Usefulness

Reporting Frequency: Monthly and quarterly reports are shared from kebeles to the city and then to the region.

Field Investigations: 15 surveillance reports in the past three months triggered field investigations.

Feedback Mechanisms: City Administration experts provide written and verbal feedback to clinics and kebeles during supervision and monthly, quarterly and annually review meetings.

Awareness of Data Use

Objectives: The city has clear objectives — early detection of outbreaks, tracking vaccination coverage, and supporting disease control planning.

Data Collector Awareness: Most DAs, model farmers and kebele animal health workers understand how their data contribute to disease reporting and response planning.

Laboratory Use in Surveillance

Supporting Laboratory: Bahir dar Regional Veterinary Laboratory provides diagnostic services. **Samples Submitted:** Rabies samples were submitted during the last reporting month. **Sample Delivery Time:** 10 hours from collection to delivery. **Result Feedback Time:** 30 days from laboratory to City Administration office. **Integration of Data:** Laboratory results are combined with field surveillance reports during monthly, quarterly and annually analysis and reporting (Table 3).

Out of the 15 reviewed DOVAR reports, two were

Table 3: number of outbreak and zero report sent by DOVAR from July 2022 to June 2025 G.C

DOVAR report category	Sum of July 2022- June 2023 G.C DOVAR report	Sum of July 2023- June 2024 G.C	Sum of July 2024- June 2025 G.C
Number of zero report sent	3	0	9
Outbreak report sent	0	0	3
Grand Total	3	0	12

found to have data errors 13.3 % and 10 missing value comprising 66.6%. Major errors no stamping and failure to write the name of the city administration in the reported data in the cover pages and in the details in July 2022 up to June 2025. There is also only 3 recording data present July 2022-June 2023 G.C and no recording data in July 2023-June 2024 G.C. According to Figure 2. Fifteen of the 15 reports that were sent were delivered on time (100%)

DISCUSSION

There were three animal disease outbreak occurrences reported from July 2022 to June 2025. Among the 15-outbreak report sent, 10 of them were low quality as few data error, missing data and misplaced & corrected data observed.

Accordingly, Figure 2-7, the 36 months DOVAR report sent to Bahir Dar regional laboratories shown the report had some sort of data error and few data were missed during different animal disease outbreak occurrence reported. Major outbreak sent report had poor in quality and it should be discouraged. Quality DOVAR report data seen in on time 2022 up to June 2025 G.C. should be kept for better result and pertinent stakeholder's support should be strengthened as high occurrence of emerging and transboundary disease like foot and mouth disease and Rabies, were reported in the last 36 months.

The primary data collector at kebele level, development agent (DA) did not take any capacity building related to the benefit and methods of data collection, organization, collation of animal disease events. The animal health team in the district did not take in the past years in capacity building related to the benefit and methods of data collection, organization, and collation of animal disease events once in the last 36 months from July 2022 to June 2025. Therefore, the district Livestock office should consider capacitating the kebele animal health officer for monthly DOVAR format utilization and the significance of immediate disease outbreak report for better controlling of animal disease in integrated manner.

The veterinary surveillance system in the district shown the farmer reported disease incidence to kebele development agent or animal health assistance or sometimes directly to district veterinary coordinator when they have seen disease outbreak, so that the appropriate data has been collected and reported to the city Administration veterinary coordinator to cross check and to set tentative diagnosis, and then the City veterinary coordinator sent the report to Bahir dar regional laboratories. Bahir dar Regional Veterinary Laboratory is the responsible Laboratory to provide diagnostic support

for city Administration. However, Rabies sample was submitted to this laboratory during the past three years.

CONCLUSION AND RECOMMENDATION

The surveillance system in Debre Markos City needs to improve animal health surveillance data quality, identify filled information accurately, and ensure proper data collection and analysis. The City veterinary epidemiology performs better than average in terms of completeness (100%). Although major low-quality DOVAR reports were sent up to 2025, not progressive improvement was observed in 2025 G.C. DOVAR outbreak report but the link of laboratory and field investigation is weak. The primary data collector at kebele level, Animal Health technical (AHT) did not take any capacity building related to the benefit and methods of data collection, organization, collation of animal disease events. The animal health team in the district participate in capacity-building activities pertaining to the advantages of data collection, organization, or collation of animal disease events only one woreda expert once in the past years. The animal health team in Debre markos city needs to improve the capacity to analyses the animal-place-time data it obtains from kebeles. The following recommendations are forwarded on the basis of this result.

- To keep the data quality high, which has already shown that errors, missing stamps on each page, and omissions have been fixed, the district or city veterinary coordinator and the animal health team should take responsibility.
- The responsible team should create a regular reporting and feedback system to help the kebele animal health officer and the city administration veterinary service.
- The animal health team should be encouraged to provide good quality data to help improve the long-term sustainability of the surveillance system.
- We should strengthen the connection between the lab and help them investigate outbreaks better.
- When collecting data for animal health surveillance, there should be specific goals and a clear plan for how to collect the data.
- Standardize and validate the data by using a single DOVAR template with required fields like species, age, kebele, GPS, outbreak summary, reporter contacts, date, and a stamp or signature.
- Use a standard list of diseases approved by the

Ministry of Agriculture, and include simple coding sheets on each form.

- Provide a one-page checklist for data collectors before submitting the data.
- Improve the speed of data sharing by setting clear monthly deadlines and keeping a simple “on-time score” for each kebele.
- Provide regular feedback and recognition for those who meet the deadlines.
- Set up alternate ways to submit data, like sending photos or scans through messaging apps, if physical delivery is delayed.
- Improve location tracking and record-keeping by requiring GPS coordinates or standard kebele center coordinates when exact points are not available.
- Make sure all outbreak summary pages are fully filled out.
- Return incomplete reports for correction.
- Improve how data is stored and analyzed by scanning monthly reports and keeping them in a shared folder with an index log.
- Enter key information into a simple spreadsheet and automatically create monthly charts and reports that show any problems.
- Strengthen the link with the laboratory by defining when samples should be collected, like when there are suspected cases of FMD or Rabies or unusual deaths.
- Keep a basic kit for handling samples and have a clear contact plan with the regional lab.
- Build the team’s skills and improve how the system is managed through quarterly small training sessions on data quality and case definitions.

- Do a regular data quality check every six months using a short scorecard and discuss the results in review meetings.

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