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Assessment of the Quality of Animal Health Surveillance Data in Dilla Zuria District, South Ethiopia Regional State, Ethiopia

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Abstract

High-quality animal health surveillance data are essential for timely disease detection, effective control strategies, and evidence-based decision-making. This study assessed the quality and functionality of animal health surveillance data in Dilla Zuria District, Southern Ethiopia, using document review of Disease Outbreak and Vaccination Activity Reports (DOVARs) from 2019 -2023 and key informant interviews with animal health workers. Data flow, completeness, accuracy, utilization, and laboratory integration were evaluated against established surveillance quality indicators. Of the 60 expected monthly DOVAR reports, 53 (88.33%) were available, indicating relatively high reporting completeness; however, 96.2% of reports were zero reports, suggesting substantial under-reporting of disease events. Only two outbreaks (Lumpy Skin Disease and Blackleg) were documented, both with critical data quality gaps, including missing outbreak identifiers, population at risk, and case counts. No routine data analysis by animal, place, and time was conducted at the district level, and none of the animal health workers had received recent surveillance training. Although laboratory support existed, sample submission was infrequent and diagnostic feedback was delayed. Overall, the surveillance system was operational but limited in effectiveness due to weak data utilization, poor outbreak documentation, and inadequate capacity building. Strengthening analytical practices, training, laboratory integration, and data quality monitoring is essential to improve surveillance performance and animal health outcomes in the district.

Keywords: *Animal health; Ethiopia; Data quality; Dilla Zuria District; DOVARs; Surveillance*

INTRODUCTION

Animal health surveillance systems are fundamental components of veterinary public health, designed to systematically collect, analyse, interpret, and disseminate information on disease occurrence and trends to support animal disease prevention and control initiatives (FAO, 2019). High-quality surveillance data enable early detection of disease events, facilitate timely interventions, and provide evidence for decision-making that underpins effective animal health programmes, resource allocation, and policy formulation (World Organisation for Animal Health (OIE), 2018).

Data quality in surveillance is multidimensional, with completeness, accuracy and timeliness widely recognized as core attributes that determine the utility and reliability of information produced (CDC, 2001; AbouZahr and Boerma, 2005; Jima, 2022). Completeness refers to the proportion of required data items that have been reported; accuracy denotes the extent to which reported information reflects the true situation; and timeliness reflects the speed with which data are submitted within expected reporting cycles (World Health Organization, 2020). Inadequate surveillance data quality can lead to misinformed decisions, delayed actions, and suboptimal outcomes in disease prevention and control, ultimately compromising animal health and public health objectives (Nsubuga *et al*., 2006; Adugna *et al*., 2025).

In low- and middle-income countries (LMICs), surveillance systems frequently face operational challenges such as

incomplete reporting, inconsistent data recording, delayed submissions, and limited capacity for data management and analysis (Musa *et al*., 2018). These constraints undermine the ability of veterinary services to monitor disease dynamics effectively and to provide accurate epidemiological intelligence to stakeholders. Previous studies in sub-Saharan Africa have documented poor data quality in animal health reporting systems, particularly at the district or local administrative level where data flows originate (Bett *et al*., 2017; Rich and Wanyoike, 2010).

In Ethiopia, the livestock sector contributes significantly to the national economy and rural livelihoods, yet animal disease burdens remain high due in part to weaknesses in disease surveillance and reporting systems (Legese *et al*., 2014). The District-level Weekly Animal Health Disease Reporting (DOVAR) platform was introduced to standardize reporting structures and enhance surveillance coverage across districts. However, despite consistent monthly submissions from many districts, evidence regarding the quality of surveillance data produced-especially in terms of completeness, accuracy, and timeliness is limited, and few formal evaluations have been conducted (Tsegaye *et al*., 2020).

Assessing surveillance data quality is essential for identifying gaps and informing targeted improvements in surveillance performance. Data quality audits have been shown to be effective tools in evaluating routine health information systems and strengthening data management practices (MEASURE Evaluation, 2017). Furthermore, issues identified through quality assessments can be incorporated into capacity-building interventions and strategies that enhance the reliability of surveillance outputs (Joseph *et al*., 2015; Frimpong *et al*., 2017). However, there remains a paucity of empirical studies that have systematically evaluated animal health data quality at the district level in the Ethiopian context.

Therefore, this study aims to assess the quality of animal health surveillance data in Dilla Zuria District, South Ethiopia Regional State, Ethiopia, by evaluating key data quality attributes like: ways of data collection and management, information flow, awareness of stakeholders, and the link of laboratory with the field investigation. The findings will contribute to strengthening animal health surveillance systems and evidence-based decision-making in the livestock sector.

METHODOLOGY

Field work area

The field work was conducted in Gedio Zone, Dilla Zuria District, South Ethiopia Region, Ethiopia. The district is located 365 km from Addis Ababa. It has a total of 17 (seventeen) kebeles. According to the data recorded in the woreda livestock office, the livestock population of the woreda in 2023 was; cattle: 40,108; sheep: 33,895; goats: 1477; horses: 2,238; donkeys: 2,260; mules: 14,403; and poultry: 20,236. The district is located between 6°26'35"N latitude and 38°15'55"- 38°24'02"E longitudes. It is bounded by Oromia Region in the south and the west, Bule woreda in the East, and Sidama Region in the North. The altitudinal range of the woreda ranges from 1350 to 2250 m with slope between 39.4% and 51.5%. The mean monthly rainfall ranges from 83.7 mm-310 mm with an average rainfall of 172.9 mm. The mean monthly temperature ranges from 15.4°C to 17.9°C. The district has one type B clinic. The veterinary workforce of the district encompasses one doctor of veterinary medicine, thirteen bachelor of veterinary science, twenty two animal health assistants and one animal health technician regarding qualification, with the total of thirty seven in number (DZWLDO, 2023).

Data Collection and Management

Information about data quality and reporting is done by interviewing the clinic's team leader and focal person of DOVAR reporter retained DOVARs and reported data sources. A checklist was developed and used to interview the responsible district professionals who are involved in animal health surveillance. The responses obtained were evaluated according to the data quality principles. Achieved disease outbreak and vaccination activity reports (DOVAR) from 2019-2023 were reviewed for the quality assessment based on data quality principles and national standards. The data quality indicators and major findings were counted and entered into Microsoft excel sheet.

Data Analysis

The recorded data were analyzed and assessed using Microsoft Excel and presented using graphs and tables. The responses for the queries obtained from the interviewee were evaluated according to the data quality audit principles.

RESULTS

Information obtained from the interview

Surveillance data collection, source, submission, flow and analysis

Kebele animal health workers and sometimes the district epidemiology team collect surveillance data from farmers, farm owners and other stakeholders. They use a standard reporting format for vaccination and other animal health service activity report. The occurrence of disease outbreak in the kebele is reported to the district by phone and direct hard copy. The responsible professional in the district review, organize and report the data. Then the district uses DOVAR format to submit to regional veterinary laboratory and Zone agricultural department (Figure 1).

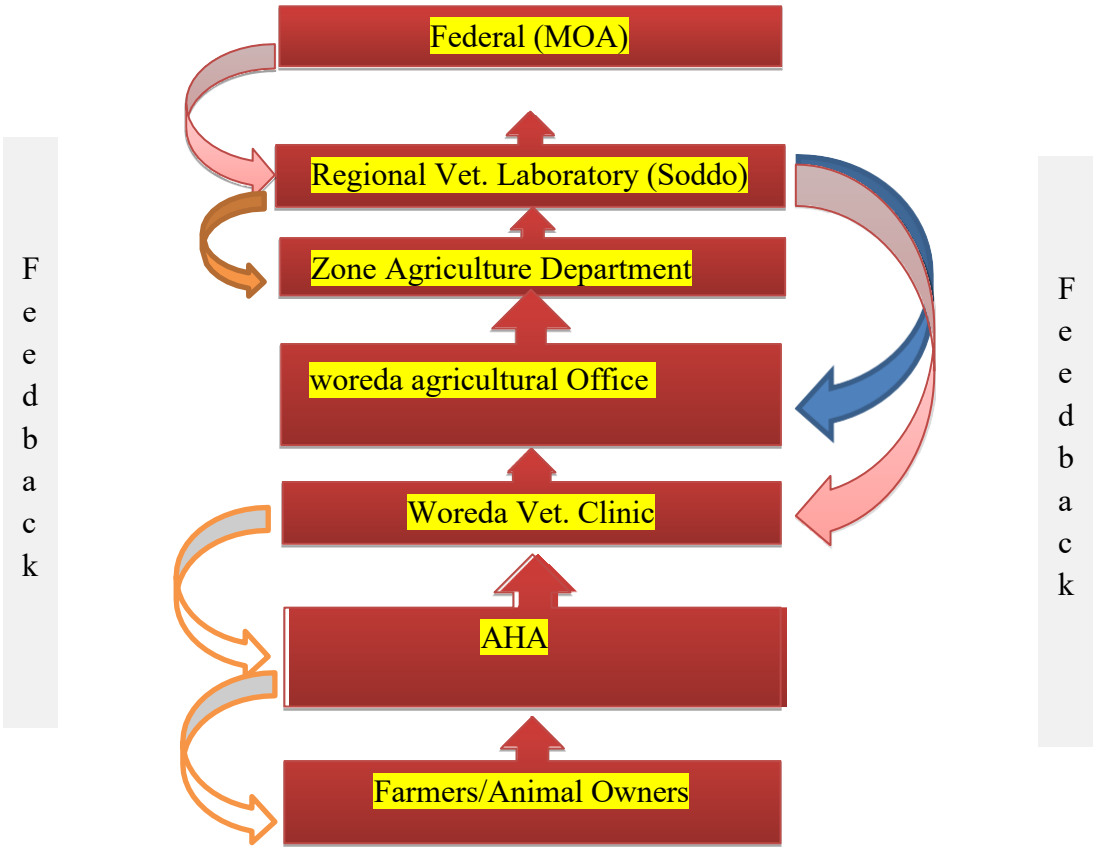

Figure 1: *Animal health surveillance data flow in Dilla Zuria district*

This field work considers DOVAR as a source of surveillance data. The district offices retain these data in their office by hard copy as permanent document. However, the office did not analyze the data they stored in animal-place-time.

Surveillance data benefit (usefulness)

At Dilla Zuria District, none of seventeen animal health workers received training about surveillance for the past 12 months. This results in professionals having limited knowledge and makes them do not understand well about surveillance data.

Awareness of data use by stakeholders

The interviewee said even though the surveillance data is used to know about the disease occurrence and distribution of the disease, the district has no clear stated objectives for collecting surveillance data. Most of the district stakeholders lack awareness on what will be done with the collected data and this makes gap on collecting and submitting accurate and timely data.

Use of laboratory in field investigation/surveillance

Soddo veterinary regional laboratory is the responsible institution to provide diagnostic support for Dilla Zuria district. In the recent time, the district did not submit sample to the Soddo Regional laboratory. But in 2023 G.C suspect of Black leg outbreak. Therefore, the time required collecting and delivering samples to the laboratory seven days to receive feedback about laboratory test result. This shows that there is strong link and communication between the laboratory and the district veterinary office.

Assessment of DOVARs

From the total 60 DOVARs which are expected to be sent every month from 2019-2023, 53 reports were found in the district's veterinary clinic (Table 1).

Table 1: *Available DOVAR formats between 2019 and 2023 in Dilla Zuria district*

S. N	Reports	Years	Expected Report to be sent	Sent Report (%)
1	DOVARs	2019	12	11 (91.67)
2	DOVARs	2020	12	11 (91.67)
3	DOVARs	2021	12	11 (91.67)
4	DOVARs	2022	12	12 (100)
5	DOVARs	2023	12	8 (66.67)
Total			**60**	**53 (88.33)**

These available reports were assessed in relation to the key data quality indicators. There was 3.8% (2 out of 53 reports) outbreak reports in the past 5 years, the rest of the reports 96.2% (51/53) were zero reports. From two outbreak reports, LSD 50% (1/2) and Black leg 50% (1/2) were reported. From the expected monthly DOVAR report 88.33 % (53/60) were reported, this indicates the completeness of reporting. Out of 53 reviewed DOVAR reports 3.8 % (2/53) have data quality problems, while 96.2 % (51 /53) were accurate data. From the data quality problems, among missing data: outbreak reference number, specific location, farming system, population at risk, number of new outbreak in month, number of active outbreak at end of the month (missing data), and all of outbreak reports have accuracy problems (Figures 2, 3, 4, 5).

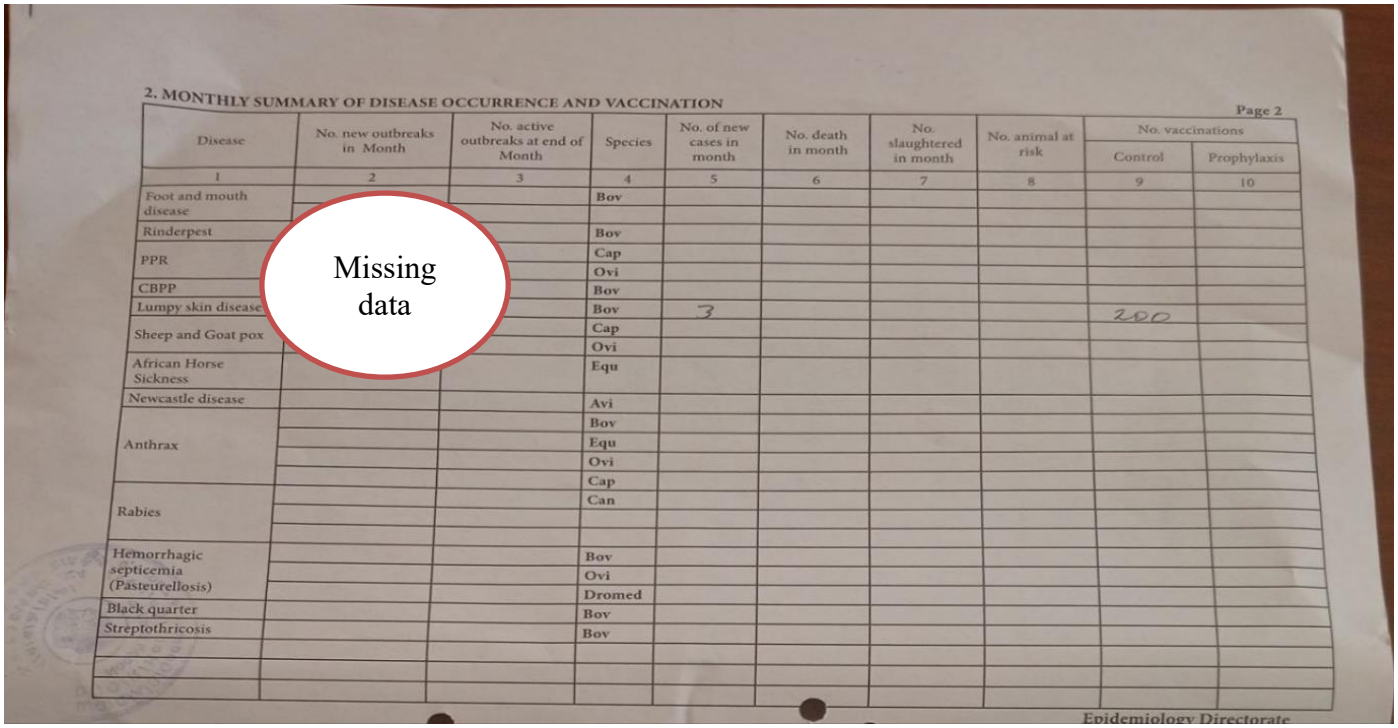

Figure 2: *Outbreak 1, February 2020 G.C*

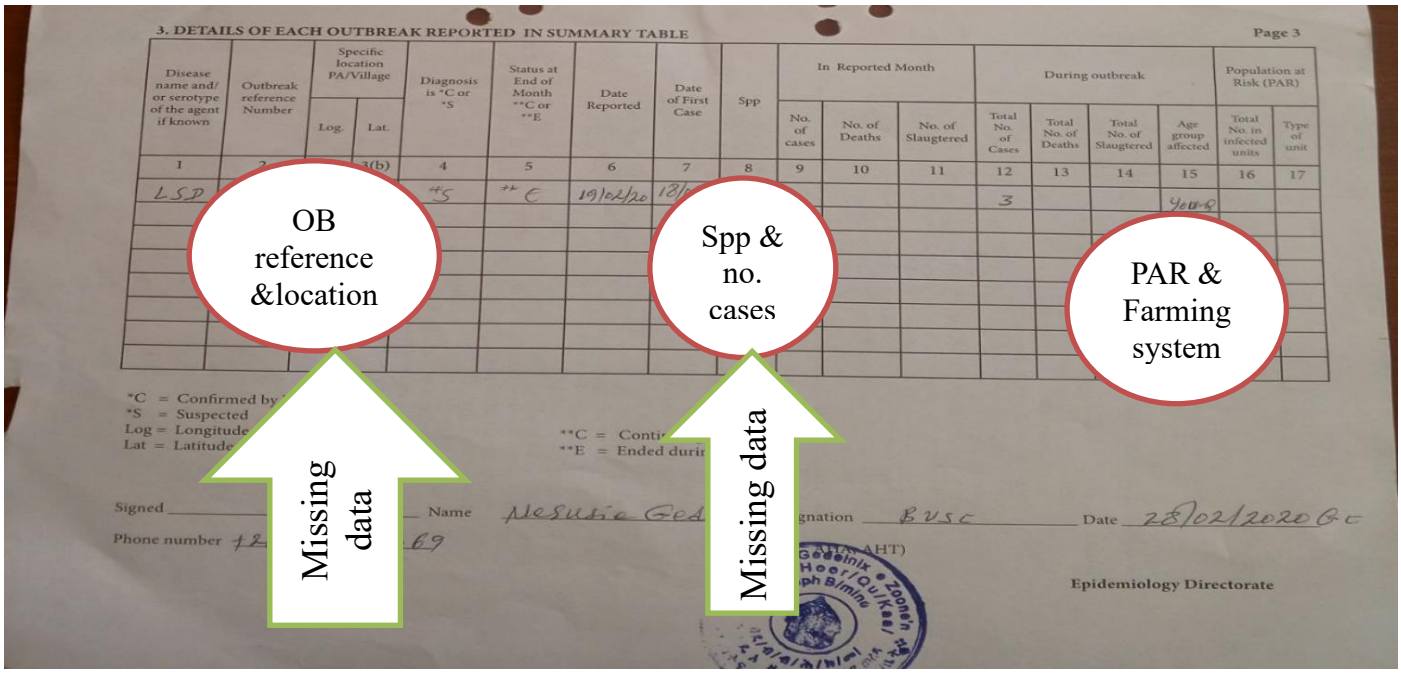

Figure 3: *Outbreak 1, February 2020 G.C*

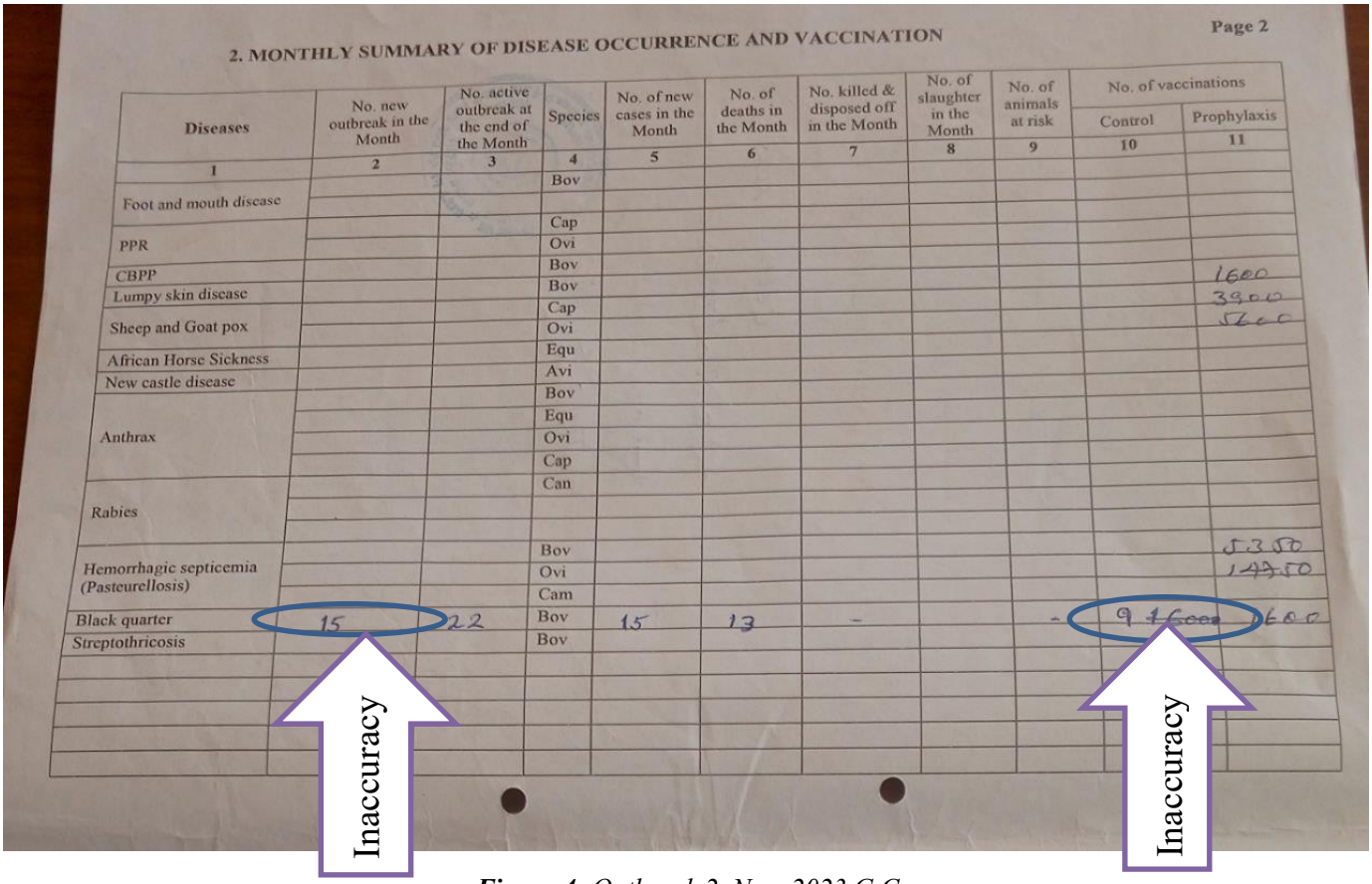

Figure 4: *Outbreak 2, Nov. 2023 G.C*

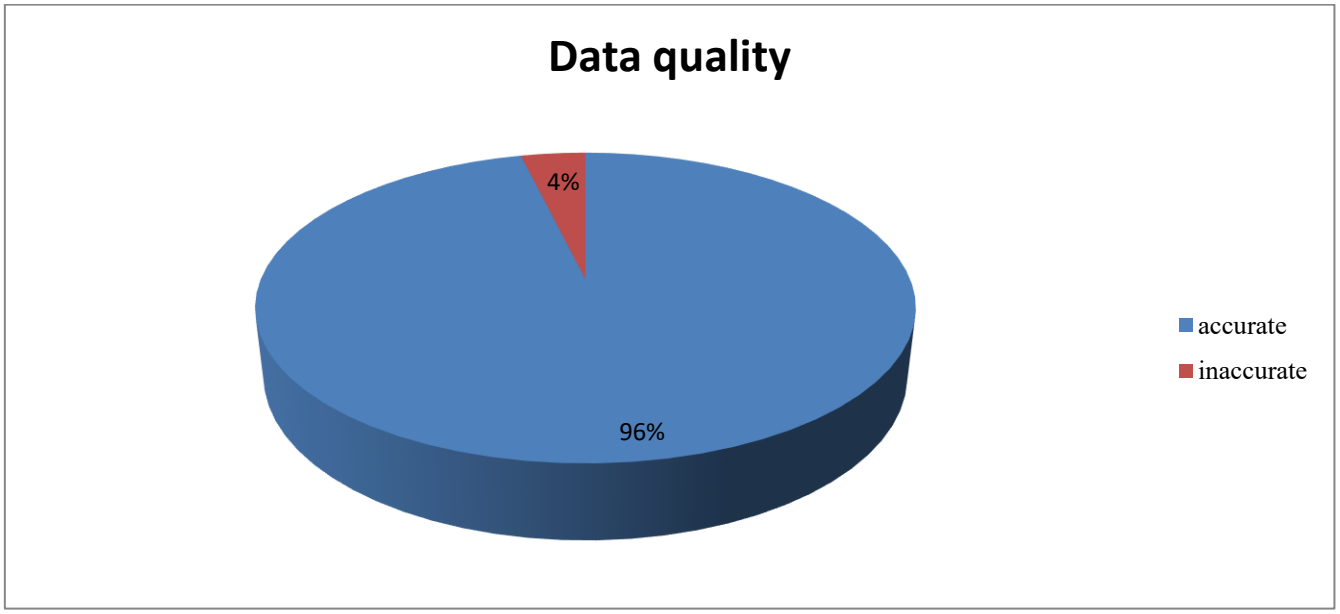

Figure 5: *Percentage of accurate data and quality problems in Dilla Zuria district*

DISCUSSION

This study evaluated the structure, performance, and data quality of the animal health surveillance system in Dilla Zuria District, Southern Ethiopia. The findings demonstrate that while a formal reporting framework exists through the DOVAR system, substantial limitations persist in data utilization, outbreak documentation, professional capacity, and analytical practices.

The structured flow of surveillance data from kebele animal health workers to district veterinary offices and subsequently to zonal and regional levels reflects alignment with national animal disease reporting mechanisms in Ethiopia. The use of standardized reporting formats is consistent with global surveillance principles that emphasize uniformity to ensure comparability and completeness of disease information (CDC, 2001; Nsubuga *et al*., 2006).

However, despite regular data transmission, the absence of routine analysis by animal, place, and time at the district level undermines the core purpose of surveillance systems, which is to transform raw data into actionable epidemiological intelligence. Surveillance systems that focus solely on reporting without interpretation are widely recognized as ineffective in early outbreak detection and disease trend monitoring (AbouZahr and Boerma, 2005; WHO, 2020). Similar gaps have been documented in Ethiopian livestock surveillance, where data are frequently compiled but rarely analyzed for decision-making (Legese *et al*., 2014; Tsegaye *et al*., 2020). This indicates that the surveillance system in Dilla Zuria functions primarily as an administrative reporting tool rather than a disease intelligence mechanism.

The limited awareness of surveillance objectives among animal health workers and district stakeholders significantly constrains data use. Although respondents acknowledged that surveillance data can inform disease occurrence, the absence of clearly defined objectives weakens system direction and effectiveness. Surveillance systems require explicit goals such as outbreak detection, disease prioritization, and program evaluation to guide data collection and analysis (Nsubuga *et al*., 2006; FAO, 2019).

The complete lack of recent surveillance training among animal health workers further explains poor data utilization and limited analytical practices. Training is strongly associated with improved data quality, reporting timeliness, and outbreak response effectiveness (MEASURE Evaluation, 2017; Musa *et al*., 2018). Similar capacity gaps have been reported across African animal health systems, where insufficient professional development leads to underreporting and weak disease intelligence (Bett *et al*., 2017; Musa *et al*., 2018). Therefore, inadequate training in Dilla Zuria District likely contributes directly to weak data interpretation and limited evidence-based action.

The weak understanding among stakeholders regarding the purpose of surveillance data suggests a poor data-use culture within the district. Effective surveillance systems depend on continuous feedback and active engagement of data collectors to reinforce the value of accurate and timely reporting (AbouZahr and Boerma, 2005; WHO, 2020). When frontline professionals do not see how data influence interventions, motivation to ensure data quality declines, resulting in delayed reporting, incomplete documentation, and potential data falsification (MEASURE Evaluation, 2017). This may explain the inconsistencies observed in outbreak reporting and declining report completeness in 2023.

The linkage between Dilla Zuria District and Soddo Regional Veterinary Laboratory demonstrates the existence of diagnostic support within the surveillance system. Laboratory confirmation of Blackleg in 2023 aligns with recommended surveillance standards that emphasize laboratory verification for accurate disease classification (OIE, 2018; FAO, 2019). However, the prolonged turnaround time of approximately seven days and infrequent sample submission reflect systemic inefficiencies. Timely laboratory diagnosis is essential for rapid outbreak response and containment (CDC, 2001; FAO, 2019). Delays in diagnostic feedback can facilitate disease spread and weaken control measures. Underutilization of laboratory services is a common constraint in low-resource surveillance systems across Africa (Musa *et al*., 2018). Thus, while laboratory infrastructure exists, its operational integration into routine surveillance remains weak.

The overall reporting completeness of 88.33% over five years indicates relatively strong compliance with monthly reporting requirements compared to many developing-country surveillance systems. Studies in Ethiopia and other African nations frequently report completeness levels below 70% (Legese *et al*., 2014; Tsegaye *et al*., 2020; Musa *et al*., 2018). Nevertheless, the decline in 2023 highlights vulnerability of the surveillance system to operational challenges such as staffing changes, workload pressures, or reduced supervision. Consistent reporting is essential for trend detection and outbreak forecasting (CDC, 2001; WHO, 2020). Fluctuations compromise surveillance reliability and weaken disease intelligence.

The dominance of zero reports (96.2%) with only two outbreaks recorded over five years strongly suggests under-reporting rather than true absence of disease. Livestock diseases such as Lumpy Skin Disease and Blackleg are endemic in many parts of Ethiopia, including southern regions (Legese *et al*., 2014; Tsegaye *et al*., 2020). Under-reporting is a widespread problem in animal health surveillance systems in Africa, often driven by limited diagnostic capacity, low awareness, fear of economic consequences, and weak supervision (Musa *et al*., 2018; Bett *et al*., 2017). Persistent zero reporting can mask disease burdens and create false confidence in disease control success. Therefore, the surveillance system in Dilla Zuria District likely fails to capture the true magnitude of livestock disease occurrence.

Although most DOVAR reports appeared accurate, all outbreak reports contained critical missing variables such as outbreak reference numbers, specific locations, population at risk, and numbers of new and active cases. These omissions severely reduce the epidemiological value of the data. High-quality surveillance data must be complete, accurate, and timely to support effective disease response (MEASURE Evaluation, 2017; WHO, 2020). Missing outbreak details hinder risk assessment, resource

prioritization, and evaluation of control strategies. Similar deficiencies in outbreak documentation have been reported in Ethiopian livestock surveillance evaluations (Legese *et al*., 2014; Tsegaye *et al*., 2020). The presence of quality problems in all outbreak reports is particularly concerning because outbreak data are the most critical outputs of surveillance systems.

CONCLUSION

The animal health surveillance system in Dilla Zuria District demonstrates a functional reporting structure with relatively high completeness of routine DOVAR submissions; however, its effectiveness is substantially constrained by limited data analysis, weak stakeholder awareness, insufficient professional training, and poor quality of outbreak documentation. The predominance of zero reporting and the presence of critical missing information in all outbreak reports strongly suggest under-reporting and compromised data reliability. Although laboratory diagnostic services are available, delays and under-utilization further weaken outbreak detection and response. Consequently, surveillance in the district operates primarily as an administrative reporting process rather than a robust epidemiological decision-support system. Addressing these systemic weaknesses is essential to enhance early disease detection, improve resource allocation, and support sustainable livestock health management.

RECOMMENDATIONS

Depending on the above conclusion, the following recommendations are forwarded:

- Strengthen technical capacity of animal health workers through regular training on surveillance principles, outbreak investigation, and routine data analysis to improve data accuracy and utilization.
- Institutionalize routine district-level data analysis and feedback mechanisms to transform surveillance reports into actionable information for early outbreak detection and targeted disease control.
- Improve outbreak reporting and laboratory integration by enforcing complete DOVAR documentation, strengthening supervision, and reducing diagnostic turnaround time through better sample transport systems.
- Implement periodic surveillance data quality audits to identify reporting gaps, ensure consistency, and support continuous system improvement.

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