

Retrospective Study of Foot and Mouth Disease in Awi Zone of Amhara Region, Ethiopia

Marie Teshager Tsehay^{1*}, Banchgize Fetene Akililu¹

¹Banja Woreda Livestock Office, Animal Health Department, Ethiopia

ABSTRACT

Foot and Mouth Disease (FMD) is an acute contagious and highly infectious disease of domestic and wild ruminants. It is one of the most important and highest priority livestock diseases that affect production and productivity. In Ethiopia, the disease causes repeated outbreaks every year, thereby causing production loss and the banning of exportation of livestock, products and their by-products. The prevalence of foot and mouth disease in Ethiopia has been reported from different parts of the country. A retrospective study was conducted from September to November 2025 in Awi zone with the objective to investigate the occurrence and distribution of the disease by reviewing past records and reports. A seven years outbreak record (2019-2025) of foot and mouth disease in Awi administrative zone was retrieved for the study. The outbreak records were retrieved from Bahir Dar Animal Health and Diagnostic Laboratory and Awi zone Livestock and Fishery Resource office database. A total of 9 FMD outbreaks were reported from 6 districts of Awi zone during the 7 years of period. High number of outbreaks was recorded in the year 2019 with a total of 481 infected cases (465 sick cases and 16 deaths). However, the incidence rate was higher in the year 2022(7.67%). The overall morbidity and case fatality rate of FMD during the study period was 0.93% and 4.67%, respectively. In general, this study revealed that FMD was endemic and economically important disease that causes epidemics frequently affecting cattle production severely in the study zone. Regular vaccination and limit movement of cattle is recommended for the control of the disease.

Keywords: Cattle, Foot and Mouth Disease, Morbidity

INTRODUCTION

Ethiopia is one of a resource rich country endowed with a large population of livestock in Africa. The entire cattle population of the country is estimated to be about 57.83 million [1-4]. Whereas the development of this sector is hampered by different constraints and has not been fully exploited the benefit of indigenous livestock compared to

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*Corresponding Author

Marie Teshager Tsehay

Banja Woreda Livestock Office, Animal Health Department, Ethiopia,
Phone: 251918574873,
Email: teshagermarie@gmail.com

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its tremendous potential. Significant losses result in each year from the death of animals as well as animal production because of lack of appropriate veterinary services, lack of attention from government, widespread endemic disease and recurrent drought [5].

Foot and Mouth Disease (FMD) is a highly contagious viral disease, which affects all cloven-hoofed domestic animals. It is one of the most economically important viral diseases listed as notifiable trans-boundary animal diseases by the world Organization for Animal Health [3]. Its annual economic impact in terms of visible production losses and vaccination costs in endemic regions of the world is estimated between US\$6.5 and 21 billion, whereas outbreaks in FMD free countries and zones cause losses of more than US\$1.5 billion a year [6-9].

Foot and mouth disease virus (FMDV), the cause of the disease, belongs to the genus Aphthovirus and family Picornaviridae. The virus affects a wide range of hosts including domestic and wild ruminants and pigs. According to OIE (World Organization for Animal Health), FMD was the first viral infection of animals recognized and ranks first among the diseases of animals. FMD is one of the most important livestock diseases responsible for the loss of production and productivity, trade embargoes and huge control costs across the globe [11,12].

Foot and mouth disease virus has seven distinct serotypes: A, O, C, and South African Territories (SAT) 1, SAT 2, SAT 3, and Asia 1. Each serotype has many biotypical strains and topotypes, with incomplete cross protection [12; 3]. Of these seven serotypes, serotype O and A have the broad distribution in Africa [14; 8]. The occurrence of FMD due to serotype C seems decreasing in recent time. Serotype C occurrence was reported for the last time in Kenya in 2004 and in Ethiopia in 2008 [13].

Although FMD is a disease of low mortality, the infection impacts huge number of animals posing a global impact as a result of reduced production, costs of control, and denied access to markets. FMD has been reported in different parts of Ethiopia with different level of magnitude. Seroprevalence studies conducted in Ethiopia have reported prevalence of FMD ranging from 4.8% to 72.1% [14,15-18]. Reports have indicated that it's the leading and most substantial cause of direct production loss and blockage of exports of live animals and their products [1]. A sound knowledge of the

epidemiology of FMD is required to apply effective control measures locally and nationally. The study aims to know the current status of FMD outbreaks in Awi zone.

Statement of the Problem

Foot and mouth disease is the most economically significant trans-boundary disease of ruminants affecting cattle, particularly at national, regional, and individual producer levels, preventing the country from generating revenue from livestock and limiting its ability to engage in international trade [8]. Outbreak incidence studies have also indicated that FMD occurs throughout the country with significant variation in geography and production systems [7]. The disease occurs frequently in Amhara region negatively impacting production and productivity of cattle at smallholder level. Analysis of FMD outbreak records in Awi zone helps to generate epidemiological information that can be used to develop disease control strategy at district level.

Significance of the Study

The FMD study helps to generate epidemiological baseline information that helps to design disease prevention and control strategy at district and zonal level. The spatial and temporal distribution of the disease and its magnitude can be mapped. Findings of the study will contribute achieving the national and regional efforts to control the disease at local or national level.

Objectives

General Objective

The main objective of this retrospective study is to investigate the occurrence and distribution of FMD in Awi zone by reviewing past records and reports.

Specific Objectives

- ✓ To determine the prevalence of FMD cases reported in the zone over the study period.
- ✓ To identify the temporal (yearly/seasonal) patterns of FMD outbreak.
- ✓ To provide baseline information that can support future control and prevention strategies

LITERATURE REVIEW

Foot and mouth disease is the most economically significant viral disease and one of the top five livestock diseases in

Ethiopia. It causes severe economic losses due to reduced animal productivity, trade restrictions, and control costs. The disease is caused by an aphthovirus (family Picornaviridae) which occurs as seven major serotypes, A, O, C, southern African Territories (SAT)1, SAT2, SAT3 and Asia1 [16]. The virus can infect cattle, sheep, goats, pigs, camels, and several wildlife species, causing fever, vesicles, erosions, salivation, lameness, and sometimes death [10]. The disease is endemic in more than 100 countries, mostly in Africa, Asia, and South America. The disease is classified as the most dangerous trans-boundary animal disease by the World Organization for Animal Health (WOAH), but it does not affect humans [5].

Transmission of FMD virus occurs mostly by direct contact or aerosol droplets; although indirect transmission through animal products, fomites and wind are also possible. The epidemiology and evolution of FMD virus strains circulating in Ethiopia are poorly understood, limiting the effectiveness of control and prevention measures [2]. FMD outbreaks occur frequently across the country, with higher frequency and intensity during the dry season. The occurrence and distribution of FMD outbreaks are influenced by various factors, such as production system, geographic location,

species, age of animals, contact with wildlife, and season of the year, mixed animal species, breed, and agro-ecology [6].

FMD has significant impacts on livestock production and trade in Ethiopia due to reduced animal performance and welfare, market access barriers and consumer confidence, and vaccination costs. Design effective control and prevention measures such as vaccination, movement control, rapid diagnostic tests, and establishing surveillance and early warning systems are important. In endemic areas such as Ethiopia, frequent vaccinations is needed due to antigenic variations, biosecurity quarantine, and movement control and improve farm hygiene help to control outbreaks [6].

RESEARCH METHODOLOGY

Study area

The study was carried out in Awi Administrative Zone, which is one of the administrative zones of the Amhara National Regional State in northwestern Ethiopia. Injibara is the administrative town of the zone, located about 445 km northwest of Addis Ababa, the quarter city of Ethiopia, and about 118 km southwest of Bahir Dar, the capital city of the Amhara Region (Figure 1).

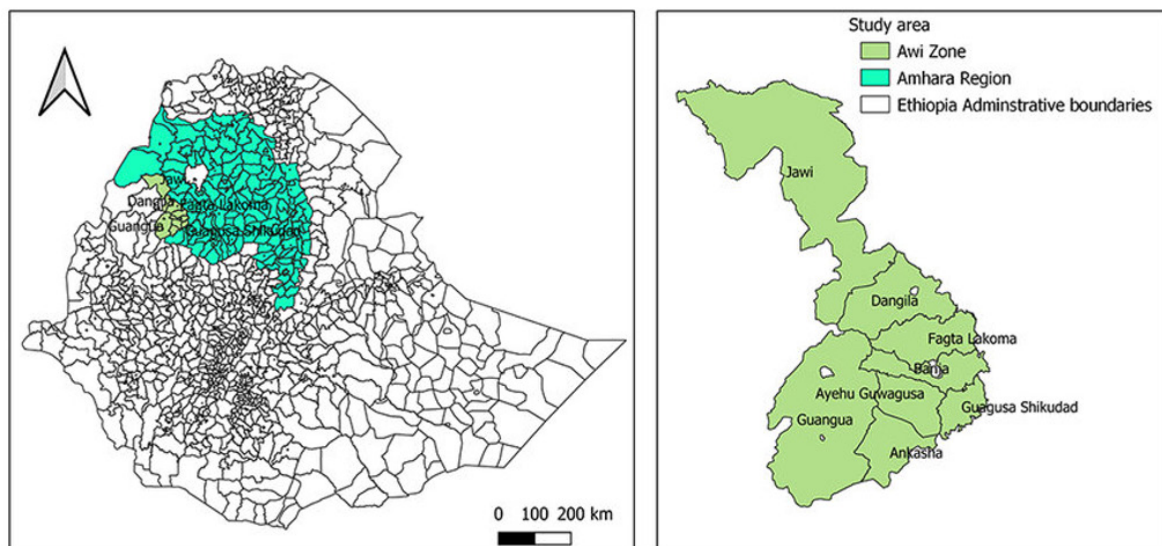


Figure 1: Map of the study area, Awi Zone

Awi Zone lies predominantly in the highland and midland agro-ecological zones, with an altitude ranging from about 1,800 to 3,000 meters above sea level. The area receives an annual rainfall of approximately 1,200–1,800 mm and has an average temperature range of 15–25°C. Mixed crop–livestock production is the major farming system, and livestock particularly cattle, sheep, goats and equine are an essential

component of household livelihoods. This makes the zone vulnerable to economically important transboundary animal diseases such as FMD.

Study Design

A retrospective study design was employed to assess the occurrence and distribution of FMD in Awi Zone. A seven years FMD outbreak record data (2019–2025) was retrieved

from the outbreak report database available in Awi Zone Livestock and Fishery Resource Office and Bahir Dar Animal Health Diagnostic and Investigation Laboratory. In Amhara region, veterinarians working at woreda level often report disease outbreaks to the zonal offices and to the Bahir Dar Animal Health Diagnostic and Investigation Laboratory.

Sampling and Data Collection

Available outbreak records specific to FMD were retrieved using MS excel. A total of 9 FMD outbreaks were reported from woredas of Awi zone. About 481 animal cases and deaths associated with FMD were retrieved retrospectively in 7 years (2019–2025) of recorded data from 6 woredas in the Awi zone. The data was extracted from the outbreak record database available at the Bahir Dar Animal Health Diagnostic and Investigation Laboratory and Awi zone Livestock and Fishery Resource Office. The information retrieved includes the number of cases, year and season of outbreak, affected districts, animal species, age, and sex of affected animals. Foot and Mouth Disease is a trans-boundary reportable disease and all cases and deaths associated with FMD are often reported to the regional and national veterinary service departments.

Data Management and Analysis

The retrieved data was checked for completeness and consistency, then entered into Microsoft Excel and was exported to Stata for analysis. Descriptive statistics such as frequencies, percentages, and proportions will be used to summarize the occurrence of FMD by year, season, district, species, age, and sex of affected animals. Trends and spatial distribution of outbreaks will be presented using tables, graphs, and charts for interpretation.

RESULT

A total of 851 FMD case were reported from 2019 to 2025, of which 813 cases of animals were sick and 38 were deaths of FMD. A total of 9 outbreaks were reported during the last 7 years period. High number of outbreak was recorded in the year 2019 (n=5) followed by 2025 (n=2). In contrast, no outbreak was reported in 2020, 2021 and 2024. The annual attack rate of FMD outbreaks in the study area was calculated for each year (Table 1). Distribution of the attack rate was higher in Guagusa Shikudad district (7.67%) followed by Banja (3.80%) and Fagta Lakoma (1.67%) districts.

Table 1: Occurrence of FMD outbreaks in Awi Zone between 2019 and 2025

Wereda	Year	No. of case	No. of death	Total infected	PAR	Attack rate(%)
Jawi	2019	384	14	398	60405	0.66
Zigem	2019	6	0	6	1050	0.57
Banja	2019	30	0	30	6000	0.50
Fagta lekoma	2019	10	0	10	600	1.67
Guagusa shikudad	2019	35	2	37	5000	0.74
Guagusa Shekudad	2022	273	5	278	3625	7.67
Guagusa Shekudad	2023	13	0	13	1500	0.87
Banja	2025	17	2	19	500	3.80
Meslachaiti	2025	45	15	60	8500	0.71
Overall		813	38	851	87180	0.98

“PAR”

The attack rate across the years was calculated in the range of 0.66% and 7.67%. The higher attack rate was recorded in

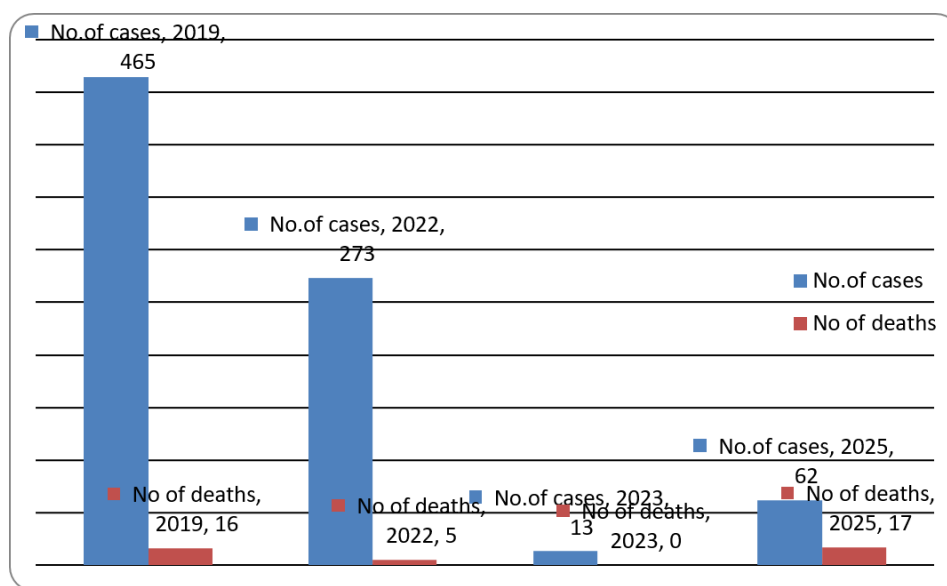
the year 2022 and the lowest attack rates in the year 2019 (Table 2).

Table 2: Number of outbreaks and attack rate of FMD by year (2019-2025)

Year	No. of Outbreaks	No. of cases	No of deaths	Total infected	PAR	Attack rate
2019	7	465	16	481	73,055	0.66
2022	2	273	5	278	3625	7.67
2023	1	13	0	13	1500	0.87
2025	2	62	17	79	9000	0.88
Overall	12	813	38	851	87,180	0.98

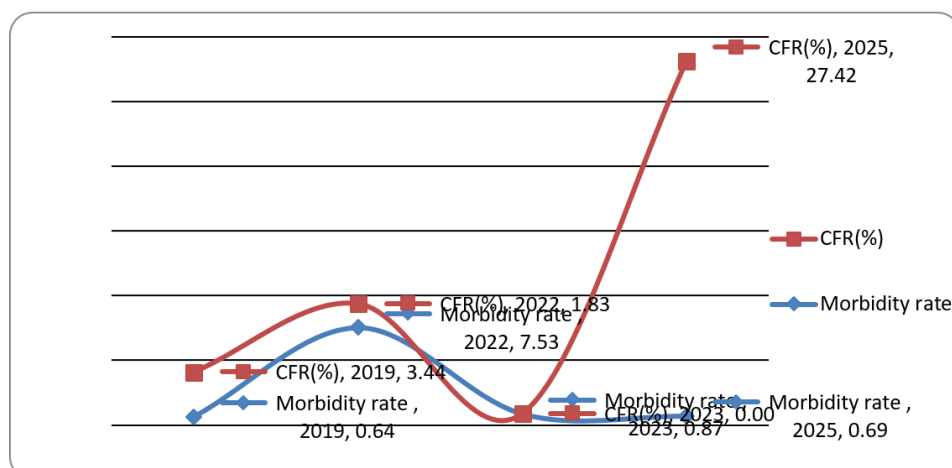
The number of FMD cases were higher in 2019 (n=481) and 16 deaths were reported. The occurrence of the outbreak was widely distributed in 5 districts of Awi zone. Relatively

high number of FMD cases (278) was also reported in 2022 with 5 case of mortality. In contrast low numbers of FMD cases were reported in the years 2023 and 2025 (Figure 2).

**Figure 2:** Number of FMD cases and deaths in Awi zone (during 2019-2025)

The morbidity rate and case fatality rate of FMD in the study area was reported in Fig 3. The overall morbidity rate during the study period was 0.93% (813/87,180) with higher rate

in 2022. The overall case fatality rate was also reported as 4.67% (38/813) with the highest case fatality in the year 2025 followed by the year 2022.

**Figure 3:** Morbidity and Case fatality rate of FMD by year (2019-2025)

DISCUSSION

The results of this study indicated that a total of 12 outbreaks of FMD were recorded in Awi zone within in seven years (2019-2025). During this retrospective study period out of 12 outbreaks of FMD reports, 813 cases and 38 deaths were recorded. The recorded data indicated that FMD outbreak cases are increasing and can cause direct and indirect losses. The attack rate of FMD was 0.98% indicated that 851 cattle were affected during the outbreaks within seven years. The highest number of cases (481) was reported in the year 2019. The morbidity rate was higher (7.53%) in the year 2022. The case fatality rate was also recorded higher (27.42%) in the year 2025. Different authors frequently reported FMD outbreak in different parts of Ethiopia including Western Amhara region. Outbreaks were geographically widespread affecting all major regional states in the country and were more frequent in the central, southern, and southeastern parts of the country. Neither long-term nor seasonal trends were observed in the incidence of outbreaks [8]. In Ethiopia, different studies reported animal and herd level seroprevalence of FMD in cattle ranging from 1.4 to 53.6% and up to 61%, respectively [11].

According to the current retrospective study, the spatial distribution occurrence of FMD was widespread throughout Awi zone affecting 5 districts. The study result indicated higher attack rate (7.67%) in Guagusa shikudad followed by Banja (3.8%) and 1.76% in Fagta Lakoma districts. The current study recognized that majority of the districts in Awi zone reported FMD outbreak during the seven years. This indicated that FMD was endemic and frequently occurring in the study area. This is in agreement with the report of (1) and (8), who reported frequent occurrence and more than 50% of the districts in Amhara region were affected by FMD outbreaks.

In the years 2020, 2021 and 2024, there was no FMD outbreak was recorded; this might be due to the irregular pattern of the diseases, poor disease surveillance and reporting system. Some districts may not report all outbreaks occurred in the districts especially when the outbreak was very mild. This may underestimate the number of outbreaks occurring during the study period. Even if this study might have some limitations, it provides important information regarding the occurrence, distribution, morbidity and case fatality rate of FMD outbreaks in Awi zone, which could be used as a

baseline input to design effective control measures against the disease.

Limitation of the study

The study was conducted in a retrospective data collected in the previous seven years. Outbreak reports were not consistent, missed in some years and underreport is observed. Records collected from districts were not properly achieved at the office of Awi Zone LRFD.

CONCLUSION AND RECOMMENDATION

This retrospective study revealed that FMD is an endemic and economically important disease of cattle with significant level of morbidity and mortality rates in the study region, which needs strong surveillance system and control strategy. The diseases outbreaks occurred annually in most districts of Awi zone. The highest number of outbreaks and cases were observed in some years that may be due to the free movement of animals from place to place for searching of water and pasture. Outbreak control through vaccination is uncommon for FMD disease due to high cost of vaccine and limited availability.

Based on the above conclusion, the following recommendations were forwarded for district veterinarians, zone and regional office:

- Supplying of FMD vaccine and mass vaccination in disease endemic areas
- Strategic prophylactic vaccination of animals should be needed before the dry season.
- Awareness creation of community on morbidity, transmission and seasons of occurrence.
- Controlling movements of animal during dry seasons for searching of pasture and water.
- Giving training for animal health workers to build capacity.
- The surveillance and reporting system should be strengthened for early detection and response; and laboratory confirmation.

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