



## Trends in Acute Flaccid Paralysis Surveillance Indicators in Libya (1998–2023): A National Epidemiological Analysis

Laila Taher Elessawi<sup>1</sup>, Fathi Sadek Adrissi<sup>2</sup>, Salem Emhemed Juwaid<sup>3</sup>

<sup>1&2</sup> Faculty of Science and Medical Technology, Tripoli, Libya

<sup>3</sup> Department of Research Affairs and consultation -Libyan Authority for Scientific Research, Tripoli, Libya

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### Abstract

#### Background:

Acute Flaccid Paralysis (AFP) surveillance represents a fundamental component of global poliomyelitis eradication strategies. In Libya, a nationwide AFP surveillance system has been operational for several decades, serving as a key mechanism for detecting poliovirus circulation and assessing surveillance performance indicators.

#### Objective:

This study aimed to analyze long-term trends in AFP reporting, Non-Polio AFP (NP-AFP) rates, Non-Polio Enterovirus (NPEV) detection, Sabin-like (SL) virus isolation, and the geographical distribution of AFP cases in Libya between 1998 and 2023.

#### Methods:

A retrospective descriptive analysis was conducted using national AFP surveillance data obtained from weekly epidemiological reports up to week 52 of 2023. Annual reporting trends, virological indicators, and regional case distributions were examined using descriptive statistical methods.

#### Results:

AFP reporting demonstrated a progressive increase over the study period, with pronounced peaks observed in 2018, 2019, 2020, 2022, and 2023. Benghazi, Al-Jabal Al-Akhdar, and Tripoli consistently reported the highest number of cases in recent years. The NP-AFP rate exceeded the World Health Organization (WHO) benchmark of  $\geq 2$  per 100,000 children under 15 years throughout the study period, reaching its highest levels after 2018. NPEV detection peaked at 16% in 2013, while SL virus isolation showed notable peaks in 2003,

2005, 2009, 2018, and 2020. In 2023, a total of 115 AFP cases were reported, including 113 Libyan and 2 non-Libyan children.

### **Conclusion:**

Libya maintains a high-quality AFP surveillance system with performance indicators consistently exceeding WHO standards. Continued investment in laboratory capacity and targeted surveillance strengthening in southern regions are essential to sustain polio-free status and enhance early enterovirus detection.

## **1. Introduction**

Acute Flaccid Paralysis (AFP) surveillance remains the cornerstone of poliomyelitis monitoring and global eradication efforts. According to the World Health Organization (WHO), achieving a minimum Non-Polio AFP rate of at least two cases per 100,000 children under the age of 15 is essential to ensure adequate surveillance sensitivity (WHO, 2023). Libya has sustained a national AFP surveillance system for decades, enabling the detection of poliovirus circulation, evaluation of surveillance quality, and guidance of public health interventions (NCDC, 2023).

Despite prolonged periods of political instability and infrastructure challenges, Libya has successfully maintained its polio-free status. Nevertheless, the risk of poliovirus importation persists due to population movement, immunity gaps, and the circulation of Non-Polio Enteroviruses (NPEVs) (GPEI, 2023). Continuous monitoring of AFP indicators is therefore critical. This study presents a comprehensive evaluation of AFP surveillance performance in Libya over a 26-year period.

## **2. Methods**

### **2.1 Study Design**

This study employed a retrospective descriptive design based on national AFP surveillance data.

### **2.2 Data Sources**

Data were obtained from national AFP surveillance records, weekly epidemiological bulletins issued up to week 52 of 2023, and laboratory reports from national enterovirus isolation facilities (NCDC, 2023; WHO-EMRO, 2022).

### **2.3 Variables Analyzed**

The analysis included total AFP cases reported annually, Non-Polio AFP rates per 100,000 children under 15 years, NPEV detection rates, Sabin-like virus isolation rates, provincial distribution of cases, and nationality of reported AFP cases.

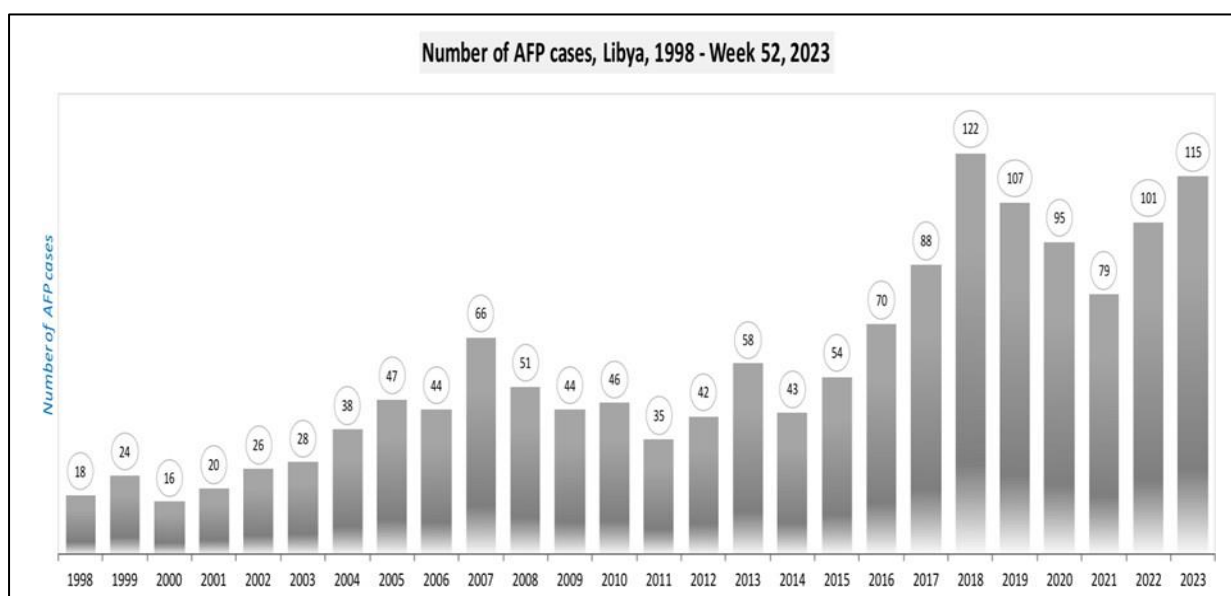
### **2.4 Data Analysis**

Descriptive statistical methods were used to assess temporal trends and geographical variations. Observed patterns were interpreted based on surveillance graphs and summarized indicators.

### 3. Results

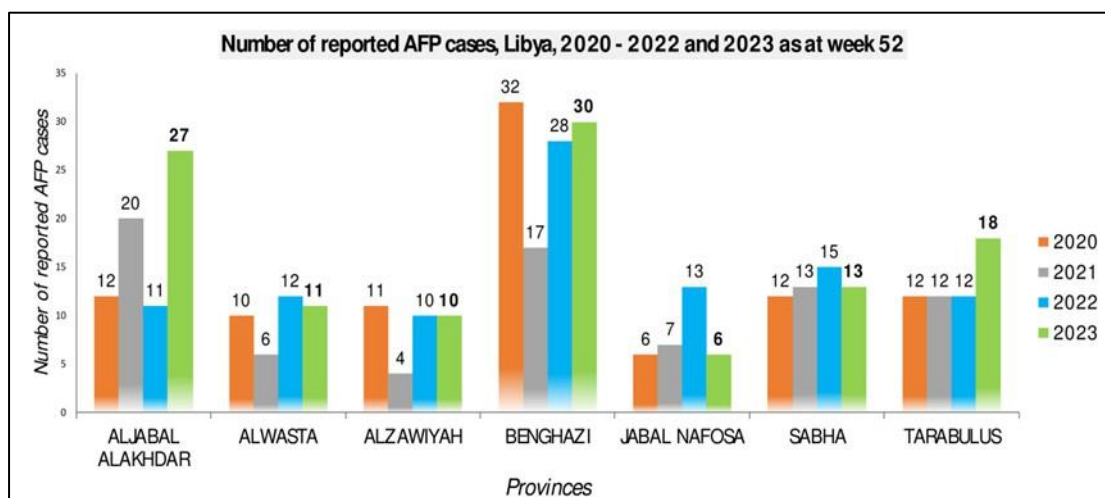
#### 3.1 Annual AFP Reporting Trends (1998–2023)

AFP case reporting increased steadily over the study period, with notable peaks recorded in 2018, 2019, 2020, 2022, and 2023, reflecting enhanced surveillance sensitivity and reporting completeness.



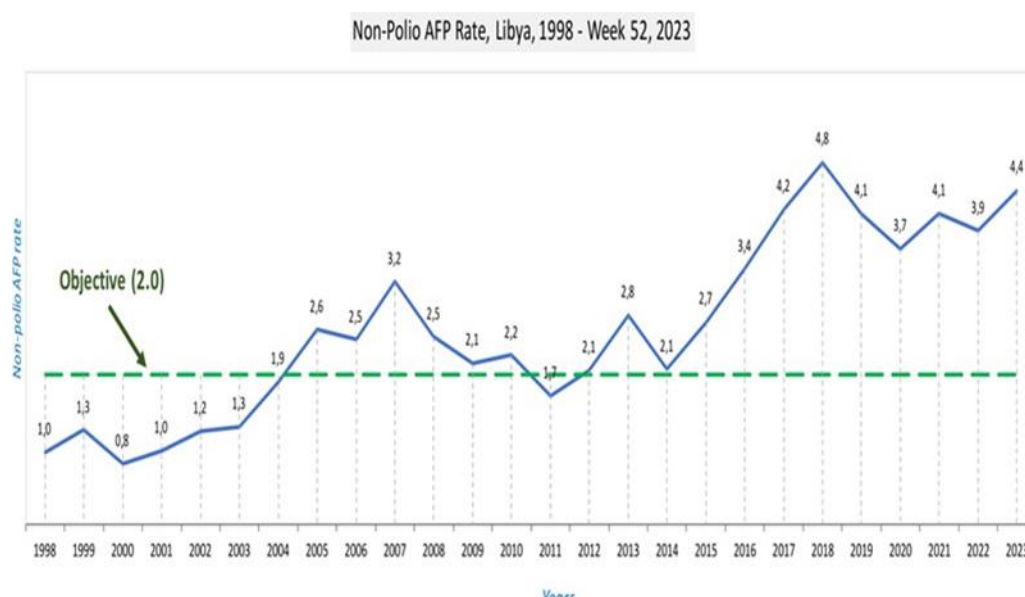
#### 3.2 Provincial Distribution of AFP Cases (2020–2023)

In 2020 and 2021, Benghazi consistently reported the highest number of AFP cases. In 2023, Al-Jabal Al-Akhdar and Benghazi emerged as the leading provinces, reporting 27 and 30 cases respectively.



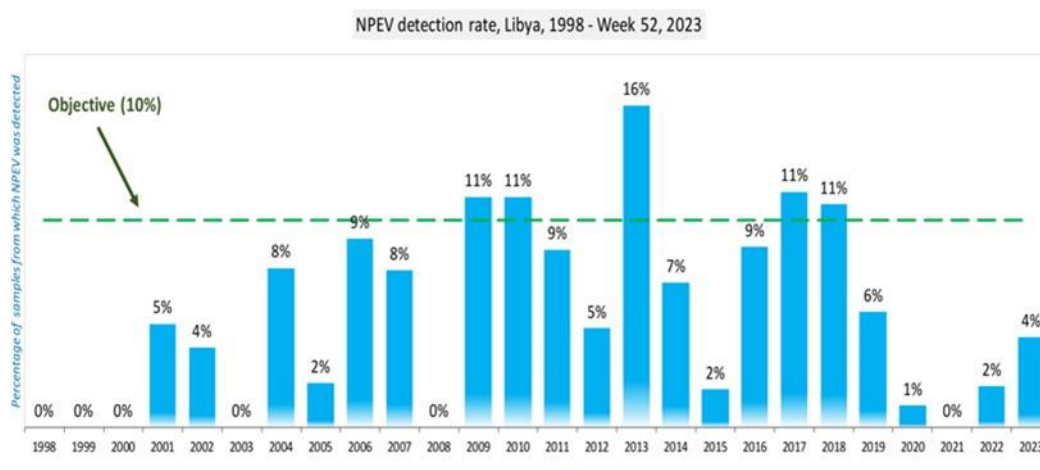
### 3.3 Non-Polio AFP Rate

Throughout the study period, the NP-AFP rate exceeded the WHO minimum threshold. The highest rates were observed between 2018 and 2023, reaching up to 4.8 per 100,000 children under 15 years.



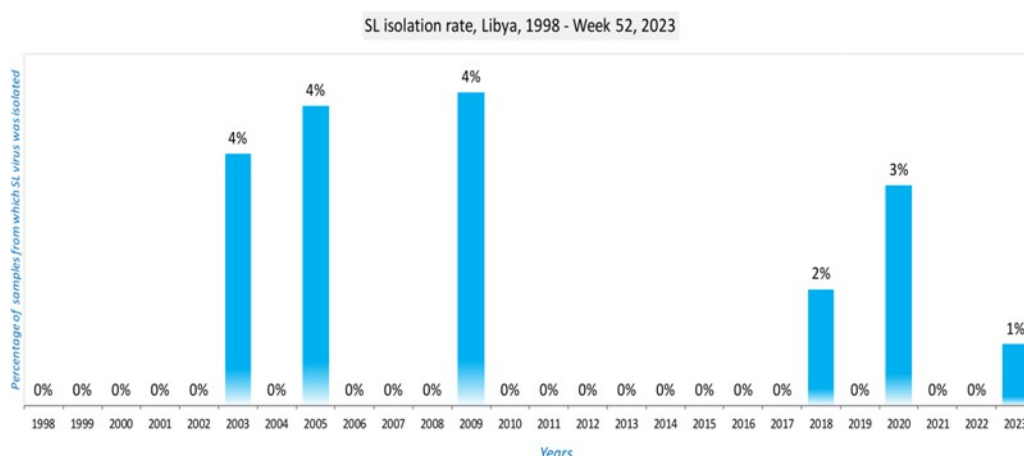
### 3.4 NPEV Detection Rate

The NPEV detection rate peaked at 16% in 2013, with secondary peaks of approximately 11% observed in 2009, 2010, 2017, and 2018, indicating variability in enterovirus circulation and laboratory performance.



### 3.5 Sabin-Like Virus Isolation

Sabin-like virus isolation demonstrated notable peaks in 2003, 2005, 2009, 2018, and 2020, corresponding with periods of intensified vaccination activities and enhanced specimen collection.



### 3.6 Nationality of AFP Cases (2023)

Of the 115 AFP cases reported in 2023, 113 involved Libyan children, while only two cases were identified among non-Libyan populations.

Region	Total AFP cases reported	Nationality	
		Libyans	Non-libyans
ALJABAL ALAKHDAR	27	27	0
ALWASTA	11	11	0
ALZAWIYAH	10	10	0
BENGHAZI	30	30	0
JABAL NAFOSA	6	6	0
SABHA	13	11	2
TARABULUS	18	18	0
<b>TOTAL</b>	<b>115</b>	<b>113</b>	<b>2</b>

#### 4. Discussion

The findings confirm that Libya's AFP surveillance system remains robust and resilient despite prolonged political and logistical challenges. The sustained increase in AFP reporting reflects improvements in case detection, healthcare accessibility, and reporting mechanisms (WHO-EMRO, 2022).

The consistently elevated NP-AFP rate underscores the high sensitivity of the surveillance system and its compliance with WHO performance standards. Variations in NPEV detection and SL virus isolation likely reflect fluctuations in laboratory capacity, specimen quality, and enterovirus circulation patterns.

Regional disparities in AFP reporting highlight the need for targeted surveillance strengthening in southern regions such as Sabha and Jabal Nafosa, where underreporting may occur due to limited access to healthcare services.

#### 5. Conclusion

Libya demonstrates strong AFP surveillance performance, with key indicators consistently exceeding WHO requirements. The high reporting rates observed in recent years and effective laboratory investigations indicate a functional national surveillance system capable of early poliovirus and enterovirus detection.

#### 6. Recommendations

Strengthening AFP surveillance in underserved southern regions is recommended. Enhancing laboratory capacity for enterovirus isolation and genetic sequencing, expanding training programs for AFP focal points, ensuring equitable vaccine access, and integrating digital reporting systems will further improve surveillance efficiency and sustainability.

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