

EPIDEMIOLOGICAL AND CLINICAL CHARACTERISTICS OF MEASLES OUTBREAK IN THE LAZIO REGION BETWEEN 2017-2024

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Introduction

Measles is a highly contagious viral disease responsible for the death or disability of millions of children. Measles incidence and mortality have declined over the past century due to improvements in nutrition, socioeconomic status and the introduction of a safe and affordable vaccine [1].

The incidence of measles shows marked seasonality, with peaks depending on the geographical region; in countries with temperate climates measles shows an increase during winter and spring. This can be attributed to several factors, such as frequenting more indoor spaces, which facilitates transmission of the virus. In tropical regions, measles seasonality is often associated with periods of drought. An increase in measles cases was observed in the period between 2016-2019, with over 500,000 confirmed cases reported to WHO [2]. The 2017 measles epidemic in Italy marked a critical period for global public health. To reduce risks to public health, since 2017 vaccination has become a mandatory requirement for school entry for the age group 0-16 years [3]. For those born between 2001-2016, the vaccinations contained in the national vaccination calendar in force in the year of birth had to be administered (all except anti-chickenpox) [4]. In 2024, ECDC observed an increasing number of EU countries reporting measles cases, with 15 deaths in Romania and 1 in Ireland [5].

Measles is no longer endemic in most European countries; it is also estimated that between 2000-2018, vaccination prevented 23,2 million deaths and deaths decreased by 73% [6].

A different situation was shown in a study conducted at Manila Hospital between 2016-2019, in which the mortality risk was 3.2%, compared to 2.6% reported in the Philippines in 2019, with 41% of deaths occurring among infants under 9 months; no infant who had been fully vaccinated died [1].

Aim

The control and prevention analysis of measles surveillance has the aim of promptly activating epidemiological investigations for contact tracing and the related prophylactic and control measures; identify population groups at risk of transmission; rapidly activate a public health response; monitor disease incidence and identify changes in disease epidemiology to prioritize, plan and implement prevention programs.

Methods

The present study conducted a descriptive analysis of all measles cases reported in the Lazio Region between 2017-2024.

We summarized sociodemographic and clinical characteristics, vaccine status, hospitalization and case outcome.

We obtained data from the measles case notification system of the Istituto Superiore di Sanità (ISS). Doctors must report any suspected case within 12 hours to the local health authority. Following the epidemiological investigation, the local health authority reports the case, via a standardized surveillance form, to the Regional Service for Surveillance and Control of Infectious Diseases (SERESMI), which, after having verified the completeness and accuracy of data, and collected the results from the Regional Reference Laboratory, inserts the case into the ISS web platform.

All statistical analyses were performed using STATA 17 and p-value <0.05 was considered statistically significant.

Results

In the Lazio Region, after the 2017-2019 epidemic (2755 cases, 82.2% confirmed), a total of 24 cases (75.0% confirmed) were reported in the years 2020-2023 and 161 (94.4% confirmed) in the first half of 2024 (Table 1).

The M/F ratio was 0.9 from 2017 to 2019, 1 in 2020-2023 and 1.04 in 2024.

The age group most affected in the entire period was 19-39 years old (table 1), followed by 40-50 years old. A statistically significant difference was found between the first half of 2017 and the first half of 2024 ($p < 0.001$).

With the introduction of vaccination starting in 2017, there was a progressive decrease in the incidence of cases, most evident in the 0-1 age group, which had an incidence of 184.1 cases/100,000 inhabitants in the first half of 2017, compared to 14.1/100,000 in the first half of 2024, but also in the 19-39 age group where 50.7 cases/100,000 were recorded against 6.5/100,000 in 2024.

Predominantly, during each period the majority of reported cases were born in Italy ($p = 0.001$), with a high prevalence of unvaccinated subjects. Of the cases for which information is known, 68.6% were unvaccinated in 2017, 71.4% in 2018-2019, 75.0% between 2020 and 2023 and 87.0% in the first half of 2024. A statistically significant difference was found between the first half of 2017 and the first half of 2024 ($p < 0.001$).

Of the 2730 cases for which information is known, 55-65 % were hospitalized, without significant differences over the entire period. The most frequent complications were similar between 2017 and 2018-2019 (diarrhea 53.5% vs 50.8%, stomatitis 45.9% vs 35.7%, hepatitis 27.6% vs 30.3%), while compared to previous years, an increase in pneumonia occurred in 2024 (47.2%, $p = 0.011$).

As regards the cases reported among healthcare workers, they represented on average 6% in the entire period, occurring mainly among unvaccinated subjects: 78.3% in 2017, 73.3% in the period 2018-2019, the only case in the period 2020-2023 and 92.9% in 2024. This highlights the importance of vaccination in highly exposed groups for whom vaccination is recommended, such as healthcare workers.

Table1. Main characteristics of measles cases 2017-2024

Features	2017	2018-2019	2020-2023	2024	Jan-June 2017 vs Jan-June 2024
All	n=1964	n=791	n=24	n=161	
	N (%)	N (%)	N (%)	N (%)	p value
Age					
Median (IQR)	27 (16-36)	30 (23-37)	35 (20-43)	31 (25-41)	
Range	0-70	0-62	0-58	0-62	
Age group					
0-1	221 (11.25)	60 (7.59)	2 (8.33)	10 (6.21)	<0.001^
2-4	93 (4.74)	26 (3.29)	-	2 (1.24)	
5-18	223 (11.35)	45 (5.69)	4 (16.67)	12 (7.45)	
19-39	1094 (55.70)	495 (62.58)	9 (37.50)	95 (59.01)	
40-50	258 (13.14)	123 (15.55)	8 (33.33)	22 (13.66)	
50+	73 (3.72)	40 (5.06)	1 (4.17)	20 (12.42)	
missing	2 (0.10)	2 (0.25)	-	-	
Incidence by age group					
0-1	232.46	34.27	0.65	14.07	
2-4	60.03	8.88	0.00	1.68	
5-18	41.37	4.16	0.19	2.31	
19-39	69.56	16.04	0.15	6.45	
40-50	24.56	5.96	0.21	2.34	
50+	3.09	0.82	0.01	0.77	
Gender					
Female	1016 (51.73)	405 (51.20)	12 (50.00)	79 (49.07)	0.476^
Male	948 (48.27)	386 (48.80)	12 (50.00)	82 (50.93)	
Nationality					
Italian	1886 (96.03)	750 (94.82)	24 (100.00)	145 (90.06)	0.001^
Not Italian	71 (3.62)	39 (4.93)	-	16 (9.94)	
missing	7 (0.36)	2 (0.25)	-	-	
Vaccination					
Yes, one dose	81 (4.12)	55 (6.90)	1 (4.17)	12 (7.45)	<0.001^
Yes, two doses	22 (1.12)	13 (1.64)	1 (4.17)	6 (3.73)	
Yes, missing doses	81 (4.12)	36 (4.55)	1 (4.17)	-	
No	1347 (68.58)	565 (71.43)	18 (75.00)	140 (86.96)	
missing	433 (22.05)	122 (15.42)	3 (12.50)	3 (1.86)	
Hospitalization					
Yes	1082 (55.09)	444 (56.13)	16 (66.67)	99 (61.49)	0.280^
Only emergency room visit	390 (19.86)	215 (27.18)	5 (20.83)	36 (22.36)	
No	311 (15.84)	103 (13.02)	3 (12.50)	26 (16.15)	

missing	181 (9.22)	29 (3.67)	-		
Complications					
Yes	851 (43.33)	356 (45.01)	11 (45.83)	89 (55.28)	0.011 [^]
No	1113 (56.67)	435 (54.99)	13 (54.17)	72 (44.72)	
Classification					
Confirmed	1588 (80.86)	677 (85.59)	18 (75.00)	152 (94.41)	
Possible	255 (12.98)	63 (7.96)	5 (20.83)	6 (3.73)	
Probable	121 (6.16)	51 (6.45)	1 (4.17)	3 (1.86)	
Healthcare Workers	129 (6.57)	30 (3.79)	1 (4.17)	14 (8.70)	
Age*					
Median (IQR)	31 (27-38)	27 (34-23)	44	31 (36-28)	
Range	20-70	21-50	-	26-43	
Vaccination*					
Yes	10 (7.75)	6 (20.00)	-	1 (7.14)	
No	101 (78.25)	22 (73.33)	1 (100.00)	13 (92.86)	
missing	18 (13.95)	2 (6.67)	-	-	

*Only Healthcare Workers

[^] Pearson's Chi-squared test

Conclusions

This study highlights the ongoing measles challenge in the Lazio Region between 2017-2024. Although measles is preventable through vaccination, a significant number of cases have been reported among susceptible populations, including groups for which vaccination is recommended, indicating gaps in immunization coverage and acceptance. This underlines the need to strengthen surveillance, improve vaccination strategies and public health interventions to effectively combat measles epidemics in this Region.

References

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