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TRENDS IN INCIDENCE OF LABORATORY CONFIRMED MEASLES IN TOGO, 2005-2014

Internal Medicine

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ABSTRACT

Background: Since 2002, Togo implements to reduce measles incidence, routine and supplemental vaccination, case-based surveillance and case management. Although measles surveillance data are available, there is no detailed analysis. We conducted this study to describe the epidemiological profile of measles confirmed at Laboratory in Togo from 2005 to 2014.

Methods: We conducted a retrospective study on measles surveillance data from August 2015 to January 2016. We reviewed laboratory records from 2015 to 2014, obtained from Togo's National Laboratory Institute. We analyzed the data by person, place and time using Epi Info 7. We calculated frequencies, proportions and incidences.

Results: From 2005 to 2014, we recorded 3154 suspected measles cases of which 1224 (38.81%) laboratory confirmed cases with a median age of 5 years for confirmed cases. Children of 9 to 59 months old and those of 5-15 years old group represented respectively 47.55 % and 36.76 % of the confirmed cases. Among confirmed cases, 53.36 % were males and 87.58 % were vaccinated. Measles occurred with picks around January to March of each year. The incidence for 100 000 were 0.54, 0.49, 0.15, 0.93, 2.63, 2.04, 2.60, 3.66, 4.41, 2.22 respectively in 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014 and 2014. .

Conclusion: Measles has globally a tendency to resurgence from 2005 to 2014 in Togo, with picks following a seasonality and occurring much more among children from 9 months to 15 years old. We recommend supplemental vaccination covering a largest target (9 months to 14 years) and to consider a second dose administration.

KEYWORDS

Measles, incidence, laboratory, children, Togo

INTRODUCTION

Measles has been known for a long time [1] as a "highly contagious disease" [2], mainly affecting children from the age of 5-6 months The period of contagiousness begins 5 days before and lasts up to 5 days after the eruption. The virus thus ejected remains dangerous for at least 30 min. It survives little time on objects and surfaces.

Perceived as a benign disease in a healthy subject in developed countries, measles is in fact a very serious disease in under-nourished children or in poor hygiene conditions: in 1980, 2,600,000 people died of this disease [3]. This number decreased sharply to 140,000 people in 2010 [4], partly due to vaccine policies.

The diagnosis is essentially clinical and the detection of antibodies of the IgM type (serology) allows the biological confirmation [5]. The curative treatment of measles is not specific to this disease. Administration of high-dose oral vitamin A may reduce the severity and duration of complications as well as mortality [6, 7]. In 2005, nearly 77% of the world's population was vaccinated, resulting in a further reduction in the mortality of fewer than 345 000 deaths in 20 million patients that year. Half of the fatal cases are in Southeast Asia, where immunization coverage is lower [8]. Between 2000 and 2005, more than 300 million children aged between nine months and 15 years were vaccinated or revaccinated [9].

The overall mortality attributed to measles fell dramatically by 78%, from 733 000 deaths in 2000 to 164 000 deaths in 2008 [19]. Reduction in measles mortality has contributed about 23% of infant mortality since 1990 and 24% since 2000 [10]. In Togo, measles is one of the factors in the high rate of infant and juvenile mortality [11,12] after malaria, neonatal causes, pneumonia and diarrhea [13]. This disease is one of the target diseases of the Expanded Program on Immunization and measles vaccine (VAR) is administered at the age of 9 months for routine immunization. Vaccine coverage in VAR increased from 48% in 2002 to 85% in 2011 [14]. As part of the regional strategy for accelerated measles control [14], four national immunization campaigns have been organized since 2001 which have significantly reduced measles mortality by more than 94% [14]. However, the national surveillance system reports measles cases in children across the country.

It seems therefore of interest to analyze measles data over the last 10 years in order to describe the evolutionary trends of the disease over time, its distribution across the country and the individual

characteristics of the affected individuals; And to determine the impact of control strategies (vaccination and surveillance) implemented in the country on the incidence of this disease.

The aim of this study is to contribute to the improvement of child survival in Togo, the general objective being to describe the epidemiological profile of laboratory confirmed measles in Togo from 2005 to 2014.

The specific objectives assigned to this work are:

Materials and method

The study consisted in a retrospective analysis of the measles data base of the National Institute of Hygiene (NIH) of Togo, national reference laboratory. It covered all measles suspected cases which were notified with collected blood specimen in Togo from 2005 to 2014, compiled at the National Institute of Hygiene. We considered the following definitions:

- Suspected case of measles: Any person presenting with fever, a generalized maculopapular (non-vesicular) rash and cough or colds or conjunctivitis (red eyes), or any person in whom a doctor suspects measles [15].
- Confirmed case of measles: this is a suspected case which is confirmed in the laboratory (positive IgM serology) or has an epidemiological link with confirmed cases or an outbreak [15].
- Epidemic: A health district is said to be in an epidemic when, during a month, the district has notified at least 5 suspected cases of measles or 3 confirmed cases of measles in the laboratory [15].

Sampling was exhaustive. We included all suspected measles cases notified at the level of health districts of Togo that had been sampled for biological confirmation at the NIH laboratory from 2005 to 2014. Non-analyzed samples were excluded.

Our study data were extracted from NIH's yellow fever-measles database and information on vaccination coverage and campaigns was obtained from the Immunization Division. These data were analyzed using the EPI INFO 7.1.5.2 software and the formatting of the results using the EXCEL 2007 software. Frequencies, proportions and association measurements were calculated.

Results

Out of a total of 3 154 cases of suspected measles, 1224 cases were confirmed in the laboratory (38.81%).

Individual characteristics of confirmed cases

The sex ratio M / F was 1.14. The mean age was 5.81 ± 6.68 years, the extremes being 0 and 43 years; the median age was 4 years, and the interquartile intervals of 1 and 8 years. The under-5 group was the most represented (54.66%), followed by 5-10 years (27.41%) and the 10-to-15-year group (9.33%). Of these cases, 87.58% were not vaccinated against measles.

Evolution of cases confirmed over time

Confirmed cases of measles were observed each year from 2005 to 2014. The annual evolution of these cases in this period presents three main phases: a fall from 28 cases in 2005 to 8 confirmed cases in 2007, followed by a rapid ascent to 151 cases in 2009, followed by a gradual increase to a peak of 292 cases in 2013 before declining to 151 cases by 2014.

Table I shows the annual evolution of the cumulative number of measles cases confirmed in the laboratory.

Table I: Annual trends in the number of laboratory confirmed measles cases, Togo 2005-2014

Years	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Cumulative number of confirmed measles cases	28	26	8	52	151	120	156	240	292	151

Table II shows the cumulative number of cases according to the months of occurrence in the year.

Table II: Distribution of the cumulative number of confirmed cases of measles according to the months of occurrence in the year, Togo 2005-2014

Months	January-March	April - June	July - September	October-December
Cumulative number of cases	702 (57.35 %)	245 (20.01 %)	132 (10.78 %)	145 (11.84 %)

This table shows that cases of measles mostly occur (57.35%) in the first quarter of each year.

Distribution of confirmed cases by place

Over the period from 2005 to 2014, all the 40 health districts in the country reported confirmed cases of measles except 2 districts (Akébou and Danyi). The mean was 30.6 ± 24.96 confirmed cases per district. The results show a large variability in the cumulative number of confirmed cases of measles between the health districts ranging from 0 cases (Akébou and Danyi in the Plateaux region) to 103 cases in the Haho district (Plateaux region). Table III summarizes the distribution of confirmed cases of measles by health district in Togo from 2005 to 2014.

Table III: Distribution of confirmed cases of measles by health district in Togo from 2005 to 2014

Cumulative number of confirmed cases from 2005 to 2014	health districts
In no case	Akébou ; Danyi
1 to 10 cases	Agou, Bas-Mono, Wawa, Cinkassé, Tandjoaré, Kpélé, Avé
11 to 20 cases	Dankpen, Kloto, District N° IV, Lacs, Assoli, Blitta et Sotouboua
21 to 30 cases	District N° I, Moyen-Mono, Kozah, Vo, Tchaoudjo, Doufelgou, Binah
31 to 40 cases	Yoto, Bassar, Anié, Kéran, Tône, Amou, Tchamba
41 to 50 cases	Oti et Ogou
More than 50 cases	Kpendjal, Zio, District N° II, Golfe, District N° III, Est-Mono, District N° V, Haho.

On the basis of at least 3 laboratory confirmed measles cases per month in a district, the number of districts having experienced an epidemic increased gradually from 2 in 2005 to 19 in 2013. This number of districts in outbreaks per year is presented in Table IV.

Table IV: Evolution of the number of districts having experienced a measles outbreak in Togo from 2005 to 2014.

Years	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Number of districts in measles outbreak	2	2	1	3	8	6	7	13	19	13

Comparative Evolution of Incidence of Confirmed Measles Cases and Measles Vaccine Coverage

Measles vaccine coverage ranged from 70% in 2005 to 87% in 2012. At the same time, despite the increase in VAR coverage, the incidence of confirmed measles cases has gradually increased from 3.32 to 25.52 in 2013. The table V presents the evolution of vaccine coverage VAR and the incidence of measles confirmed in the laboratory according to the years.

Table V: Comparative Evolution of the Incidence of Confirmed Measles Cases in the Laboratory and VAR Vaccination Coverage by Year in Togo from 2005 to 2014.

Years	2005	2006	2007*	2008	2009	2010*	2011	2012	2013*	2014
Measles vaccine coverage (%)	70	83	77	80	84	84	85	87	82	82
Incidence of confirmed measles cases (per 100 000)	3.32	3.07	3.03	3.38	14.31	10.96	8.84	12.06	25.52	11.75

* National campaign year for measles mass vaccination

Analysis of this table shows that the incidence of confirmed measles cases declines in the years following the years of mass measles vaccination campaigns and then gradually resumes an upward trend.

Discussion

Individual characteristics: age, sex and immunization status

The confirmed cases of measles in our study had an average age of about 6 years with a sex ratio of 1.14; the majority of cases were less than 5 years old.

These findings reinforce the fact that measles is known as a childhood illness [16], thus contributing to an increase in the morbidity and mortality of children under five years of age [17]. Bamela made a similar observation in Togo in 2013 [18] with an average age of 7 ± 6.9 years. Also, measles infection arises as a result of the accumulation of susceptible individuals who escaped immunization before their first birthday.

The proportion of cases confirmed in our sample is lower than the rate found by Anindya and al [19] in Pune in India (50.34%). This difference could be explained by the weakness of his sample and by the fact that his case study took into account the cases actively sought in the community.

The sex ratio (M / F) found in our study is similar to that observed in Mayotte (1,1) [20], and in Togo 2) by Bamela in 2013 [18]. Indeed, measles is a viral infection that is transmitted from person to person without distinction of sex.

According to the vaccination status, the vast majority of the suspected cases reported were unvaccinated. Our results also highlighted the protective effect of vaccination on the occurrence of measles. Young unvaccinated children are the most exposed to the risk of measles and potentially fatal complications. All people who are not immunized (who have never been vaccinated or have never contracted the disease) are likely to be infected. Although a safe, highly effective and inexpensive vaccine exists, measles is estimated by the World Health Organization (WHO) to account for more than 30 million children worldwide and causes nearly 777,000 Deaths each year [16], of which more than half occur in Africa. This may be justified by HIV infection among mothers and by chronic malnutrition in children in poor areas [21].

Characteristics of time and place

Time

From 2005 to 2014 suspected cases of measles were reported and cases were confirmed each year with a gradual increase from 2005 to 2008 and from 2009 to 2012 to reach a peak in 2013 and a fall in 2014.

The relatively low level of measles cases observed since 2005 could be justified by the measles vaccination campaign carried out in 2004 throughout the country. The incidence of measles, which was 7.37 per 100 000 inhabitants in 2004 before the campaign, fell sharply in 2005 [22], and despite a gradual increase according to the years, only 2, 96 per 100,000 inhabitants in 2007 before experiencing a further increase in 2009.

This relative decline in the incidence of measles from 2005 to 2007 could no doubt be explained by the impact of the 2004 measles vaccination campaign [23].

The number of confirmed cases of measles rose from 8 in 2007 to 52 in 2008 and almost tripled in 2009. This resurgence of measles could be explained for the following reasons:

- The reduction in measles immunization coverage in Togo [24] with a high number of children who do not complete their vaccine series before the age of one year. This situation is often linked to factors such as geographical inaccessibility of certain localities, poor coverage of health services, high mobility of populations and resistance of some populations to vaccinating children.
- The restriction of the vaccine target in 2007 and 2010, which only covered children aged 9 months to 59 months, rather than extending to 14-year-olds as in 2001, 2004 and 2013.
- The gradual accumulation of susceptible children, children who have escaped immunization before their first birthday, reduces group immunity. Indeed, vaccine efficacy measured by epidemiological approaches is estimated in industrialized countries between 90 and 95% [25]. For measles, the level of immunization coverage required to reach the level of group immunity and eliminate the virus was estimated to be close to 96%. This estimate was based on data collected in England and Wales prior to the introduction of mass vaccinations, assuming that the proportion of susceptible individuals did not change over time and that the vaccine was effective to 100% [26]. With low immunization coverage at the national level, the level of group immunity is far from being reached, and this increases the number of susceptible subjects; thus the introduction of the virus gives rise to a resumption of transmission.

The decline in the number of confirmed cases of measles observed in 2014 is justified by the measles vaccination campaign of children aged 9 months to 9 years carried out in Togo in 2014. This fall is maintained and more straightforward in 2015 with a cumulative incidence which is from 11.75% to 4.65%.

It appears from the analysis of our database that there is a seasonality in the occurrence of measles cases in Togo. Indeed, it has been observed that the peaks of cases of measles appear between January and March of each year, period of the year corresponding to the dry season and in which harmattan wind blows. This is consistent with the seasonal character of measles in the literature [27; 28]. It is important that for the implementation of prevention strategies such as mass immunization campaigns, this aspect of seasonality be taken into account in order to immunize children before periods of peaks.

Place

All districts of the country reported measles cases over the 10 years of our analysis period but 2 districts (Akébou and Danyi) had no confirmed cases. The districts that have notified more than 30 confirmed measles cases over the 10 years are for the most part:

- On the one hand, districts in the northern region of the country where the average temperature is higher than the southern region and which is characterized by a long dry season, and the presence of the harmattan from December to March.
- On the other hand, districts in the southern region with a high population density.

Indeed, environmental factors are known to favor the occurrence of communicable diseases such as measles. These factors include difficult access to drinking water, promiscuity, poor housing and sanitation, malnutrition and climate change. [27]

For the 2 districts that had no confirmed case of measles during the 10 years, other than the assumption of a weakness of the surveillance system, in this case the low level of notification, one could mention the prevailing climate. In fact, they are mountainous areas of the Plateaux region characterized by a cool and humid microclimate throughout most of the year. This type of climate would not be conducive to the spread of the measles virus [29, 30].

Conclusion

Measles generally has a resurgence trend in Togo between 2005 and 2014. The results of our study show that measles has occurred with a gradually increasing incidence from 2005 to 2014. This infection evolves according to a seasonality and the majority of Case is in the under-5 group. As a result, new strategies should be considered to achieve the objectives of the WHO phase-out strategy.

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