Travel Medicine and Infectious Disease (2015) 13, 74–79

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevierhealth.com/journals/tmid

Secular trend and epidemiology of measles in the Kingdom of Saudi Arabia: 2009–2012

Ziad A. Memish [a,c,*], Elijah A. Bamgboye [a,b], Mutaz Mohammed [a], Rafat AlHakeem [a], Jaffar A. Al-Tawfiq [d,e], Abdullah Assiri [a]

[a] Public Health Directorate, Ministry of Health, Riyadh, Saudi Arabia
[b] Department of Medical Statistics and Epidemiology, University of Ibadan, Nigeria
[c] College of Medicine, Al-Faisal University, Riyadh, Saudi Arabia
[d] Johns Hopkins Aramco Healthcare, Dhahran, Saudi Arabia
[e] Indiana University School of Medicine, Indianapolis, IN, USA

Received 26 July 2014; received in revised form 20 November 2014; accepted 26 November 2014
Available online 4 December 2014

KEYWORDS
Measles;
Vaccination;
Incidence;
Elimination;
Saudi Arabia

Summary *Purpose:* To determine incidence of measles and progress towards its elimination in Saudi Arabia.
Methods: A retrospective analysis of routinely collected active and passive surveillance data on measles at the Ministry of Health, Saudi Arabia. All laboratory confirmed measles from (2009–2012) were analyzed to determine measles annual incidences and distribution by age, gender, nationality, seasonality, vaccination status and spatial distribution by region.
Results: Measles incidence per 1,000,000 populations increased from 3.2 in 2009 to a peak of 12.8in 2011 and a slight fall to 9.9 in 2012. About 50% of cases were in children under-five years, 12% were infants and 33% were 15 years and above. Of the total, 39%were unvaccinated and16% had unknown vaccination status. Fifty-five percent of infants were not due for vaccination. Of children <5 years, 42% received vaccination. Spatial distribution is not countrywide in each of the four years but seemed to concentrate in the central and South West regions with40% in Jizan and Jeddah.
Conclusion: High incidence of confirmed measles among unvaccinated infants requires strengthening of the immunization services. Improvement in measles case surveillance for completeness of vaccination status, vaccination of unvaccinated youths and comprehensive immunization are needed for measles elimination.

* Corresponding author. College of Medicine, AlFaisal University, Riyadh 11176, Saudi Arabia. Tel.: +966 1 2124052; fax: +966 1 2125052.
E-mail address: zmemish@yahoo.com (Z.A. Memish).

http://dx.doi.org/10.1016/j.tmaid.2014.11.009
1477-8939/

1. Introduction

The Kingdom of Saudi Arabia (KSA) is the largest Gulf country with an area of 1,960,582 million km^2 and an estimated total population in 2011 of28,376,355 (19,405,686 Saudis and 8,970,670 non- Saudis). The GDP per capita in KSA has been stable around 20,300 dollars over the years and about 7% of the annual budget of KSA has been allocated to the Ministry of Health [1]. Riyadh, the capital city, is the largest city with a population of 7.1 million, followed by Jeddah (3.9 million), Dammam-Khobar-Dhahran in the Eastern province (2.8 million), Makkah, (1.9 million), and Aseer (1.6 million) [1]. The country is divided into 13 administrative and 20 health regions. The health regions are further divided into health districts. For example Riyadh Health Region has 27 districts and seven sectors [1].

Measles, a highly contagious disease with a high morbidity and mortality impact on children was reported to affect more than 20 million people worldwide [2]. The Middle East countries including the WHO Eastern Mediterranean region (EMR) of which Saudi Arabia is part are not exempted from the scourge of this disease [3]. In 1997 the 22 member countries of the EMRO adopted a resolution to eliminate measles in the region by 2010 [3]. In spite of positive steps taken towards this elimination by member countries, the region including Saudi Arabia witnessed a pandemic of measles in 2006—2007 [4,5]. Subsequently, the WHO drew up an enhanced plan of action in 2006 towards elimination of measles by 2010 [6].

The Expanded Immunization Program (EPI)was started in Saudi Arabia in the 1970s. Vaccination of infants was reinforced in 1979 by a royal decree mandating that infants be fully vaccinated with BCG and 3 doses each of OPV and DPT vaccines before receiving a birth certificate. In 1983, measles vaccination was added as condition for obtaining a birth certificate. Reported immunization coverage for all EPI antigens increased from $<$50% in 1980 to $\geq$90% by 1993 and has been $\geq$95% since 2004. Vaccination services are provided at 2037 health centers throughout the country [7,8].

Monovalent measles containing vaccine (MCV) was introduced into Saudi Arabia in 1977 at 9 months of age, and in October, 1982, a royal decree made MCV vaccination at 9 months mandatory. In 1991, and in response to measles outbreaks affecting infants $<$1 year of age, a national two-dose schedule was introduced. The age of vaccination with the first dose of MCV (MCV1) was lowered to 6 months, and a second dose of MCV (MCV2), in the form of measles, mumps and rubella vaccine (MMR), was introduced at age 12 months [7].

In order to actualize the resolve of WHOEMR, to eliminate measles from the region by the end of 2015 special conduct of measles immunization campaigns was recommended in addition to routine immunization [6]. Accordingly, Saudi Arabia conducted two campaigns in 1998 and 2000, and achieved a reported coverage of 96% and 97%, respectively [9].

In 2002, a 3-dose schedule in which MCV1 vaccination was changed to 9 months, while the first dose of MMR remained at 12 months of age and a second dose of MMR was added at 4—6 years of age was implemented as part of the elimination strategy [6].

Following the 2007 nationwide measles outbreak, measles immunization campaign was conducted, targeting children 9 months-18 years, with a reported coverage of 98%. The policy of MMR2 was changed in 2008 to be given within the school setting [7].

However, a new vaccination policy has been followed since January 2013 that a third dose of MMR has been administered at the age of 18 months. A case based surveillance of laboratory confirmed measles was one of four-pronged approach to achieve elimination of measles by the year 2015 by EMRO countries and this has since commenced in Saudi Arabia for over ten years.

In the present study, we determined the incidence of confirmed measles and its descriptive epidemiology in terms based on the case surveillance data 2009—2012.

1.1. Methodology

The notification of infectious disease system is well established in KSA and all cases of infectious diseases are reported to the central registry at the Ministry of Health in Riyadh. A case surveillance system for measles was implemented to capture all new cases in KSA. The system makes it compulsory to immediately notify the health authority of suspected case of measles "Any fever rash illness" by e-mail, fax or phone. The clinical symptoms are confirmed with laboratory investigation that samples (nasopharyngeal swab and serum) for each case are collected and sent to the WHO Accredited National Lab to be simultaneously tested for measles and rubella culture and IgM. These notifications are forwarded to the Infectious Diseases Directorate in the office of the Deputy Minister for Preventive Medicine at the Ministry of Health in KSA. The identification of measles virus strain or genotype was started after the 2010 outbreak. As part of surveillance system, passive and active surveillance is performed, each health directorate should report 2 discarded cases for each 100,000 of population according to the WHO guidelines for measles elimination. Each administrative level has schedule for supportive supervision and active surveillance visit, a weekly report of these visits is send to measles surveillance national officer at ministry of health.

Data on cases of measles including outcome of laboratory investigations and epidemiologic links for the period 2009 to 2012were retrieved from this database and analyzed for person, place and time using SPSS software [10]. The incidence of measles was plotted by year and months to show seasonal and secular trend while a spatial distribution of cases was shown for the KSA.

2. Results

2.1. Incidence of confirmed measles

There were a total of 3118 suspected cases of measles reported in 2009—2012, all of them were tested for both measles and rubella. The study only recruited and analyzed the laboratory confirmed cases (1076 cases) which represents 34.5% of all the suspected cases The absolute number of confirmed measles increased from 83 in 2009 to 336 in 2010, 362 cases in 2011 and 295 cases in 2012. These