

Epidemiology of measles outbreaks in Qatar in 2007

M.G. Al-Kuwari,¹ Z.A. Nazzal¹ and A.A. Al Khenji¹

وبائيات فاشيات الحصبة في دولة قطر عام 2007

محمد غيث الكواري، زاهر أحمد نزال، عبد الحميد أحمد الخنجي

الخلاصة: بعد تحقيق انخفاض هائل في معدلات المراضة والوفيات الناجمة عن الحصبة في قطر منذ تبنت هذه الدولة برنامج التخلص من الحصبة في عام 1997، لم تشهد قطر سوى فاشيات صغيرة متكررة للحصبة. وتهدف هذه الدراسة إلى تحديد المميزات الديموغرافية والوبائية لحالات الحصبة التي أُبلغ عنها لبرنامج الترصد القطري عام 2007. وقد تبين أنه من بين 362 حالة مؤكدة من الحصبة، كانت 67.7% من الحالات في عمر 1-14 سنة، و16.9% في عمر أكبر من 15 سنة. كما تبين أن غالبية الحالات إما أنها لم تتلق اللقاح (35.9%) أو لم يُعرف أو لم يُوثق تلقيها للقاح (47.0%). وكانت النسبة العالية من الحالات من الباكستانيين (39.5%) يليهم القطريون (27.6%). وتركزت فاشيات الحصبة بين أطفال الوافدين من الأعراق الآسيوية الذين لا يُعرف شيء عن حالة تلقيحهم. وتُلقي هذه الدراسة الضوء على أهمية تحقيق مستويات عالية ومُتساوئة من التغطية باللقاحات في المجتمع.

ABSTRACT While a major reduction in morbidity and mortality from measles has been achieved in Qatar since it adopted the measles elimination programme in 1997, the country has experienced small, recurrent measles outbreaks. The aim of this study was to determine the demographical and epidemiological characteristics of measles cases reported to the surveillance programme in Qatar in 2007. Of 362 confirmed cases 67.7% were among children aged 1-14 years old and 16.9% were > 15 years. A majority of cases were unvaccinated (35.9%) or had unknown or undocumented vaccination status (47.0%). The high proportion of cases were among Pakistani nationals (39.5%) followed by Qataris (27.6%). Measles outbreaks were concentrated among the children of expatriates of Asian ethnicity with unknown vaccination status. This highlights the importance of achieving uniformly high levels of vaccination coverage in a community.

Épidémiologie des flambées de rougeole au Qatar en 2007

RÉSUMÉ Alors qu'une baisse importante de la morbidité et de la mortalité dues à la rougeole avait été obtenue au Qatar depuis l'adoption du programme d'élimination de la rougeole en 1997, le pays a connu des petites flambées récurrentes de rougeole. La présente étude visait à déterminer les caractéristiques démographiques et épidémiologiques des cas de rougeole rapportés dans le cadre du programme de surveillance au Qatar en 2007. Sur les 362 cas confirmés, 67,7 % concernaient des enfants âgés de 1 à 14 ans et 16,9 % avaient plus de 15 ans. La majorité des cas n'avait pas été vaccinée (35,9 %) ou leur statut vaccinal était inconnu ou non documenté (47,0 %). Les enfants de nationalité pakistanaise représentaient une forte proportion des cas (39,5 %), suivis par les enfants de nationalité qatarie (27,6 %). Les flambées de rougeole étaient concentrées chez des enfants d'expatriés appartenant au groupe ethnique asiatique et au statut vaccinal inconnu. Ces résultats soulignent l'importance d'atteindre des taux de couverture vaccinale élevés et uniformes dans une communauté.

¹Primary health care practice, Doha, Qatar (Correspondence to M.G. Al-Kuwari: drmgalkuwari@gmail.com).

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Introduction

Measles is a highly infectious vaccine-preventable disease caused by the measles virus and characterized by a high potential to produce outbreaks [1]. For a time it was one of the leading causes of childhood death, especially in developing countries [2]. It is estimated that before the implementation of measles elimination activities there were 100 000 deaths each year due to measles in the Eastern Mediterranean Region (EMR) [3].

Qatar has committed to the World Health Organization (WHO) regional initiative "eliminate measles virus transmission in EMR by 2010" using the following strategies: strengthening routine infant immunization, giving a second opportunity for measles immunization, and strengthening measles surveillance [3,4]. Children in Qatar are given the first dose of the measles/mumps/rubella (MMR) vaccine at 1 year of age and the second dose at 4–6 years of age. Failure to deliver at least 1 dose of measles vaccine to all infants remains the primary reason for the high rates of mortality and morbidity from measles in developing countries [5]. A significant reduction in the morbidity and mortality of measles in Qatar has been achieved since 1997 when the country adopted the measles elimination programme. Nevertheless, Qatar has experienced recurrent, small-scale measles outbreaks, increasing the incidence to about 400 cases/1 000 000 for the year 2007 [6].

An understanding of the basic epidemiology of measles is a prerequisite for effective control measures [7]. It is recommended by WHO to collect adequate surveillance data on measles cases and outbreaks and analyse these data to allow further evaluation of vaccination coverage as well as the implementation of the appropriate preventive measures needed to control and prevent measles [8]. The aim of this study therefore was to determine

the demographic and epidemiological characteristics of measles cases in Qatar in 2007 in order to inform public health strategies to improve measles control in the country.

Methods

This study was conducted in the Gulf country of Qatar (estimated population > 1 500 000 in 2008). A retrospective review of records of measles notification forms available within the national epidemiological surveillance system was carried out from 1 January to 31 December 2007. Data were collected on all measles cases reported to the measles surveillance system of the public health department of the National Health Authority in Qatar during the year 2007.

All 362 cases notified by the attending physicians during this period were included in the study. Information was collected using a specially designed checklist that included: patient's demographic data (age, sex, nationality), MMR vaccination status, place of reporting and time of reporting the case by month, and laboratory data.

The clinical case definition used was as following: a patient displaying maculopapular rash, fever $\geq 38.3^{\circ}\text{C}$ and

cough, coryza or conjunctivitis. Cases were classified as clinical (if they fulfilled the clinical definition), confirmed (if measles-specific IgM antibodies were present in a blood sample collected within 3–28 days of the onset of rash) or as epidemiologically linked (if the suspected case had been in contact with a confirmed case within the incubation period).

The data were analysed using SPSS, version 11.0. Descriptive statistics and the chi-squared test were used for analysis.

Results

In 2007, 362 cases of measles were notified from all the health care sectors in Qatar. The peak of the outbreaks was in late spring and early summer, with 207 cases (57.2%) reported during May and June (Figure 1).

Diagnosis of measles was laboratory confirmed in 124 (34.3%) cases, while 13 (3.6%) cases were classified as epidemiologically linked and 224 (61.9%) were clinically confirmed cases.

Table 1 shows the demographic characteristics of the reported measles cases; 192 cases (53.0%) were among males. In term of age, the median age was 5 years (range, 2 months to 52 years).

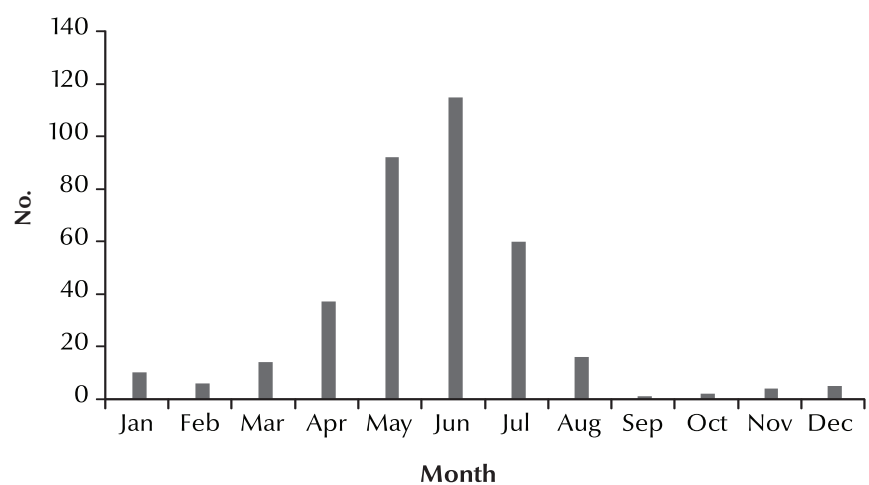


Figure 1 Monthly frequency of reported measles cases in Qatar, 2007

Table 1 Characteristics of the reported measles cases in Qatar, 2007 (n = 362)

Variable	No.	%
Age group (years)		
< 1	56	17.1
1–4	121	33.4
5–14	124	34.4
>15	61	16.9
Sex		
Male	192	53.0
Female	170	47.0
Nationality		
Qatari	100	27.6
Pakistani	143	39.5
Indian	30	8.3
Other	68	18.8
District		
Doha	222	61.3
Al Rayyan	110	29.0
Wakra	18	5.0
Al Khor	12	3.3

The highest proportion of the measles cases was in the age group 5–14 years (34.3%), followed by ages 1–4 years (33.4%); altogether the 1–14 years age group formed 67.7% of cases.

On reviewing the vaccination status, it was found that 130 (35.9%)

cases were unvaccinated, 62 (17.1%) were vaccinated and 170 (47.0%) cases were of unknown vaccination status.

Analysis of nationality showed that 72.4% were expatriates, with the highest proportion of cases (39.5%) among

Pakistani nationals, while Qatari nationals represented 27.6% of cases.

The highest proportion of unvaccinated case was among Pakistani nationals (43.4%) compared with 35.0% and 26.7% among Qataris and Indians respectively (Table 2). However, this difference between nationalities was not statistically significant ($\chi^2 = 7.408$, $df = 6$, $P = 0.285$). Regarding the age group, the great majority of unvaccinated cases (94.6%) were among children < 1 years, compared with 13.1% among cases > 15 years old. This relation between vaccination status and age group was statistically significant ($\chi^2 = 1.207$, $df = 6$, $P < 0.001$).

Discussion

The recurrence of small-scale outbreaks of measles in Qatar is evidence that the potential for local outbreaks is still present despite the increased rate of MMR vaccination coverage for the 1st dose and improved measles surveillance in recent years. This study provides details of the epidemiological characteristics of measles cases re-

Table 2 Distribution of vaccination status of reported measles cases in Qatar by nationality and age (n = 362)

Variable	Total No.	Vaccination status					
		Vaccinated		Unvaccinated		Unknown	
		No.	%	No.	%	No.	%
Nationality							
Qatari	100	18	18.0	35	35.0	47	47.0
Pakistani	143	23	16.1	62	43.4	58	40.6
Indian	30	5	16.5	8	26.7	17	56.7
Other	89	16	18.0	25	28.1	48	53.4
$\chi^2 = 7.408$, $df = 6$, $P = 0.285$							
Age group (years)							
< 1	56	2	3.6	53	94.6	1	1.8
1–4	121	28	23.1	32	26.4	61	50.4
5–14	124	28	22.6	37	29.8	59	47.6
>15	61	4	6.6	8	13.1	49	80.3
$\chi^2 = 1.207$, $df = 6$, $P < 0.001$							

df = degrees of freedom.

ported to the public health department in Qatar in 2007.

The peak season for occurrence of measles outbreaks was late spring, April to June. Such a seasonal trend which peaks in late spring and early summer has been reported in another study, in Taiwan [9].

The median age of the cases in our study was 5 years, which is similar to studies conducted in Oman and The Netherlands [10,11]. However, it was younger than found in studies in Saudi Arabia [12] and Oceania [13]. The current study revealed that children aged 1–4 and 5–14 years were more affected than infants < 1 year old. This is consistent with the natural history of measles, as infants are protected by their maternal antibodies [14].

In relation to vaccination status, our study revealed that 17.0% of cases were known to have been vaccinated with MMR and the majority were either unvaccinated or of unknown vaccination status. The proportion of measles cases who had received MMR is low compared with other studies in the region. Studies conducted in Oman, Saudi Arabia, and the Islamic Republic of Iran showed vaccination rates of measles cases of 50%, 62% and 46.5% respectively [11,12,15]. Studies from The Netherlands and Germany showed that only 5%–6% of measles cases were vaccinated [10,16]. The high rate of unvaccinated children aged < 1 year is due to the fact that the MMR 1st dose is usually given at the 1st birthday.

In agreement with the epidemiological features of measles in other neighbouring countries such as Oman and Saudi Arabia [11,12], more measles cases in Qatar were reported among children of expatriates (about two-thirds of cases) than among Qatari nationals. Almost 40% of all measles cases were among children of Pakistani nationality, the majority of whom had not received a single dose of MMR (43.4% were unvaccinated). This can be explained by the low socioeconomic status of this community in Qatar, which is likely to be linked to poor health awareness.

The number of MMR doses among those who were vaccinated could not be determined from the data of the surveillance system and as it is known that measles vaccine is highly effective, reaching more than 98% efficacy if given in 2 doses particularly if given at preschool age [14]. The occurrence of outbreaks from time to time can be attributed to an accumulation of susceptible people over time (those who are unvaccinated and those who received only 1 MMR dose), especially among those who received 1 dose, where the effectiveness of the vaccine reaches only 90% [14].

The occurrence of measles among those who are immunized with 2 MMR doses raises doubts about the effectiveness of the MMR vaccine in Qatar and points to the possible use of out-of-date vaccine or poor storage and handling of vaccines. Such failure in vaccination has been reported in some Eastern

European countries. For example, in Poland and the Ukraine 41% and 36% of reported measles cases had received 2 MMR doses. There are also concerns about the reliability of the immunization registration and this needs to be investigated with an evaluation of the reporting system used by the communicable disease control unit in Qatar. Despite these hypotheses, the occurrence of measles outbreaks from time to time in some developed countries with > 90% coverage is considered a normal phenomenon [17].

In conclusion, our study showed that the age group most affected with measles in Qatar was 1–14 years, and most of cases were unvaccinated or had unknown vaccination status. To prevent future outbreaks of measles, measles control and vaccination awareness should be continued and improved at all levels. “Catch-up” mass vaccination campaigns should be conducted to interrupt chains of transmission. In addition, surveillance enhancement and maintaining high coverage of the 2nd dose of MMR is critical to control measles outbreaks in Qatar, especially among the children of the expatriate Asian community. Apart from this, the large proportion of cases of unknown vaccination status highlights the importance of improving the quality of the vaccination registry and improving the data collected during the investigation of future measles outbreaks.

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Measles incidence for 2009 and 2010 in countries of the Eastern Mediterranean Region of WHO
(Source: http://www.emro.who.int/vpi/measles/media/pdf/MeaslesBulletin_December10.pdf)

Country	Measles incidence (cases/million population)		Country	Measles incidence (cases/million population)	
	2009	2010		2009	2010
Afghanistan	109.34	76.9	Oman	5.67	0.9
Bahrain	2.71	0.0	Pakistan	2.59	5.7
Djibouti	24.45	0.0	Palestine	1.27	0.0
Iran (IR)	3.95	7.6	Qatar	26.24	59.8
Iraq	910.17	8.8	Saudi Arabia	3.15	15.8
Jordan	0.00	0.0	Somalia	161.14	66.6
Egypt	3.31	0.2	Sudan	1.74	15.2
Kuwait	35.44	10.4	Syrian Arab Republic	1.79	0.4
Lebanon	7.64	4.9	Tunisia	0.19	0.0
Libyan Arab Jamahiriya	58.72	9.6	United Arab Emirates	17.63	16.2
Morocco	18.79	16.1	Yemen	5.51	15.5