Measles Outbreak in Iraq, 2003-2004.

Saad El-Din H Ali [1] MBChB. Tariq Al-Hadithi [1] MBChB, DTM&H, MSc, PhD.
Ahmed S Al-Naaimi [1] MBChB, MSc. Jawad Al-Diwan [2] MBChB, MSc.
Sabah Mehdy [3] MBChB, MSc.

Abstract

Background: Measles is one of the important childhood diseases that carries high morbidity and mortality.

Objectives: The present study was designed to verify and describe the occurrence of an outbreak in Iraq and assess the vaccination status of measles cases.

Methods: Data were collected from the monthly reports of the General Health Directorates of the governorates to the Communicable Disease Control (CDC) center in Baghdad for the years 2003-2004. An epidemic was verified when the calculated monthly rate (in a specific time and place) exceeds the median endemic rate for Iraq over the 5 years period preceding the epidemic (1998-2002).

Results: A total of 9017 measles cases were reported to the CDC in Baghdad for the years 2003-2004. The monthly rates were above the median endemic rate (0.25 / 100,000 population), ranging between 1.11 and 9.31 / 100,000 during the period December, 2003 and September, 2004. Variations in the occurrence rate, start and duration of the outbreaks between governorates was noticed. The majority of cases (83.6%) were reported in winter and spring (December–May). Unvaccinated individuals constituted about two thirds of cases.

Conclusion: Interruption and deterioration of health services that accompanied and followed the gulf wars in 1991 and 2003 have lead to dramatic upsurge in infectious diseases, especially vaccine preventable diseases. Strengthening of immunization programs directed towards measles is an important tool in preventing a future outbreak.

Key words: Measles, Iraq, outbreak, vaccination.

Introduction

Measles is one of the important childhood diseases that carries high morbidity and mortality. The disease continues to be a problem of great concern, in spite of all efforts to prevent it by following the expanded program of Immunization (EPI)[1]. Worldwide, measles vaccination has been very effective, preventing an estimated 80 million cases and 4.5 million deaths annually. Nevertheless, because vaccination coverage is not uniformly high, measles still causes approximately 30 million cases and 888,000 deaths each year. Measles vaccination has changed the epidemic pattern from roughly biennial cycle to irregular consequences of outbreaks[2-5].

The present study was designed to verify the occurrence of an outbreak of measles and to find out where and when the outbreak occurred in the country and to assess the vaccination status of measles cases.

Materials and Methods

Data collection: Data were collected from the monthly reports of the General Health Directorates of the governorates to the CDC in Baghdad for the years 2003-2004. Data were not available for Irbil, Duhok and Sulaimaiyah Governorates. The data collected included counts of measles cases, residency and vaccination status (number of vaccine doses received by the vaccinee).

Confirmation of the existence of epidemic was done by calculating the monthly median endemic rate all over Iraq for the 5 years period preceding the epidemic (1998-2002) according to the recommendations of CDC, Baghdad. An epidemic was verified when the calculated monthly rate (in a specific time and place) exceeds the median endemic rate.

Statistical analysis:

Data were translated into a computerized database structure. Statistical analyses were done using SPSS version 13 computer software. Counts or reported cases were converted into rates per 100,000 population using the census estimates of corresponding years obtained from the Ministry of Planning.

Results:

A total of 9017 measles cases were reported to the CDC in Baghdad for the years 2003-2004. The majority of cases (95%) were reported in 2004. The highest proportion of cases (92%) were reported in southern governorates. The rates of measles cases during the period January-November, 2003 ranged between 0.00 and 0.21 / 100,000 population, which are lower than the median endemic rate for the period 1998-2002 (0.25 / 100,000 population). The rates were above the median endemic rate, ranging between 1.11 and 9.31 / 100,000 during the period December, 2003 and September, 2004. From this point onward the rates became lower than the median endemic rate in October, 2004 (Figure 1).

The occurrence of outbreak at the governorates level for the years 2003-2004 is shown in Table 1. Variations in the occurrence rate, start and duration of the outbreaks between governorates was noticed. The earliest outbreak appeared in Thi Qar in July 2003 to be followed by other governorates, with occasional reporting of rates higher than the median endemic rate in At Tamim and An Najaf governorates as early as May and March 2003, respectively. The outbreaks extended till December 2004 in kerbala, Al Qadisiyah, Al Muthana and Maysan to disappear completely from the country in January 2005.

Figure 2, shows that 83.6% of cases were reported in winter and spring (December – May), while only 16.4% of them were reported in summer and autumn (January-November). Unvaccinated individuals constituted 68.4% of the total cases, 26.5% had received one dose of the vaccine, while those who received a full course of measles vaccine (2 or more doses) constituted 5.1% only of the total measles cases, Table 2.

Discussion:

The present study demonstrates the occurrence of measles outbreak all over Iraq, during the period December 2003 and September 2004 with variations in the occurrence rate, start and duration of the outbreak at governorates level. The first appearance of the outbreak was in Dhi Qar, starting at July 2003 and then spread to other southern and middle governorates.

The outbreak may be attributed to accumulation of susceptible individuals resulting from unvaccination or incomplete vaccination.

Some of the susceptible individuals were probably outside the target age group for vaccination when the measles vaccine was introduced, other susceptible individuals might have resulted from vaccine failure associated with improper vaccination or bad preservation or storage of the vaccine in transportation or vaccine setting resulting in a break in the cold chain.

The present study showed that 68.4% and 26.5% of reported cases were either unvaccinated or incompletely vaccinated, respectively. Several workers have showed that measles cases were reported in communities with low vaccine coverage[6-8].

Many reports stressed on the deterioration in vaccine coverage in Iraq associated with gulf wars[9-14]. The national immunization programme was completely halted in 1991[9]. In 1992, a measles epidemic spread through out the country[15, 16]. An outbreak was also reported in 1998[17].

Already in 1927, Kermack and Mckendrick predicted that there should be a critical threshold level for the fraction of susceptible individuals, below which the introduction of infection could only lead to minor outbreaks.

When the fraction of susceptible individuals exceeds the threshold level, chance events determine whether a minor or major outbreak will occur.

The probability that an outbreak will be a major one increases with fraction of susceptible individuals in excess of the threshold[18-20].

This measles outbreak disappeared completely from all governorates of Iraq in January 2005. This may be attributed to depletion of susceptibles or to the effect of mass immunization campaigns, together with routine immunization implemented by the health authorities.

The major part of this outbreak of measles manifested itself in the southern governorates of the country, a finding which could be attributed to heterogeneous distribution of susceptible individuals. A heterogeneous distribution of malnutrition and infant mortality rates was already demonstrated[5, 21-24]. Southern governorates had a five year old mortality estimated to be 34% higher than the level in Baghdad[25, 26].

A high proportion of reported cases were in winter and spring constituting 83.6%. This might be attributed to people overcrowding indoor, which gives the short lived virus a better chance to spread than when they remain outdoor on summer evenings[27]. This is in agreement with previous study in Iraq[15].

Interruption and deterioration of health services have accompanied and followed the gulf wars in 1991 and 2003. Breaks in the cold chain due to interruption of electrical power supply and difficulties in transportation and shortage of vaccines in addition to malnutrition and poor water supply and sanitation were other consequences of these wars[9-14]. All these factors have lead to dramatic upsurge in infectious diseases, specially vaccine preventable diseases.

Although the image that has been perpetuating in the western world is that the last gulf war was "clean" and fought with "surgical precision" in a manner that minimize civilian causalities in virtually all sectors of society, the impact of these events is incalculable and health services are barely functioning.

Strengthening of immunization programs including mass immunization campaigns, directed towards measles is an important tool in preventing a future outbreak.

References

1. CDC update: Global measles control and mortality reduction worldwide 1991-2001. Morb Mort Wkly Rep, 2003, 471-475.
2. WHO. Vaccine – preventable diseases: monitoring system. 2003 global summary. WHO/V&B/03.20.
3. Kapp C. WHO and UNICEF report good news on measles. Lancet, 2004; 363: 1531.
4. Rohani P, Earn DJD, Grenfell BT. Opposite pattern of synchrony in sympatric disease metapopulation. Science, 1999; 28: 968-971.
5. Jansen VA, Stollenwerk N, Jensen HJ, et al. Measles outbreak in a population with declining vaccine uptake. Science, 2003; 301: 804.
6. Van den Hof S, Meffre CMA, Conyn-Von Spaendouk M, et al. Measles outbreak in a community with very low vaccine coverage, the Netherlands. Emerg Infect Dis, 2001; 7 (supp 3): 593-597.
7. Centers for Disease Control and Prevention. Measles outbreak-Netherlands, April 1999-January 2000. Morb Mort Wkly Rep, 2000; 49: 299-303.

8. Feikin DR, Lezotte DC, Hamman RF, et al. Individual and community risk of measles and pertusis associated with personal exemptions of immunization. JAMA, 2000; 284: 3145-3150.
9. Al-Nouri, Al-Rahim Q. The effect of sanctions on children of Iraq. Arch Dis Child, 2003; 88: 92.
10. Niazi A, Al-Kubaisi W. The humanitarian and health impact of war and embargo on Iraq. Iraqi Med J, 1998; 47: 1-4.
11. UNICEF-Iraq. The situation of children in Iraq. An assessment based on United Nations convention on rights of children. Geneva, 2002.
12. Gathergood K, Rolstone D. Helping children in Iraq. Lancet, 2000; 256: 78.
13. Court C. Iraq sanctions lead to half million-child death. Br Med J, 1995; 311: 1523.
14. Al-Alwan A. Health in Iraq. A draft prepared as discussion paper for the First National Conference on Health. Ministry of Health. August 2004.
15. Muhieldeen HAH. Epidemiological study of cases of measles admitted to Ibn Al-Khateeb hospital from August 1991 to July 1992. MSc thesis, College of Medicine, Baghdad University, 1992.
16. Hoskins E. Public Health and Persian Gulf War. In: Levy E, Sidel V. War and Public Health. Washington DC, American Public Health Association, 2000: pp 254-278.
17. Lafta RK. Vaccination and measles epidemic in Iraq, 1998. Iraqi J Comm Med, 2000; 16:46-48.
18. Kermack WO, McKendrick AG. Contribution to Mathematical theory of epidemics. 1927. Bull Math Biol, 1991; 53: 33-55.
19. Daley DJ, Gani J. Epidemic modeling: An introduction. Cambridge, Cambridge University Press, 1999: p 213.
20. Fine P. Herd immunity: history, theory, practice. Epidemiol Review, 1993; 15: 265-302.
21. Shawky S. Infant mortality in Arab countries: sociodemographic, perinatal and economic factors. E M H J, 2001; 7: 956-965.
22. Ascheron A, Chase R, Cote T, et al. Effect of gulf war on infant and child mortality in Iraq. N Eng J Med, 1992; 327: 931-936.
23. Bierman A. The gulf war and infant and child mortality in Iraq. N Eng J Med, 1993; 328: 1358.
24. Ali M, Shah IH. Sanctions and childhood mortality in Iraq. Lancet, 2000; 325: 1851-1857.
25. Garfield R, Leu C. A multivariate method for estimating mortality rate among children under five years from health and social indicators in Iraq. Int J Epidemiol, 2000; 29: 510-515.
26. Garfield R. Morbidity and mortality among Iraqi children from 1990 through 1998: assessing the impact of Gulf war and economic sanctions. Ann Int Med, 2000; 133: 310-311.
27. Christie AB. Measles. In: Infectious Diseases: Epidemiology and Clinical Practice. 4th edition, New York, Churchill Livingstone, 1987, pp 451-571.

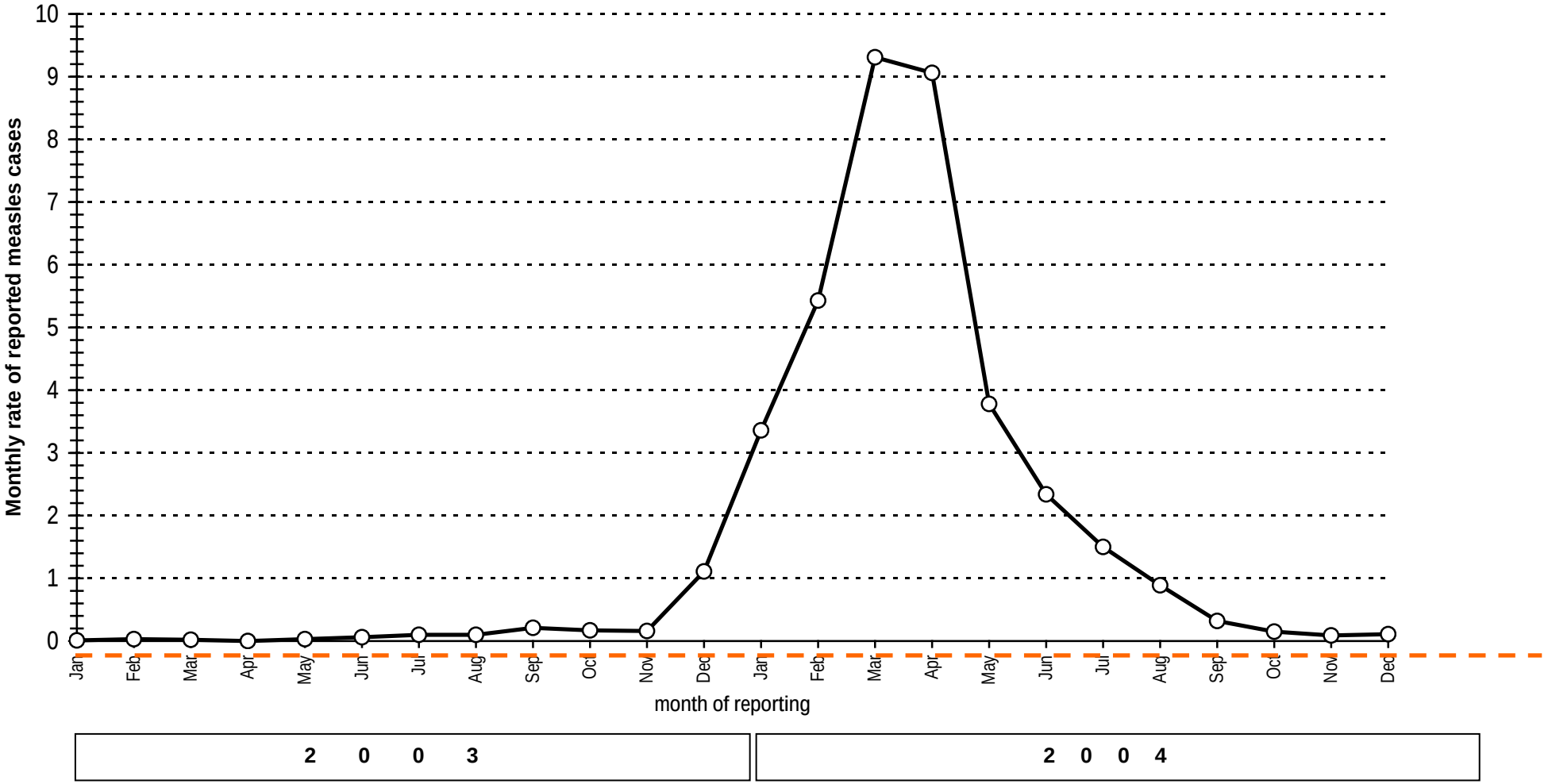

Figure 1: Line graph showing the monthly rate of reported measles cases per 100,000 of total Iraqi population for the period 2003-2004.

Table 1: The monthly rate of reported measles cases per 100,000 population at governorate level for the period 2003-2004

	2003												2004											
Governorate	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Ninawa	0.04	0.00	0.00	0.00	0.00	0.04	0.00	0.04	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.35	0.35	0.43	0.31	0.12	0.00	0.04
At Ta'mim	0.12	0.24	0.36	0.00	0.00	0.24	0.12	0.60	0.12	0.60	0.00	0.12	0.00	0.35	0.58	1.50	0.23	0.12	0.12	0.23	0.12	0.12	0.12	0.00
Salah ad Din	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.09	0.00	1.08	1.53	1.44	0.63	1.17	0.45	0.00	0.00	0.00	0.36	0.00
Diyala	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.14	0.21	0.14	1.84	1.06	1.06	1.48	0.71	0.42	0.00	0.00
Baghdad	0.02	0.03	0.00	0.00	0.00	0.00	0.03	0.05	0.03	0.03	0.03	0.08	0.02	0.50	1.03	1.06	1.02	0.96	0.74	0.24	0.05	0.02	0.02	0.08
Al Anbar	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.15	0.08	0.61	0.76	0.83	0.61	0.23	0.00	0.00	0.00
Babil	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.07	0.00	0.47	1.68	1.41	1.88	1.14	1.81	1.68	0.20	0.13	0.27	0.00
Wasit	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.03	8.66	21.95	24.11	10.82	10.61	6.18	5.67	2.89	0.62	0.31	0.00
Karbala'	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.00	0.13	0.26	0.13	0.00	1.03	6.16	12.07	7.70	3.21	2.95	1.93	1.28	0.39	0.26	0.26	0.90
An Najaf	0.00	0.11	0.00	0.00	0.63	0.42	0.21	0.00	0.00	0.32	0.00	0.00	0.82	2.05	7.59	10.98	2.26	0.62	0.51	0.41	0.00	0.00	0.21	0.00
Al Qadisiyah	0.00	0.00	0.00	0.00	0.00	0.23	0.11	0.00	0.11	0.45	0.11	0.11	3.61	6.79	23.10	17.95	8.54	3.61	1.86	0.77	0.66	0.44	0.11	0.33
Al Muthanna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19	0.00	2.05	32.04	70.77	56.11	69.86	28.78	12.49	8.14	1.99	0.72	0.00	0.00	0.36
Dhi Qar	0.00	0.00	0.07	0.00	0.07	0.00	0.77	0.77	1.89	1.33	1.61	5.40	21.90	21.15	15.23	15.17	5.44	2.86	1.77	0.68	0.27	0.27	0.07	0.00
Maysan	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.00	0.13	0.00	0.00	0.00	0.78	7.57	14.10	2.09	6.79	4.83	1.70	0.26	0.13	0.00	0.78
Al Basrah	0.00	0.00	0.00	0.00	0.00	0.23	0.11	0.11	0.80	0.17	0.45	8.86	12.79	16.37	49.05	40.18	14.66	5.24	1.76	0.88	0.00	0.33	0.17	0.17
Total	0.01	0.03	0.02	0.00	0.03	0.06	0.10	0.10	0.21	0.17	0.16	1.11	3.36	5.43	9.31	9.06	3.78	2.34	1.50	0.89	0.32	0.15	0.09	0.11

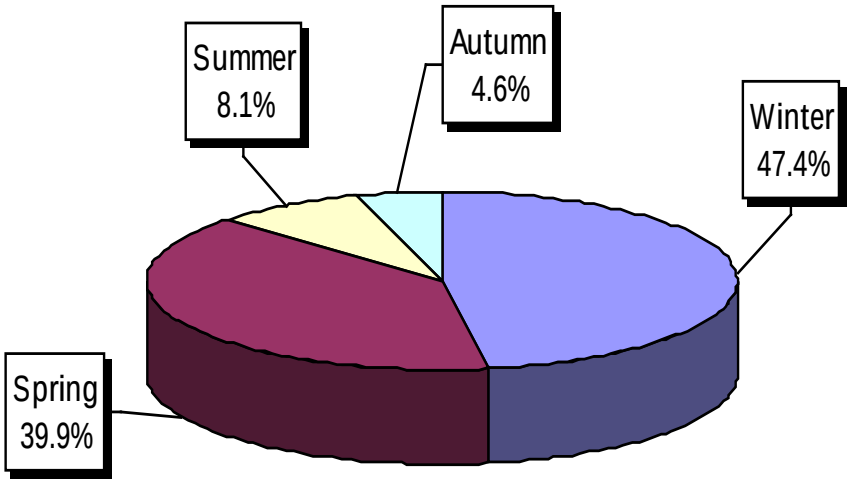

Figure 2: Pie chart showing the frequency distribution of reported measles cases by season.

Table 2: Vaccination status of reported measles cases.

No. of vaccination Doses	N	%
Unvaccinated	6170	68.4
Incomplete course (Only one dose)	2388	26.5
Full course (2+)*	460	5.1
Total (Iraq)	**9017**	**100**

*Note: The full course vaccination policy was implemented in Iraq by the year 2004.

الخلاصة

الخلفية: .تبقى الحصبة من الأمراض المهمة التي تصيب الأطفال كونها تتسبب بنسب عاليه من المراضة و الوفيات. صممت الدراسة الحالية للتحقق من حصول فاشية للحصبة في العراق ووصفها، بالأضافة الى دراسة حالة التلقيح لحالات الحصبة.

طرق العمل:.تم جمع البيانات من التقارير الشهرية الوارده من مديريات الصحة في مراكز المحافظات الى مركز السيطرة على الأمراض الأنتقاليه في بغداد للسنتين 2003–2004. تم التحقق من حصول الفاشية عند تجاوز المعدل الشهري للأصابات (المحدد بزمان و مكان معين) لمؤشر "وسيط المعدل المتوطن" للأعوام الخمسة التي سبقت فترة الدراسة (1998–2002).

النتائج:.تم تسجيل 9017 حالة حصبة في مركز السيطرة على الأمراض الأنتقاليه في بغدادللفترة 2003–2004. كان المعدل الشهري للأصابات خلال الفترة من كانون الأول 2003 الىأيلول 2004 أعلى من "وسيط المعدل المتوطن" (المساوي الى 0.25 /100,000من السكان). لوحظت اختلافات بين المحافظات في معدل الأصابات، توقيت الشروع ومدة الدوام للفاشية. غالبية الأصابات (83.6%) سجلت في فصل الشتاء و الربيع (كانون الأول الى مايس). كان حوالي ثلثي الأصابات من غير الملقحين.

الأستنتاج:.أدى انقطاع و تردي الخدمات الصحية الذي صاحب حربا الخليج لسنة 1991 و 2003 الى ارتفاع مفاجيء و ملحوض في الأمراض المعدية وبالأخص تلك التي يمكن الوقاية منها بواسطة التلقيح.تقويةبرامج التلقيح الخاصة بالحصبة يمكن أن يكون أداة مهمة في منع حصول فاشية حصبه مستقبلاً

الكلمات المفتاحية: الحصبة، العراق، الفاشية، التلقيح.