

# Immunization coverage among children born between 1989 and 1994 in Saladdin Governorate, Iraq

O.G. Al-Sheikh,<sup>1</sup> J.I. Al-Samarrai,<sup>1</sup> M.M. Al-Sumaidaie,<sup>1</sup> S.A. Mohammad<sup>1</sup> and A.A. Al-Dujaily<sup>1</sup>

التغطية بالتطعيم للأطفال المولودين بين سنتي 1989 و 1994 في محافظة صلاح الدين، بالعراق  
عمر غانم الشيخ وجميل إبراهيم السامرائي ومزاحم محيي الدين الصميدعي وشيما عبد الله محمد وعباس علي الدجيلي

**خلاصة:** قمنا بتقدير معدلات التغطية بالتطعيم بين الأطفال المولودين بين سنة 1989 وسنة 1994 (في السنتين الأوليين من العمر) وحاولنا التعرف على أسباب عدم إكمال التطعيمات. ومن بين 662 طفلاً تم استقصاؤهم، كان هناك 326 طفلاً حضرياً من مدينة تكريت و336 طفلاً من ثلاث قرى ريفية. وتبين أن معدلات التغطية بلقاح بي سي جي، والجرعة الأولى من اللقاح الثلاثي واللقاح الفموي ضد شلل الأطفال، ثم الجرعة الثانية فالجرعة الثالثة من نفس التلقيح، ولقاح الحصبة، ولقاح النكاف والسحائي والحصبة الألمانية، واللقاح الثلاثي ولقاح شلل الأطفال (الجرعة التعزيزية الأولى) كانت 97%، 97%، 94%، 92%، 83%، 70% و59% على التوالي في مدينة تكريت. أما في المناطق الريفية فقد كانت المعدلات 92%، 65%، 57%، 41%، 42%، 32% و25% على التوالي. وكانت أكثر الأسباب شيوعاً لعدم إكمال التطعيمات هي عدم المعرفة بوجودها والجهل بها في كل من المناطق الحضرية (42%) والريفية (49%). أما النسبة المئوية للأطفال ذوي التطعيمات الكاملة فقد انخفضت بين سنة 1989 وسنة 1994 في المناطق الحضرية والريفية على السواء.

**ABSTRACT** We assessed vaccination coverage rates among children born between 1989 and 1994 (0-2 years of age) and tried to find the underlying causes of incomplete immunization. Of 662 children surveyed, 326 were from Tikrit city (urban) and 336 were from three rural villages. The coverage rates for BCG, DPT-OPV (first dose), DPT-OPV (second dose), DPT-OPV (third dose), measles, MMR, and DPT-OPV (first booster) were 97%, 97%, 94%, 92%, 83%, 70% and 59% respectively in Tikrit city; in rural areas they were 92%, 65%, 57%, 41%, 42%, 32%, and 25% respectively. The most common causes of incomplete immunization were unawareness and ignorance for both urban and rural areas. The percentage of children completely immunized declined between 1989 and 1994, both in urban and rural areas.

**Couverture vaccinale des enfants nés entre 1989 et 1994 dans le Gouvernorat de Saladdin en Iraq**  
**RESUME** Nous avons évalué les taux de couverture vaccinale chez les enfants nés entre 1989 et 1994 (âgés de 0 à 2 ans) et cherché à identifier les causes sous-jacentes de vaccination incomplète. Sur les 662 enfants sur lesquels portait l'enquête, 326 venaient de la ville de Tikrit (milieu urbain) et 336 venaient de trois villages (milieu rural). Les taux de couverture pour le BCG, le DTC-Polio (première dose), le DTC-Polio (deuxième dose), le DTC-Polio (troisième dose), le vaccin antirougeoleux, le ROR et le DTC-Polio (premier rappel) étaient respectivement de 97%, 97%, 94%, 92%, 83%, 70% et 59% dans la ville de Tikrit; dans les zones rurales, ils étaient de 92%, 65%, 57%, 41%, 42%, 32% et 25% respectivement. Les causes les plus courantes de vaccination incomplète étaient la méconnaissance et l'ignorance aussi bien pour les zones urbaines que pour les zones rurales. Le pourcentage d'enfants complètement vaccinés a diminué entre 1989 et 1994 dans les zones urbaines comme dans les zones rurales.

<sup>1</sup>Department of Community Medicine, Tikrit University College of Medicine, Tikrit, Iraq.

Received: 15/01/98; accepted: 17/09/98

## Introduction

It is the right of every child to be immunized and the duty of every parent to ensure this. Measles, tuberculosis, pertussis, diphtheria, poliomyelitis, mumps, tetanus and rubella can be prevented by immunization. The World Health Organization (WHO) aims to eradicate these diseases worldwide and recommends the implementation of the Expanded Programme on Immunization (EPI) to all developing countries [1].

Four of the ten mid-decade goals endorsed at the World Summit for Children in 1990 were related to immunization. It is estimated that vaccination against measles, neonatal tetanus and pertussis currently prevents 3 million deaths per year [2]. A number of developing countries were hopeful of achieving these mid-decade goals by 1995. Of the 66 nations that achieved the target of 80% immunization by the end of 1990, immunization coverage has increased in 30%, remained stable in 50% and declined in 20% [2].

By 1993 most countries in the WHO Eastern Mediterranean Region (EMR) were successfully immunizing most children with bacille Calmette Guérin (BCG), diphtheria, pertussis, tetanus (DPT) (three doses), oral poliomyelitis vaccine (OPV) (three doses) and measles by the end of the first year of age [3].

In Iraq, EPI started in 1985 and reported EPI coverage in 1990 was 90%, but unfortunately the programme suffered a set back in 1991. In 1992 the EPI campaign was launched to boost coverage and the baseline of 1992 was used to determine the 1995 target [4].

The vaccination schedule adopted by Iraq is:

- BCG in the 1st week of life
- DPT and OPV, first dose at 2 months of age

- DPT and OPV, second dose at 4 months of age
- DPT and OPV, third dose at 6 months of age
- Measles at 9 months of age
- Measles, mumps and rubella (MMR) at 15 months of age
- DPT and OPV, first booster 1 year after last dose [5].

Emphasis is placed on the need for further health education about the importance of completing the full series of recommended vaccinations, of having vaccinations on time, of checking a child's vaccination history whenever they are in contact with the health care system and, where necessary, administering over-due immunizations [6].

The aim of this study was to calculate the immunization coverage rate for children 0-2 years of age born from 1989 to 1994 in Saladdin Governorate. The causes of incomplete immunization were also studied.

## Subjects and methods

A cross-sectional study was conducted to calculate the coverage rate for children aged 0-2 years from 1989 to 1994 in comparison with the recommended immunization schedule for their age.

The data were collected from Tikrit city and three villages (Dijla, Al-Gezeira and Jwaizrat) in Saladdin Governorate. A random sample was taken from each area. The total number of families surveyed was 341 (186 from Tikrit and 155 from the three villages) and the total number of children surveyed was 662 (326 from Tikrit and 336 from the three villages).

A questionnaire was designed to access information kept by families on their chil-

dren's health histories using community-based visits. Variables included were name, birth date, sex, vaccines received to date and the causes behind any partially immunized or unimmunized children. The educational level of both parents was also included.

A pretest was carried out on nine families and three variables were amended. The amended variables were: the income of the family was excluded because of difficulty in obtaining it; hepatitis B vaccine was excluded from the study because it was only introduced as a recommended vaccine for children in Iraq in 1994 and therefore most of the children surveyed would not have been immunized against hepatitis B and inclusion of this question would have given incorrect results; daily presence of the father at home was also excluded from the study because of its variability.

Vaccines included in this study were: BCG, DPT-OPV (three doses), measles, MMR and DPT-OPV (first booster).

Methods of data processing included pre-coding of the data on the questionnaire, a computer master table, computer statistical analysis using the BASIC program and Harvard Graphics package. The chi-squared test was used as a significance test.

## Results

A total of 196 (60%) children were fully immunized (i.e. they had been given all the vaccines required for their age in the immunization schedule) in Tikrit city (urban), compared with 93 (28%) in the three villages (rural).

The percentage of fully immunized children born in 1989 in the urban area was 65% (35 out of 54), which increased to 69% for those born in 1990 (34 out of 49). The percentage then shows a gradual de-

crease for those born in 1991 (51%) (25 out of 49), 1992 (49%) (28 out of 57) and 1993 (46%) (22 out of 48). An abrupt increase was noticed again in those born in 1994 (73%) (45 out of 62) (Figure 1).

In rural areas the number of fully immunized children was 21% (7 out of 34) for those born in 1989. A slight increase in the number was noticed for those born in 1990 (30%) (10 out of 34). Fully immunized children born in 1991 and 1992 were nearly equal, 30% (12 out of 40) and 29% (16 out of 55) respectively. The number then decreased to 17% (12 out of 70) in those born in 1993 and as with the urban children the number increased for those born in 1994 reaching 25% (19 out of 77) (Figure 1).

Figure 2 shows how immunization coverage declined as the children got older. Vaccination with BCG had the highest coverage rate in both urban (97%) and rural (92%) areas, whereas DPT-OPV (first booster dose) showed the lowest coverage in both urban (59%) and rural (25%) areas.

The most common cause of partial immunization or completely unimmunized children in the urban area was ignorance or

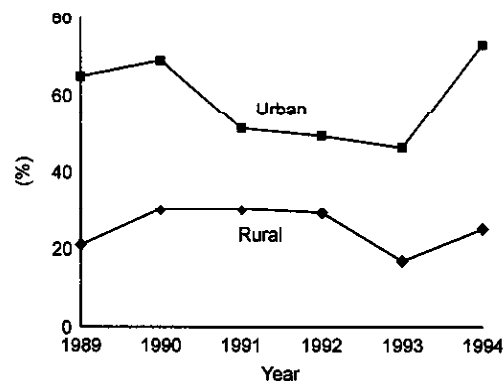


Figure 1 Completely immunized children born between 1989 and 1994 in urban and rural areas of Saladdin Governorate, Iraq

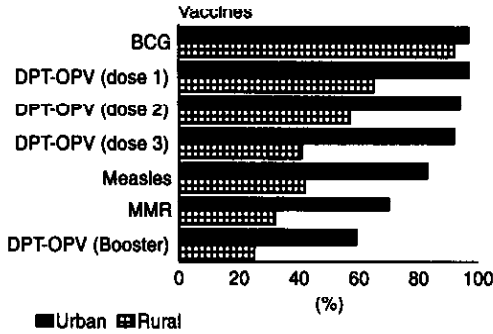


Figure 2 Immunization coverage in Saladdin Governorate, Iraq

negligence on the part of the mother (42%) and the unavailability of vaccines in primary health care (PHC) centres (23%). In the rural areas, ignorance and negligence in mothers (49%) and distant PHC centres (37%) were the most common causes (Table 1).

The educational level of the mother in urban areas showed no relation to the immunization status of their children ( $P < 0.25$ ). Surprisingly, children of illiterate

mothers had the highest coverage (81%). In contrast, there was a significant relationship between the educational level of the mother in rural areas and the immunization status of their children ( $P < 0.001$ ) (Table 2). The educational level of the father showed no significant relationship to the immunization status of their children in both urban ( $P < 0.5$ ) and rural ( $P < 0.25$ ) areas (Table 3).

Fully immunized male and female children in the urban area were 59% and 61% respectively. In the rural area fully immunized male and female children were 21% and 38% respectively. The sex of child was shown to have a significant relationship with immunization status in rural areas ( $P < 0.001$ ). In contrast, there was no significant relationship in the urban area ( $P > 0.5$ ) (Table 4).

## Discussion

There was a decline in the percentage of completely immunized children born between 1989 and 1994 in both urban and ru-

Table 1 Causes of incomplete immunization in children born between 1989 and 1994 in Saladdin Governorate, Iraq

Cause	Urban		Rural	
	No.	%	No.	%
Negligence and ignorance	54	42	119	49
Distant PHC centre	0	0	90	37
Unavailability of vaccines	30	23	2	1
Fear of side-effects	20	15	5	2
Difficulties in reaching PHC centre	12	9	17	7
Mother not convinced	4	3	5	2
Others	10	8	5	2
Total	130	100	243	100

PHC - primary health care

Table 2 Relationship between educational level of the mother and immunization status

Educational level	Urban					Rural				
	Completely immunized		Partly immunized		Total No.	Completely immunized		Partly immunized		Total No.
	No.	%	No.	%		No.	%	No.	%	
Illiterate	22	81	5	19	27	34	24	109	76	143
Reads and writes	41	59	28	41	69	34	28	87	72	121
Primary	42	54	36	46	76	10	20	40	60	50
Intermediate	22	69	10	31	32	2	40	3	60	5
Secondary	29	55	24	45	53	5	71	2	29	7
Institute	27	63	16	37	43	4	67	2	33	6
College	12	52	11	48	23	4	100	0	-	4
Postgraduate	1	100	0	-	1	0	-	0	-	0
Total	196	60	130	40	326	93	28	243	72	336

P-value (urban) < 0.25; P-value (rural) < 0.001

Table 3 Relationship between the educational level of the father and immunization status

Educational level	Urban					Rural				
	Completely immunized		Partly immunized		Total No.	Completely immunized		Partly immunized		Total No.
	No.	%	No.	%		No.	%	No.	%	
Illiterate	2	50	2	50	4	7	27	19	73	26
Reads and writes	10	62	6	38	16	13	15	71	85	84
Primary	33	63	19	37	52	37	30	88	70	125
Intermediate	39	57	30	43	69	14	36	25	64	39
Secondary	31	72	12	28	43	9	36	16	64	25
Institute	16	48	17	52	33	3	27	8	73	11
College	63	60	42	40	105	10	38	16	62	26
Postgraduate	2	50	2	50	4	0	-	0	-	0
Total	196	60	130	40	326	93	28	243	72	336

P-value (urban) < 0.5; P-value (rural) < 0.25

rural areas. Immunization coverage in the urban area is higher than for rural areas in many parts of the world [7-9] as well as in this study. The lower coverage in rural ar-

reas may be related to the educational level of mothers as the mother in a rural area is usually less educated than those in urban areas [10-12] or due to lack of information

Table 4 Relationship between sex and immunization coverage

Sex	Urban					Rural				
	Completely immunized		Partly immunized		Total No.	Completely immunized		Partly immunized		Total No.
	No.	%	No.	%		No.	%	No.	%	
Male	104	59	71	41	175	42	21	160	79	202
Female	92	61	59	39	151	51	38	83	62	134
Total	196	60	130	40	326	93	28	243	72	336

*P*-value (urban) > 0.5; *P*-value (rural) < 0.001

or knowledge about immunization [13,14] as there is less access to sources, such as the mass media and health education campaigns. Coverage with all vaccines appropriate for the child's age (following the vaccination schedule) decreased from 97% (urban) and 92% (rural) for BCG to 59% (urban) and 25% (rural) for DPT-OPV (first booster dose). This is supported by the findings Farizo et al. in which coverage was found to decrease from 67% at 3 months to 25% at 19 months [15].

As stated in a study by Al-Hadi, it is clear that government policies are the main force behind immunization coverage [16]. In Iraq, in the case of the BCG vaccine, birth certificates are not issued unless the child has been given its BCG vaccine. As a consequence in both urban and rural areas BCG coverage was above the recommended level (90% by 1995), results that accord with those of Shubber (1992) [17].

A wide range of variations were found between urban and rural immunization coverage levels for DPT-OPV (three doses), measles, MMR and DPT-OPV (first booster) (Figure 2). This may be due to educational and social factors as well as factors relating to health status, e.g. distant PHC centres, especially in rural areas.

The educational level of the father did not seem to affect the immunization status of the child, possibly as the mother is in more direct contact with the child and normally deals with issues relating to child health and development. Mothers in urban areas have greater access to sources of information, e.g. the mass media and health education campaigns.

A study by Wassif et al. in Egypt showed that immunization coverage among males was higher than in females [9]. In contrast, Nasser et al. found that in the Islamic Republic of Iran sex did not seem to be associated with the child's immunization status [18]. In our study, the sex of the child was not related to the child's immunization status in the urban area ( $P > 0.5$ ) (Table 4) but was significantly related to their immunization status in the rural areas, more females being immunized than males ( $P < 0.001$ ).

The most common cause of incomplete immunization in urban and rural areas was negligence and ignorance (42% and 49% respectively) (Table 1). However, a study by Shubber found the cause to be related to the effect of United Nations sanctions which have been imposed on Iraq since 1990 [17].

In conclusion, there is still a large gap in immunization coverage between urban and rural areas in Saladdin Governorate and the main cause of incomplete immunization is inadequate health education for mothers. Government policy is the driving force behind the higher coverage rate for the BCG vaccine relative to other vaccines, as birth certificates are not issued unless the child has been given the BCG vaccine.

It is recommended that health authorities, in collaboration with Tikrit University College Of Medicine, establish mobile teams of health educators to advise the rural population of Saladdin Governorate.

## Acknowledgements

This article is a version of the students community project which is a partial requirement for passing to the next year of study in the Tikrit University College of Medicine. Other members of the group are: Mohammad M. Weiss, Mohammad Y. Abbas, Haider T. Mohammad, Nilly N. Thoun, Mizhir A. Aboud and Nawal Z. Abed. We also appreciate the help and advice of Dr Ramzia Al-Ani (Saladdin Health Authority) and Mrs Maliha Masoad (Tikrit University College of Medicine).

## References

1. Bulut A et al. *The basics of maternal and child health*, 1st ed. Turkey, Institute of Child Health (Istanbul University) and UNICEF Turkey, 1994.
2. UNICEF. Immunization. *Global child health news and review*, 1995, 3:35.
3. *The work of WHO in the Eastern Mediterranean Region. Annual report of Regional Director, 1 January-31 December 1993*. Alexandria, World Health Organization, Regional Office for the Eastern Mediterranean, 1994.
4. *Mid-decade goals workplan. Iraq*. Iraq, UNICEF, 1994.
5. Al-Tikriti SK et al. *For a better life*, 1st ed. Baghdad, Ministry of Health, 1994:49.
6. Stehr-Green P et al. How well are we protecting our children? An immunisation coverage survey in Hawke's Bay. *New Zealand medical journal*, 1992, 105(938):277-9.
7. Mehra M et al. Immunization coverage evaluation surveys in rural Narela zone and city zone areas of Delhi. *Indian pediatrics*, 1990, 27(4):342-6.
8. Tandon BN, Gandhi N. Immunization coverage in India for areas served by the Integrated Child Development Programme. The Integrated Child Development Services Consultants. *Bulletin of the World Health Organization*, 1992, 70(4):461-5.
9. Wassif SM et al. Cluster survey for vaccination coverage in Sohag Governorate, October 1989. *Journal of the Egyptian Public Health Association*, 1990, 65(3-4):411-26.
10. Bhardwaj SD, Singh G, Singh AS. Statistical study of the socioeconomic factors affecting child immunisation in rural areas. *Indian journal of medical sciences*, 1991, 45(10):269-72.
11. Alemu W, Woldeab M, Meche H. Factors influencing non-attendance in the immunization of children in three selected regions, Ethiopia, July 1988. *Ethiopian medical journal*, 1991, 29(2):49-55.

12. Cutts FT et al. Determinants of vaccination in an urban population in Conakry, Guinea. *International journal of epidemiology*, 1991, 20(4):1099-106.
13. Weeks RM, Barenzi JF, Mayira JR. A low-cost, community-based measles outbreak investigation with follow-up action. *Bulletin of the World Health Organization*, 1992, 70(3):317-21.
14. Haurum J, Johansen M. En holdnings-og vidensundersogelse blandt forældre som ikke ønsker deres barn vaccineret mod mæslinger, farsyge og rode hunde (MFR-vaccination). [Attitudes and knowledge among parents who do not want their children to be vaccinated against measles, mumps, and rubella (MMR-vaccination).] *Ugeskrift for læger*, 1991, 153(10):705-9.
15. Farizo KM et al. Vaccination levels and missed opportunities for measles vaccination: a record audit in a public pediatric clinic. *Pediatrics*, 1992, 89(4 Pt 1):589-92.
16. Al-Hadi AH. *Mother health services in Iraq: an appraisal of present problems and potentials*. Baghdad, Ministry of Health, 1985:252-74.
17. Shubber AMH. *Vaccination coverage: a comparison between urban and rural areas in Najaf* [Diploma thesis]. Baghdad, Iraq, Saddam Medical College, 1992.
18. Nasser K et al. Determinants of partial participation in the immunization programmes in Iran. *Social science and medicine*, 1990, 30(3):379-83.

### Year 2000 goals

The following are the child health goals to be attained by the year 2000, which were adopted by the World Summit for Children on 30 September, 1990.

- The eradication of poliomyelitis
- The elimination of neonatal tetanus (by 1995)
- A 90% reduction in measles cases and a 95% reduction in measles deaths, compared to preimmunization levels
- Achievement and maintenance of at least 90% immunization coverage of one-year-old children and universal tetanus immunization for women in the child-bearing years
- A halving of child deaths caused by diarrhoea and a 25% reduction in the incidence of diarrhoeal diseases
- A one-third reduction in child deaths caused by acute respiratory infections
- The elimination of guinea worm diseases