

RESEARCH ARTICLE

# Vaccination coverage in Qatar: Benchmarking with global figures

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## ABSTRACT

**Introduction:** Vaccination is considered one of the most successful and cost-effective public health interventions of the 20<sup>th</sup> century. In 2017, Qatar's Expanded Program of Immunization (EPI) provided vaccination services against a comprehensive list of 15 vaccine-preventable diseases.

**Objectives:** To assess the performance of Qatar's national immunization system, identify possible gaps by determining the national vaccination coverage rates, and benchmark these rates against regional and global figures.

**Methods:** The data utilized herein were retrieved from the vaccination coverage estimates generated by the World Health Organization and United Nations International Children's Emergency Fund. Relevant local, regional, and global vaccination coverage figures were manually extracted and then analyzed for six vaccines (DTP3, Pol3, MCV2, HepB, PCV3, and RotaC) in 2017. Percentages and proportions were compared using the Chi-squared test.

**Results:** Vaccination coverage levels in Qatar have surpassed the optimal level of 90% for all vaccines. Compared with international figures, the national coverage exceeds the relevant benchmarks. For DTP3 and Pol3, Qatar achieved 97% coverage compared with 99% coverage in Jordan and 85% coverage globally. For MCV2, Qatar achieved 93% coverage compared with 99% coverage in Jordan and 67% coverage globally. For RotaC, Qatar achieved 97% coverage compared with 96% coverage in Jordan and 28% coverage globally. For HepB, Qatar achieved 97% coverage compared with 43% coverage globally.

**Conclusions:** Compared with the international benchmarks of major vaccines, the vaccination coverage rates in Qatar are high. However, challenges for maintaining high coverage, such as cultural and language barriers, should be addressed.

Keywords: Qatar, vaccination Coverage, vaccine-preventable diseases

## INTRODUCTION

No single preventive intervention in the public health domain has been more cost-effective than immunization. The international community has endorsed the value of vaccination to prevent and control large numbers of infectious diseases and several chronic diseases caused by infectious agents.<sup>1</sup>

Vaccination plays an instrumental role in preventing the suffering and death associated with infectious diseases, such as diarrhea, measles, pneumonia, polio, and whooping cough. In addition, the decreased financial toll of these diseases has led to the allocation of resources to other national priorities such as education and economic development. Thus, expanding access to immunization is vital to realize the sustainable development goals.<sup>2</sup>

Currently, immunization annually prevents between two to three million deaths from vaccine-preventable diseases (VPDs) across different age groups.

An additional 1.5 million deaths can be avoided if global vaccination coverage is further promoted.<sup>3</sup> The vaccination coverage reflects the protection level a population possesses against VPDs and the disease occurrence risk.<sup>4</sup>

Qatar established the national immunization program shortly after the World Health Organization (WHO) established the Expanded Programme on Immunization (EPI) in 1974. The national immunization program was rapidly developed in accordance with international and local situations to include a comprehensive list of 15 VPDs by 2017.<sup>5</sup>

### Aim

This study aimed to assess the performance of Qatar's national immunization system, identify possible gaps by determining the national vaccination coverage rates, and benchmark Qatar using regional and global figures.

## METHODOLOGY

Data pertaining to vaccination coverage in Qatar during 2017 were obtained and benchmarked using both regional and global vaccination coverage estimates of the same year. For comparison, the collected data were standardized for all applicable vaccines; each vaccine was defined based on its type and the total number of doses received. The vaccines

were selected based on their importance in preventing serious illnesses and in protecting communities as prioritized by the WHO.

The data utilized in this comparison were retrieved from the vaccination coverage estimates generated by the WHO and the United Nations International Children's Emergency Fund (UNICEF).<sup>6,7</sup> Thus, the required data were extracted from the aggregated reports of national authorities that compile information from health service providers regarding the number of vaccinations administered during a specific time period (numerator) and the reported target population (denominator). Relevant local figures were manually extracted for Qatar, as were their counterpart global figures for the year of 2017. Additionally, data for one regional country (Jordan) were obtained from the same databases for comparison purposes.

Data were analyzed using Statistical Package for the Social Sciences (SPSS Inc., Version 16.0, Chicago, USA); percentages and proportions were compared using the Chi-squared test. The level of significance was set at  $p < 0.05$ .

## RESULTS

As demonstrated by the obtained data, the vaccination coverage of certain major childhood vaccines has surpassed the optimal level of 90%. As per comparisons with international figures, the national coverage again exceeded the relevant benchmarks. The differences between Qatar's rates and the international figures were both relatively small (DTP3 vaccine, 14.11% higher than the benchmark) and large (RotaC vaccine, 260% higher than the benchmark). In addition, HepB vaccine coverage also showed a 125.6% higher coverage compared with the global figures (Table 1).

## DISCUSSION

As a high-income country<sup>8</sup> and boasting one of the top five health systems internationally,<sup>9</sup> Qatar operates an immunization program that has attained effective vaccination coverage rates for most VPDs.<sup>10</sup> Qatar's current health expenditure is estimated at \$2,028 per capita, which is classified as the highest among countries of the Middle East and North Africa. Nevertheless, as per the high vaccination coverage noted in Jordan, which spends only \$257 per capita on health, the vaccination success story in both countries is independent of their financial status.<sup>11</sup>

**Table 1. Coverage rates of major vaccines in Qatar compared with international coverage and coverage in Jordan, 2017.**

Selected vaccine of major priority	Qatar	Jordan	International	<i>p</i> value of Chi-squared test*
DTP3 Percentage of surviving infants who received the third dose of the diphtheria and tetanus toxoid with pertussis-containing vaccine	97%	99%	85%	0.000
Pol3 Percentage of surviving infants who received the third dose of the polio-containing vaccine, either the oral or inactivated polio vaccine	97%	99%	85%	0.000
MCV2 Percentage of children who received the second dose of the measles-containing vaccine according to the nationally recommended schedule	93%	99%	67%	0.000
HepB Percentage of births that received a dose of the hepatitis B vaccine within 24 hours of delivery	97%	-	43%	0.000 Fisher's exact test
PCV3 Percentage of surviving infants who received the third dose of the pneumococcal conjugate vaccine	98%	-	44%	0.000 Fisher's exact test
RotaC Percentage of surviving infants who received the final recommended dose of the rotavirus vaccine, which can be either the second or third dose, depending on the vaccine	93%	96%	28%	0.000

HepB and PCV3 data were not available for Jordan in 2017.

\* $p \leq 0.05$  = statistically significant.

Although the global DTP3 coverage has remained stable for much of the past decade among most nations,<sup>12</sup> the Gulf Cooperation Council (GCC) countries have satisfied the relevant targets of the Global Vaccine Action Plan (GVAP) 2020. Moreover, Qatar and other GCC countries have achieved a DTP3 vaccination coverage of at least 90% over the previous five years.<sup>10</sup> In addition, Qatar's national immunization program has succeeded in vaccinating 95% or more of its target population with the first and second doses of measles-containing vaccines (MCVs).<sup>10,13</sup>

The proportion of children receiving the DTP vaccine has been employed as an indicator of a country's ability to provide routine vaccination services. During 2017, the global coverage rates of the DTP3 vaccine

reached 85%, up from 72% in 2000 and 21% in 1980.<sup>14</sup> Nevertheless, further progress has stalled in the current decade, and 71 countries are yet to achieve the GVAP coverage target of 90% or greater for the DTP3 vaccine. Globally, an estimated 19.9 million children under one year of age did not receive the three recommended doses of DTP in 2017, and 20.8 million children of the same age group failed to receive a single dose of MCV.<sup>14</sup>

Qatar has managed to sustain a high immunization rate (approximately 96% since 2006) for the first and third doses of hepatitis B (HepB).<sup>10</sup> Moreover, a seroprevalence study on HepB among school children in Qatar revealed an optimal vaccination coverage (100%).<sup>15</sup> The global vaccination coverage for HepB third dose is estimated at 84%, with 98% of the

countries having already integrated HepB into their routine national immunization programs.<sup>16</sup>

Despite their high economic cost, the RotaC and PCV3 vaccines have maintained coverage rates of approximately 95% over the past decade in Qatar. In addition, similar coverage rates for the aforementioned vaccines have been noted across all GCC countries since 2010.<sup>9</sup> Similarly, as per a previous study among the residents of the GCC countries, those residing in Qatar were more likely (odds ratio = 16.8) to have received the pneumococcal vaccine than their peers.<sup>17</sup> Furthermore, the coverage rates of the RotaC and PCV3 vaccines have been increasing among low-income nations.<sup>14</sup>

The results reported above may be subject to some limitations. First, the inaccurate reporting of vaccination coverage at administrative levels may result in overestimation. Second, some vaccination entries may be incomplete owing to children moving in and out of the country, considering that the majority of

Qatar's population is composed of expatriates. Third, the timeliness in the context of catch-up schedules was not examined, indicating that children who were defaulters may have been counted as part of the national coverage figures.

## CONCLUSION

The vaccination coverage rates in Qatar are high compared with the international benchmarks of major vaccines. However, the challenges to sustain such vaccination coverage should be addressed. Moreover, continued investment in immunization programs is crucial to maintain the aforementioned gains. In addition, the rapid population growth and the high expatriate density are unique challenges for Qatar to maintain its vaccination coverage at optimal levels. Finally, cultural and language barriers and fighting myths about vaccination should be addressed to maintain vaccination program success.

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