

ORIGINAL ARTICLE

Impact of COVID-19 pandemic on immunisation services performance in Sharqat, Saladin Governorate, Iraq

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Abstract

Objective: To determine the frequency of vaccination delays and the causes of such delays during the coronavirus disease-2019 pandemic.

Method: The cross-sectional study was conducted from December 15, 2020, to July 20, 2021, at health centres in the Sharqat area of Saladin Governorate in Iraq, and comprised parents who brought their child for immunisation during coronavirus disease-2019 pandemic. Data was gathered via direct interviews using a pre-designed questionnaire. Data was analysed using SPSS 19.

Results: Of the 150 respondents, 84(56%) were from urban areas, and 65(42%) had higher education levels. The association was significant with level of education, socio-economic status of the family and availability of transportation ($p < 0.05$).

Conclusion: The vaccination process got disrupted during the coronavirus disease-2019 pandemic in Iraq.

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Introduction

The coronavirus disease-2019 (COVID-19) pandemic was a threat to global public health and healthcare systems.¹ On January 30, 2020, the World Health Organisation (WHO) declared a state of emergency, and on March 11, 2020, COVID-19 was declared a global pandemic.²

About eight months into the pandemic, the WHO found that 90% of countries had stopped providing essential health services, such as vaccines, especially in the early stages of the pandemic.³ In Iraq, public primary healthcare clinics are responsible for delivering essential healthcare services, including care for children, at no cost to the population. Every child who visits a public facility has access to healthcare, including immunisations. This indicated that many individuals would likely use such healthcare services.⁴

Extensive vaccination coverage around the globe, particularly in lower- and middle-income countries (LMICs), has resulted in excellent child survival rates, reduced infection rates, and less long-term damage, indicating that any decline in immunisation rate would pose severe risk to children's public health.⁵

Moreover, delays in healthcare services may result in missing or delayed vaccines for children, which is a significant problem.^{6,7} Vaccine-preventable diseases (VPDs) continue to be a concern that needs precautionary measures to avert serious illness in children.⁸ Children are more likely to get

diseases that can be prevented if they are not vaccinated on time. This may also influence herd immunity.⁹ According to the WHO, VPDs pose a danger to 80 million children globally due to the COVID-19 pandemic. This is due to the epidemic's negative impact on healthcare.¹⁰

Furthermore, influenza immunisation could lessen the severity of sickness in those with COVID-19 and influenza.¹¹ Even though regular childhood immunisations are an essential health service that should be completed, the epidemic impacted this service. For instance, just 25% of children in the United States got their vaccinations on schedule. Before the COVID-19 epidemic, different countries had different percentages of delayed vaccinations.¹² Since the Iraqi health system had used all its resources to handle the epidemic, other services, including ambulatory care, were likely to suffer. Individuals also feared that they may contract the virus if they went to healthcare institutions. This issue has also been researched in various contexts.¹³⁻¹⁶ The current study was planned to assess the frequency of regular vaccination delays and the reasons for the delays during the COVID-19 pandemic.

Material and Methods

The cross-sectional study was conducted from December 15, 2020, to July 20, 2021, at Al-Sharqat, Left Coast and Al-Khadraniya health centres in the Sharqat area of Saladin Governorate in Iraq. The sample size was estimated using Raosoft calculator using the following equations:

$$x = Z^2 \left(\frac{c}{100} \right)^2 r (100 - r)$$

$$n = \frac{N \times x}{(N - 1) E^2 + x}$$

$$E = \text{Sqrt} \left[\frac{(N - n) \times}{n(N - 1)} \right]^{17}$$

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The sample was raised using random sampling technique. Electronic health records were used to get all the relevant information. Further data was collected via direct interviews using a pre-designed questionnaire after taking informed consent from all the parents.

Those included were subjects who lived in the Al-Sharqat area and had of children aged <5 years whose complete vaccination records were available. Those with missing data were excluded.

The first part of the questionnaire comprised socio-demographic variables, including, age, gender and socio-economic status (SES), educational level, occupation, number of persons in the household, number of rooms, area of residence, etc.

SES was calculated using the demographic variables. Each item was scored and SES was considered high when total score ranged 121-150, middle when it was 90-120, and low when it was 89 or less.¹⁷

The second part of the questionnaire comprised general variables concerning immunisation services, including the extent of commitment to have the children vaccinated at the specified time, availability of transportation, and parental neglect.

A pilot study was conducted from December 2 to December 12, 2021, to estimate the time for each interview, to find out whether the questionnaire content was well understood, to identify whether respondents understand the questions and directions, to assess content clarity, relevance and adequacy, to test reliability and validity of the questionnaire, and to identify barriers which may be experienced during the study. The inclusion criterion remained the same as that of the main study, and the sample was raised using convenience sampling.¹⁰ The sample of pilot study was excluded from the main sample.

Reliability and validity of the questionnaire was determined using Cronbach's alpha (Table 1).

Data was analysed using SPSS 19. Descriptive data was expressed as frequencies and percentages, and chi-square test was used for further analysis. Evaluation intervals were considered weak at 0.00-33.33, moderate at 33.34-66.66, and perfect at 66.67-100.

Grand and global mean scores for overall assessment were attained by transforming the recorded responses of each period into a quantitative measure scale using percentile transformation technique: Percentile value = (Sum of actual scoring-Sum of Min. of scoring scale) / (Range of Sum scoring scale) *100%

For inferential analysis, one sample chi-square test was used to compare the observed and expected frequencies in each category to test whether all categories contained the same proportion of values or if each category contained a user-specified proportion of values. $P < 0.05$ was considered significant, and $p < 0.01$ was considered highly significant.

Results

Of the 150 respondents, 84(56%) were from urban areas, 65(42%) had higher education levels and 43(28.7%) had >3 children (Table 2).

The urban-rural divide was not significantly associated with vaccination patterns ($p = 0.124$) (Table 3). However, people in urban areas had significantly better availability of transportation than those in rural areas ($p < 0.001$) (Table 4).

The relationship was significant ($p < 0.001$) with higher level of education (Table 5).

The relationship between education level and transportation availability was significant (Table 6).

The level of education was significantly associated with neglect regarding child vaccination (Table 7) and with the

Table-1: Reliability coefficients of the study questionnaire.

Reliability Coefficient of the studied Questionnaire	Standard lower bound	Actual values	Assessment
Alpha (Cronbach) (*)	0.70	0.8485	V. good

X: Mean, SD: Standard deviation, BMI: Body mass index.

Table-2: Socio-demographic data of the subjects.

Socio-Demographical variable	Groups	n (%)
Residence	Urban	84 (56%)
	Rural	66 (44%)
Educational level	Illiterate	17 (11.3%)
	Elementary school	28 (18.7%)
	Secondary school	42 (28%)
	High education	63 (42%)
The economic level of the family	Weak	52 (34.7%)
	Moderate	76 (50.7%)
	Very good	22 (14.7%)
Occupations	Earnor or Housewife	68 (45.3%)
	Student	7 (4.7%)
	Employee	75 (50%)
Availability of transportation	Weak	31 (20.7%)
	Moderate	68 (45.3%)
	Very good	51 (34%)
Number of children	1	40 (26.7%)
	2	41 (27.3%)
	3	26 (17.3%)
	More	43 (28.7%)

Table-3: Relationship between area of residence and extent of commitment to get the children vaccinated at the specified time.

Residence	The extent of commitment to vaccinate children with appropriate vaccines within the routine vaccination schedule and at the specified time			p - value
	Weak	Moderate	Very good	
(Urban)	13 8.7%	36 24.0%	35 23.3%	0.124 (NS)
(Rural)	14 9.3%	35 23.3%	17 11.3%	
(Total)	27 18.0%	71 47.3%	52 34.7%	

HS: Highly Sig. at P<0.01; S: Sig. at P<0.05; Testing based on One-Sample Chi-Square test.

Table-4: Relationship between area of residence and availability of transportation.

Residence	Availability of transportation			p - value
	Weak	Moderate	Very good	
Urban	10 6.7%	35 23.3%	39 26.0%	0.001 HS
Rural	21 14.0%	33 22.0%	12 8.0%	
Total	31 20.7%	68 45.3%	51 34.0%	

HS: Highly Sig. at P<0.01; S: Sig. at P<0.05; Testing based on One-Sample Chi-Square test.

Table-5: Relationship between the educational level and the extent of commitment to get the children vaccinated at the specified time.

Residence	The extent of commitment to vaccinate children within the routine schedule and at the specified time			p - value
	Weak	Moderate	Very good	
Illiteracy	8 5.3%	7 4.7%	2 1.3%	<0.001 HS
Elementary school	4 2.7%	12 8.0%	12 8.0%	
High school	9 6.0%	26 17.3%	7 4.7%	
Higher Education	6 4.0%	26 17.3%	31 20.7%	
Total	27 18.0%	71 47.3%	52 34.7%	

HS: Highly Sig. at P<0.01; S: Sig. at P<0.05; Testing based on One-Sample Chi-Square test.

Table-6: Relationship between the educational level and availability of transportation.

Residence	Availability of transportation			p - value
	Weak	Moderate	Very good	
Illiteracy	6 4.0%	10 6.7%	1 0.7%	<0.001 HS
Elementary school	7 4.7%	17 11.3%	4 2.7%	
High school	9 6.0%	22 14.7%	11 7.3%	
Higher Education	9 6.0%	19 12.7%	35 23.3%	
Total	31 20.7%	68 45.3%	51 34.0%	

HS: Highly Sig. at P<0.01; S: Sig. at P<0.05; Testing based on One-Sample Chi-Square test.

Table-7: Relationship between the educational level and neglect regarding child vaccination.

Educational level	Neglecting to visit the health care centre for the purpose of vaccinating children		p - value
	Yes	No	
Illiteracy	13 8.7%	4 2.7%	<0.001 (S)
Elementary school	15 10.0%	13 8.7%	
High school	30 20.0%	12 8.0%	
Higher Education	22 14.7%	41 27.3%	
Total	80 53.3%	70 46.7%	

HS: Highly Sig. at P<0.01; S: Sig. at P<0.05; Testing based on One-Sample Chi-Square test.

Table-8: Relationship between the educational level and the number of times the vaccination date was postponed during the coronavirus disease-2019 (COVID-19) epidemic.

Educational level	The number of times the vaccination date is postponed during the epidemic (COVID-19)			p - value
	Once	Twice	More	
Illiteracy	4 2.7%	5 3.3%	8 5.3%	<0.001 (HS)
Elementary school	11 7.3%	15 10.0%	2 1.3%	
High school	13 8.7%	16 10.7%	13 8.7%	
Higher Education	40 26.7%	15 10.0%	8 5.3%	
Total	68 45.3%	51 34.0%	31 20.7%	

HS: Highly Sig. at P<0.01; S: Sig. at P<0.05; Testing based on One-Sample Chi-Square test.

Table-9: Relationship between occupation and commitment to have the children vaccinated at the specified time.

Occupation	The extent of commitment to vaccinate children within the routine vaccination schedule and at the specified time			p - value
	Weak	Moderate	Very good	
Earners/Housewife	20 13.3%	33 22.0%	15 10.0%	<0.03 (S)
Student	1 0.7%	2 1.3%	4 2.7%	
Employee	6 4.0%	36 24.0%	33 22.0%	
Total	27 18.0%	71 47.3%	52 34.7%	

HS: Highly Sig. at P<0.01; S: Sig. at P<0.05; Testing based on One-Sample Chi-Square test.

Table-10: Relationship between occupation and neglect regarding child vaccination during the coronavirus disease-2019 (COVID-19) epidemic.

Occupation	Neglecting to visit the primary health care center for the purpose of vaccinating children during the spread of the epidemic (COVID-19)		p - value
	Yes	No	
Earner/Housewife	50 33.3%	18 12.0%	<0.001 (HS)
Student	2 1.3%	5 3.3%	
Employee	28 18.7%	47 31.3%	
Total	80 53.3%	70 46.7%	

HS: Highly Sig. at $P < 0.01$; S: Sig. at $P < 0.05$; Testing based on One-Sample Chi-Square test.

Table-11: Relationship between occupation and the reason for not visiting the primary health care centre for vaccination.

Occupation	The reason for not visiting the primary health care centre for the purpose of vaccination				p - value
	Unavailability of transportation	Curfew	Low economical level	Other	
Earner/Housewife	10 6.7%	24 16.0%	20 13.3%	14 9.3%	<0.001 (S)
Student	1 0.7%	2 1.3%	1 0.7%	3 2.0%	
Employee	9 6.0%	43 28.7%	1 0.7%	22 14.7%	
Total	20 13.3%	69 46.0%	22 14.7%	39 26.0%	

HS: Highly Sig. at $P < 0.01$; S: Sig. at $P < 0.05$; Testing based on One-Sample Chi-Square test.

postponement of due dates (Table 8).

Commitment to child immunisation was significantly associated with employment (Table 9) and occupation (Table 10).

The relationship of missed vaccination appointments was significant with pandemic-induced lockdowns, unavailability of transportation, low SES and other reasons (Table 11).

Discussion

The results showed that the COVID-19 pandemic affected child immunisation in the Sharqat area, which is in line with global literature.^{19,13}

The current findings revealed a substantial relationship between residence and transportation availability, which has been reported in an earlier study done in Iraq.²⁰ The study's findings demonstrated a significant association between education level and the degree of devotion to getting children vaccinated. The finding is consistent with an earlier report.²⁰

The number of children getting vaccinated changed because of COVID-19 for many reasons. In England and Pakistan, for example, the number of children vaccinated varied from place to place.^{21,22} This could be because of differences between cultures in how well health rules are followed, fears of infection, or differences in SES. Previous investigations have indicated that living in the rural areas is related to lower SES indicators, such as poverty and low education.^{23,24} Besides, COVID-19 regulations also forced individuals to remain at home²⁵ and parents' concerns that bringing their children to the health centre could make them sick.^{26,27} Changes in public health priorities and decisions about health policies, like isolating and quarantining people during the pandemic, also helped bring the vaccination rate down. Politics, fear of being exposed to the COVID-19 virus in health centres,²⁸ SES,³⁰ and worries about the safety of vaccines and their possible side effects are some of the factors that slowed down the vaccination process. Improved vaccination rates in primary care are possible when parents feel comfortable and are regularly informed about immunisation schedules. Healthcare staff must also access mechanisms to contact and follow up with families.³¹

Conclusion

The number of children aged <5 years who missed their immunisation schedule increased during the COVID-19 pandemic. This may have long-term effects.

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References

- Hartley DM, Perencevich EN. Public Health Interventions for COVID-19: Emerging Evidence and Implications for an Evolving Public Health Crisis. *JAMA* 2020;323:1908-9. doi: 10.1001/jama.2020.5910.
- World Health Organization. (WHO). WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020. [Online] 2020 [Cited 2022 February 01]. Available from URL: <https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-COVID-19---11-march-2020>.
- World Health Organization. (WHO). Pulse survey on continuity of essential health services during the COVID-19 pandemic: Interim report. [Online] 2020 [Cited 2022 February 01]. Available from URL: file:///C:/Users/kca/Downloads/WHO-2019-nCoV-EHS_continuity-survey-2020.1-eng.pdf
- Cetorelli V, Shabila NP. Expansion of health facilities in Iraq a decade after the US-led invasion, 2003-2012. *Confl Health* 2014;8:e16. doi: 10.1186/1752-1505-8-16.
- Bustreo F, Okwo-Bele JM, Kamara L. World Health Organization perspectives on the contribution of the Global Alliance for Vaccines and Immunization on reducing child mortality. *Arch Dis Child* 2015;100(Suppl 1):s34-7. doi: 10.1136/archdischild-2013-305693.
- Kang E. Impact of Disasters on Community Medical Screening

- Examination and Vaccination Rates: The Case of the Sewol Ferry Disaster in Ansan, Korea. *Disaster Med Public Health Prep* 2021;15:286-91. doi: 10.1017/dmp.2020.29.
7. Rainey JJ, Sugerman D, Brennan M, Cadet JR, Ernsly J, Lacapère F, et al. Rapid monitoring in vaccination campaigns during emergencies: the post-earthquake campaign in Haiti. *Bull World Health Organ* 2013;91:957-62. doi: 10.2471/BLT.12.117044.
 8. Bianchini S, Argentiero A, Camilloni B, Silvestri E, Alunno A, Esposito S. Vaccination against Paediatric Respiratory Pathogens. *Vaccines (Basel)* 2019;7:168. doi: 10.3390/vaccines7040168.
 9. Centers for Disease Control and Prevention (CDC). Risks of Delaying or Skipping Vaccines. [Online] 2019 [Cited 2020 July 30]. Available from URL: <https://www.cdc.gov/vaccines/parents/schedules/risks-delaying-vaccines.html>
 10. Burton A, Monasch R, Lautenbach B, Gacic-Dobo M, Neill M, Karimov R, et al. WHO and UNICEF estimates of national infant immunization coverage: methods and processes. *Bull World Health Organ* 2009;87:535-41. doi: 10.2471/blt.08.053819.
 11. Kiseleva I. New Points of Departure for More Global Influenza Vaccine Use. *Vaccines (Basel)* 2020;8:410. doi: 10.3390/vaccines8030410.
 12. Walton S, Cortina-Borja M, Dezateux C, Griffiths LJ, Tingay K, Akbari A, et al. Measuring the timeliness of childhood vaccinations: Using cohort data and routine health records to evaluate quality of immunisation services. *Vaccine* 2017;35:7166-73. doi: 10.1016/j.vaccine.2017.10.085.
 13. Santoli JM, Lindley MC, DeSilva MB, Kharbanda EO, Daley MF, Galloway L, et al. Effects of the COVID-19 Pandemic on Routine Pediatric Vaccine Ordering and Administration - United States, 2020. *MMWR Morb Mortal Wkly Rep* 2020;69:591-3. doi: 10.15585/mmwr.mm6919e2.
 14. Harris RC, Chen Y, Côte P, Ardillon A, Nievera MC, Ong-Lim A, et al. Impact of COVID-19 on routine immunisation in South-East Asia and Western Pacific: Disruptions and solutions. *Lancet Reg Health West Pac* 2021;10:100140. doi: 10.1016/j.lanwpc.2021.100140.
 15. Bramer CA, Kimmins LM, Swanson R, Kuo J, Vranesich P, Jacques-Carroll LA, et al. Decline in child vaccination coverage during the COVID-19 pandemic - Michigan Care Improvement Registry, May 2016-May 2020. *Am J Transplant* 2020;20:1930-1. doi: 10.1111/ajt.16112.
 16. Causey K, Fullman N, Sorensen RJD, Galles NC, Zheng P, Aravkin A, et al. Estimating global and regional disruptions to routine childhood vaccine coverage during the COVID-19 pandemic in 2020: a modelling study. *Lancet* 2021;398:522-34. doi: 10.1016/S0140-6736(21)01337-4.
 17. Raosoft, Inc. Sample size calculator. [Online] 2004 [Cited 2017 November 06]. Available from URL: <http://www.raosoft.com/samplesize.html>
 18. Al-Naqeeb Abdulkhaleq A. Suggested Technique for Estimation of the Self Consistency in the Principle Components for choosing the outcomes Factors Matrix & Estimate Sample Size. *Journal of Techniques* 2009;22:A36-45.
 19. Abbas K, Procter SR, van Zandvoort K, Clark A, Funk S, Mengistu T, et al. Routine childhood immunisation during the COVID-19 pandemic in Africa: a benefit-risk analysis of health benefits versus excess risk of SARS-CoV-2 infection. *Lancet Glob Health* 2020;8:e1264-72. doi: 10.1016/S2214-109X(20)30308-9.
 20. Alhaddad AR, Ahmadnezhad E, Fotouhi A. The vaccination coverage rate in under-5 children in Nasiriyah, Iraq before and during the COVID-19 pandemic. *Epidemiol Health* 2022;44:e2022035. doi: 10.4178/epih.e2022035.
 21. McDonald HI, Tessier E, White JM, Woodruff M, Knowles C, Bates C, et al. Early impact of the coronavirus disease (COVID-19) pandemic and physical distancing measures on routine childhood vaccinations in England, January to April 2020. *Euro Surveill* 2020;25:2000848. doi: 10.2807/1560-7917.ES.2020.25.19.2000848.
 22. Rana MS, Alam MM, Ikram A, Salman M, Mere MO, Usman M, et al. Emergence of measles during the COVID-19 pandemic threatens Pakistan's children and the wider region. *Nat Med* 2021;27:1127-8. doi: 10.1038/s41591-021-01430-6.
 23. Restrepo-Méndez MC, Barros AJ, Wong KL, Johnson HL, Pariyo G, França GV, et al. Inequalities in full immunization coverage: trends in low- and middle-income countries. *Bull World Health Organ* 2016;94:794-805B. doi: 10.2471/BLT.15.162172.
 24. Singh GK, Siahpush M. Widening rural-urban disparities in all-cause mortality and mortality from major causes of death in the USA, 1969-2009. *J Urban Health* 2014;91:272-92. doi: 10.1007/s11524-013-9847-2.
 25. Chu IY, Alam P, Larson HJ, Lin L. Social consequences of mass quarantine during epidemics: a systematic review with implications for the COVID-19 response. *J Travel Med* 2020;27:taaa192. doi: 10.1093/jtm/taaa192.
 26. Lazzerini M, Barbi E, Apicella A, Marchetti F, Cardinale F, Trobia G. Delayed access or provision of care in Italy resulting from fear of COVID-19. *Lancet Child Adolesc Health* 2020;4:e10-11. doi: 10.1016/S2352-4642(20)30108-5.
 27. Urooj U, Ansari A, Siraj A, Khan S, Tariq H. Expectations, Fears and Perceptions of doctors during Covid-19 Pandemic. *Pak J Med Sci* 2020;36:S37-42. doi: 10.12669/pjms.36.COVID19-S4.2643.
 28. Lassi ZS, Naseem R, Salam RA, Siddiqui F, Das JK. The Impact of the COVID-19 Pandemic on Immunization Campaigns and Programs: A Systematic Review. *Int J Environ Res Public Health* 2021;18:988. doi: 10.3390/ijerph18030988.
 29. Adamu AA, Jalo RI, Habonimana D, Wiysonge CS. COVID-19 and routine childhood immunization in Africa: Leveraging systems thinking and implementation science to improve immunization system performance. *Int J Infect Dis* 2020;98:161-5. doi: 10.1016/j.ijid.2020.06.072.
 30. Paguio JA, Yao JS, Dee EC. Silver lining of COVID-19: Heightened global interest in pneumococcal and influenza vaccines, an infodemiology study. *Vaccine* 2020;38:5430-5. doi: 10.1016/j.vaccine.2020.06.069.
 31. Williams N, Woodward H, Majeed A, Saxena S. Primary care strategies to improve childhood immunisation uptake in developed countries: systematic review. *JRSM Short Rep* 2011;2:81. doi: 10.1258/shorts.2011.011112.