

Risk evaluation for COVID-19 in Arba'eenia mass gathering in Iraq 2021 using WHO assessment tool for mass gathering risk

Safaa S. Ali,¹ Riyadh A Alhilfi,² Yasir Younis Majeed,³ Ali R. Mohammed,⁴ Raghad A. Jassim,⁵ Sumayah S. Hussein,⁶ Massar S. Mohsin,⁷ Ali M. Hameed,⁸ Haneen S. Ghanim,⁹ Haider A Hantoosh,¹⁰

ABSTRACT

INTRODUCTION: The Arbaeenia pilgrimage is a big mass gathering that takes place in Iraq yearly. Millions of people from different countries participate in this event annually. Such mass gathering during the COVID-19 pandemic may disseminate the infection exacerbating the pre-existing epidemic, especially considering the low coverage rate for the COVID-19 vaccine in Iraq.

OBJECTIVE: To evaluate the risk for COVID-19 in Iraq during the next coming Arbaeenia mass gathering event 2021 by using WHO mass gathering risk assessment tool.

METHODS: We apply the WHO mass gathering risk assessment tool to measure the risk of dissemination of COVID-19 in Iraqi governorates involved directly with the mass gathering of Arba'eenia Visit. We calculated the national risk evaluation score and the governorates' risk mitigation score to measure the overall risk of COVID-19 in the following DoHs: Baghdad – Rusafa, Baghdad – Karkh, Karbala, Najaf, Babylon, Wassit, Muthanna, Basra, Diyala, Maysan, Dhi Qar, Diwaniya, and the relevant department at the Ministry of Health's headquarter.

RESULTS: The national risk evaluation score was 6/7, the average risk mitigation score of the participated governorates was 65%, and the overall risk of transmission of COVID-19 is high. Babylon showed the lowest mitigation score while Wassit, Diwaniya, and Baghdad – Karkh showed the highest score.

CONCLUSION: The overall risk of transmission of COVID-19 is high. National and international cooperation and developing emergency operations plans to enhance mitigation efforts are urgently required to prioritize COVID-19 prevention and control measures during Arbaeenia mass gathering.

Key words: Arbaeenia, mass gathering, COVID-19, Risk, evaluation, assessment.

INTRODUCTION

A mass gathering has been defined by the World Health Organization (WHO) as an occasion, either organized or spontaneous, where the "number of people attending is sufficient to strain the planning and response resources of the community, city, or nation hosting the event".¹ Historical data show that the events of different mass gatherings are the main source

of the spread of infectious diseases;^{2,3} however, many mass gatherings were successfully organized even when the WHO declared public health emergencies. For example, the FIFA World Cup in South Africa was organized during the H1N1 influenza epidemic, the 2015 Africa Cup of Football during Ebola, and many others.^{3,4,5} The sudden emergence of SARS-CoV-2 in China in December 2019, many mass

¹ MBChB, HD/FE/CM, FETP, Field Epidemiologist. Director of CDC Section / Karbala Directorate of Health, Karbala, Iraq.

² MBChB, PhD Public Health. Director General, Public Health Directorate, Ministry of Health, Baghdad, Iraq.

³ MBChB, HD/FE/CM, FETP, Field Epidemiologist, Public Health Directorate, Ministry of Health, Baghdad, Iraq.

⁴ BSc. CH, FETP Resident Community Health Technician, Public Health Department / Al-Najaf Directorate of Health, Najaf, Iraq.

⁵ BDS, FETP Resident, Quality Manager in Medico-Legal Directorate / MoH, Baghdad, Iraq.

⁶ BDS, FETP resident, Albaladiyat Dental Specialized Health Care Centre / Baghdad / Alrusafa Directorate of Health, Baghdad, Iraq.

⁷ BDS Pharmacy / FETP Resident, Public Health Department, Maysan Directorate of Health, Maysan, Iraq.

⁸ BSc CH, FETP resident, Community Health Technician / Babil Directorate of Health, Babil, Iraq.

⁹ BSc CH, FETP Resident, Community Health Technician, CDC Section / Public Health Department / Karbala DOH, Iraq.

¹⁰ MBChB, HD/FE/CM, FETP, Field Epidemiologist. Director of Field Epidemiology Section, ThiQar DoH, ThiQar, Iraq.

Corresponding Author: Safaa Saadoon Ali, Iraq Ministry of Health, Karbala Directorates of Health, Karbala, Iraq.

E mail: safaasaadoon@gmail.com.



gatherings were cancelled due to the risk of spreading COVID-19, such as Umrah in Saudi Arabia.^{3,6}

In Iraq, Many religious visits and rituals were conducted yearly; The Arba'een Pilgrimage is their biggest. It is held at Karbala, at the end of the 40-day mourning period commemorating the martyrdom of Imam Husain Ibn Ali. It is estimated that more than seventeen million people from inside and outside Iraq participated in these rituals for more than two weeks. These rituals are distributed over many Iraqi governorates but are focused in the city of Karbala at Imam Hussain Shrine. This religious gathering includes many traditions; the march to Karbala, establishment of tents on the roads to provide free food, beverage and accommodation, and mourners' gathering to complete the rituals.⁷ Proper planning and preparation for participation in mass gathering events is the most crucial step in minimizing the risk of spreading many communicable diseases, especially coronavirus disease 2019 (COVID-19).⁸

The COVID-19 Pandemic is a global health emergency that continues to spread around the world.⁹ The person-to-person transmission routes of the COVID19 virus include direct transmissions via respiratory droplets of an infected person within a radius of 6 feet and indirect transmission via inanimate objects. The appearance of symptoms of the infection varies from 2-14 days after getting an infection.¹⁰ In Iraq, as of the 14th of September 2021, the COVID-19 Pandemic has infected more than 1,9 million people, including more than 21 thousand deaths as reported by Iraq MoH.¹¹ Iraq has started the COVID-19 vaccination campaign on the 2nd of March 2021.¹² Yet, only 17% of the target population has so far received at least one dose of the COVID-19 vaccine,¹³ making mass gathering a considerable risk of disease transmission. As far as we know, no similar attempts have been conducted to evaluate, in advance, the risk for COVID-19 transmission in such event using a standardized risk assessment tool published by The WHO.

Objective: To evaluate the risk for COVID-19 dissemination in many relevant Iraqi governorate before the Arbaeenia mass gathering event of 2021 using the WHO assessment tool for mass gathering risk.

METHODS

Setting and Design: A descriptive cross-sectional study was conducted at thirteen directorates of Health (DoHs) during 5 - 6 September 2021. The DoHs included only those affiliated to eleven governorates in the middle and south Iraq who are engaged in the mass gathering event; Baghdad-Rusafa, Baghdad-Karkh, Karbala, Najaf, Babylon, Wassit, Muthanna, Basra, Diyala, Maysan, DhiQar, Diwaniya, and relevant department of the Ministry of Health's (MoH) headquarter. Risk score was measure once at the national level and applied for all DoHs, while mitigation score has been assessed at each directorate of Health.

Ethical consideration: This assessment was done upon the request of the Public Health Directorate at the Ministry of Health in Iraq, the protocol of and approval of the Public Health Directorate at the Ministry of Health in Iraq.

Definition of participants: The risk assessment tool of the WHO has included two parts, risk evaluation and risk mitigation. Five experts – evaluators- of field epidemiology; each has more than ten working years in public health departments from different health directorates answer the risk evaluation part. While 21 residents of the Intermediate Field Epidemiology Training Program/ cohort two- assessors- answered the questions related to the risk mitigation part.

Questionnaire: We used the WHO assessment tool for mass gathering risk for religious events in the context of COVID-19. This tool was available on the WHO website as a Microsoft Excel workbook.¹⁴ WHO risk assessment checklist questions have been converted into an electronic form using the online KoBo Tool box, an integrated set of tools for building forms and collecting interview responses. This electron-

Table 1 | Mitigation of main topics showing counts of questions per each topic and the total score for each topic by answers.

Topics	Number of questions per topic	Total score for each topic by answers		
		Yes (Complete)	May be (In Progress)	No (Not Considered) Or (Not Applicable)
1 Understanding COVID-19, the country situation, and the mass gathering	3	2	1	0
2 Event emergency preparedness and response plans	28	51	25	0
3 Stakeholder and partner coordination	2	3	1	0
4 Command and control	3	4	3	0
5 Communicating with Staff, Participants, Media, and Stakeholders	5	9	4	0
6 Public health awareness of COVID-19 before and during the event	6	11	6	0
7 Surge Capacity	4	7	4	0
8 Specific Religious Mitigation Measures	6	13	8	0
Total	57	100%	52%	0%

ic form was developed in English and Arabic and then distributed to all recruited evaluators and assessors. Precisely as in the WHO mass gathering risk assessment tool excel workbook, our questionnaire generally included two main checklists. The first one is related to risk evaluation, and the second one is related to risk mitigation. The risk evaluation was measure on a national level by the fine evaluators. In contrast, the assessors have answered the risk mitigation questions on the health directorate

level with the help of public health officers of the relevant health directorate.

The risk evaluation checklist included fourteen main questions subcategorized into two parts; the first contains seven questions related to the original risk of mass gathering. The second part consists of another seven questions related to event modification. All the fourteen main questions in the risk evaluation checklist had dichotomous responses of ‘yes’ or ‘no’. The dominant answer (at least 3 of 5) of the five as-

Table 2 | WHO risk versus mitigation decision matrix.

	Total Risk Assessment Score from COVID-19 evaluation tab	??
	Total Mitigation Score from COVID-19 mitigation tab %	??

Total Risk Score	Total Mitigation Score (%)			
	76-100	51-75	26-50	0-25
0-1	VERY LOW	VERY LOW	LOW	MODERATE
2-3	VERY LOW	LOW	MODERATE	HIGH
4-5	LOW	MODERATE	HIGH	VERY HIGH
6-7	MODERATE	HIGH	VERY HIGH	VERY HIGH

KEY

VERY LOW	Overall risk of transmission and further spread of COVID-19 is considered VERY LOW
LOW	Overall risk of transmission and further spread of COVID-19 is considered LOW
MODERATE	Overall risk of transmission and further spread of COVID-19 is considered MODERATE
HIGH	Overall risk of transmission and further spread of COVID-19 is considered HIGH
VERY HIGH	Overall risk of transmission and further spread of COVID-19 is considered VERY HIGH

assessors for each question was considered the final answer. The final answers were entered into the WHO's risk evaluation excel sheet that automatically calculated the final score ranges from zero to seven.

At least one assessor for each directorate was trained to interview stakeholders and complete the online mitigation checklist for mitigation risk assessment. These assessors completed the checklist in collaboration with the local public health authorities in the relevant Iraqi DoHs after a direct interview with experts involved in mass gatherings, risk assessment, epidemiology, and control measures of infectious diseases. The mitigation checklist includ-

ed fifty-seven questions categorized into eight main topics (Table 1) with a selection of one out of four responses; 'Yes/Completed', 'Maybe/In Progress', 'No/Not Considered, or 'Not Applicable'. Those 57 questions included; three questions related to understanding COVID-19, the country situation, and the mass gathering, 28 questions related to the event emergency preparedness and response plans, two questions related to the stakeholder and partner coordination, three questions related to the command and control, five questions related to the communicating with staff, participants, media, and stakeholders, six questions related to the public health awareness of COVID-19 before

Table 3 | Five evaluators total risk assessment from COVID-19 risk evaluation at the national level.

Question number	Evaluators					Average
	1st	2nd	3rd	4th	5th	
A: original risk of mass gathering						
1. Will the event take place in a host country experiencing community transmission (larger outbreaks of local transmission), as defined by WHO?	Yes	Yes	Yes	Yes	Yes	Yes
2. Will the event include international participation from countries experiencing community transmission, increasing risk of importation of COVID-19 cases to the host country?	Yes	Yes	Yes	Yes	Yes	Yes
3. Will the event include a significant number of participants or worshippers at higher risk of severe disease (e.g. people > 60 years of age or people with underlying health conditions)?	Yes	Yes	Yes	Yes	Yes	Yes
4. Will the religious event or celebration be held primarily indoors (eg in a church, synagogue, temple or mosque)?	Yes	No	No	Yes	Yes	Yes
5. Will the religious event or celebration be held in multiple venue/ cities/ countries (increasing travel between cities and between countries)?	Yes	Yes	Yes	Yes	No	Yes
6. Will the religious event or celebration include practices that increase contact between people (between worshippers or between worshippers and religious leaders) such as touching each other's, shaking hands, kissing or hugging)?	Yes	Yes	Yes	Yes	Yes	Yes
7. Will the religious event or celebration include practices that include the touching or sharing of artifacts (crosses, prayers rugs, communion vessels, etc.)?	Yes	Yes	Yes	Yes	Yes	Yes
B: Modifications of the event						
8. Can the religious event or celebration be held entirely or partially online (ie via live streaming)?	No	No	No	No	No	No
9. Can the religious event or celebration be modified so that there will be no international participation (visitors or worshippers) to reduce the risk of international spread?	No	Yes	Yes	No	Yes	Yes
10. Can the religious event or celebration be modified so that at high risk (eg people > 60 years of age or people with underlying health conditions) will be not attend or attend through virtual participation?	No	Yes	No	No	No	No
11. Can the religious event or celebration be modified so that the event will be held outdoors only?	No	Yes	No	No	No	No
12. Can the religious event or celebration be modified so that it will be held in a single venue?	No	No	No	No	Yes	No
13. Can the religious event or celebration be modified to restrict touching between worshippers or between worshippers and religious leaders?	No	Yes	No	No	Yes	No
14. Can the religious event or celebration be modified to restrict the sharing or touching of artifacts (crosses, prayer rugs or communion vessels)?	No	Yes	No	No	No	No
Total Risk Assessment Score from COVID-19 Risk Evaluation						6/7

and during the event, four questions related to the surge capacity, and six questions related to the specific religious mitigation measures. On entering the answers into the WHO's risk mitigation excel sheet, the software will automatically calculate the final score of the risk mitigation in a range of zero to 100. **Table 1.** Then, the final score of the risk evaluation and risk mitigation will be intersected on a decision matrix of the WHO risk assessment excel sheet to calculate the overall risk of COVID-19 dissemination in each DoH. This risk will be shown as very low, low, moderate, high and very high. **Table 2.**

RESULTS

Table 3 shows the risk evaluation for the 14 questions as reported by the five assessors with their average. **Table 4** shows the mitigation risk score, Wassit has the highest risk mitigation score (79 %), while Babylon has the lowest (47%). The overall risk of all tested governorates is high. However, Baghdad Karkh, Dlwan-

iya, and Wassit have a moderate risk. Babylone has a very high overall risk. **See table 5**

DISCUSSION

In general, Our assessment showed that the risk for COVID-19 dissemination in the next Arbaenia mass gathering at the national level is expected to be high. Many factors are criminalized for such a high-risk score.^{15,16} Iraq is still experiencing community transmission of COVID-19 as declared daily by Iraqi-MOH. Many Islamic countries where the international visitors come from are still experiencing high community transmission of this epidemic, such as Iran, Turkey, Pakistan, Afghanistan, Syria, and India, as reported by WHO.¹⁷ Modifications suggested to limit international participation are not considered or not applicable, in addition to the considerable national taking part from more than eleven Iraqi provinces. These multiple national and international participants will increase the travel between countries and

Table 4 | Mitigation scores for each topic in each directorate of Health

Topics of mitigation	Wassit	Diwaniya	Baghdad Karkh	Karbala	Maysan	Baghdad Rusafa	ThiQar	Najaf	Ministry centre	Muthanna	Basrah	Diyala	Babylon
1 Understanding COVID-19, the country situation, and the mass gathering	1	1	2	2	1	2	2	2	2	2	1	1	2
2 Event emergency preparedness and response plans	40	37	38	39	42	32	33	32	33	29	24	30	27
3 Stakeholder and partner coordination	3	3	3	2	1	3	3	3	1	3	2	1	3
4 Command and control	5	5	3	3	4	5	0	2	3	4	4	3	2
5 Communicating with Staff, Participants, Media, and Stakeholders	6	9	8	8	7	7	8	7	8	9	7	6	6
6 Public health awareness of COVID-19 before and during the event	8	7	10	8	3	9	10	7	8	8	5	4	3
7 Surge Capacity	7	7	7	7	7	7	6	7	6	4	7	5	4
8 Specific Religious Mitigation Measures	9	9	4	1	3	1	4	2	1	2	4	1	0
Total	79%	78%	75%	70%	68%	66%	66%	62%	62%	61%	54%	51%	47%

Table 5 | Final mitigation score and the overall risk at DoHs level.

DOHs	Mitigation Score	Overall risk
Babylon	47%	VERY HIGH
Diyala	52%	HIGH
Basrah	55%	HIGH
Najaf	62%	HIGH
Ministry centre	63%	HIGH
Muthanna	63%	HIGH
Baghdad - Rusafa	67%	HIGH
DhiQar	67%	HIGH
Maysan	69%	HIGH
Karbala	71%	HIGH
Baghdad - Karkh	76%	MODERATE
Diwaniya	78%	MODERATE
Wassit	79%	MODERATE
Average	65%	HIGH

cities carrying a higher risk of transmission.¹⁸ The significant visitor's number, including those aged more than 60 years or people with underlying health conditions crowded in an event held primarily indoors (Although many parts of this event are streamed online), increases the risk of COVID-19 transmission.^{19,20,21} Despite multiple national and global health promotions by MoH and NGOs, many risky practices that increase contact between worshippers or between worshippers and religious leaders are still not avoided during this event, such as touching each other, shaking hands, kissing or hugging as well as sharing prayer rugs.

Low average mitigation score at the national level could be explained by factors that led to the difficult implication of many mitigation measures. These measures were either not considered or not applicable in more than half of the assessed DoHs.

Shortening the duration of the Arbae'eenia mass gathering in the vast majority of the assessed DoHs is not applicable. Additional mitigation measures were not considered to limit possible large intra-country movements of people when visitors to Karbala go home to their cities. The availability of isolation rooms or mobile isolation units on-site when a person

falls ill or shows symptoms of acute respiratory infection during the event is not applicable.

Assigning seating arrangements during the event to ensure the crowd will remain stationary for most of the event is not applicable. Ensuring physical distancing cannot be maintained. Ensuring participants do not crowd at potential 'choke' points is not applicable. Measures in place to protect religious leaders, such as daily health checks, are not considered. Conducting COVID-19 laboratory diagnostic tests on all participants attending the event could not be applied.

The Provision of private cars and buses with limited travellers to enable participants to avoid public transportation is not applicable. The Medical Response Plan doesn't include resources and protocols for managing all public health interventions that would be necessary and supporting the national public health authorities if participants are infected and become sick at the event.

Collecting information by event organizers about the participants for this event, including the countries they are coming from, the epidemiological context of those countries, health data if available to gain a better understanding of the potential risks of disease spread, and facilitating measures such as contact tracing is not considered. Designated spacing was not provided to ensure worshippers are practicing their beliefs with enough physical distance from each other. Measures in place to protect religious leaders, such as physical distancing during services from worshippers, are not applicable. Side events or other private social gatherings connected to the event are not limited/or cancelled to reduce the risk of transmission. Decision-making authority/body and an agreed procedure to modify, restrict, postpone, or cancel the mass gathering event related to a COVID-19 outbreak is not applicable. Participants didn't provide information to allow for direct follow-up (contact tracing) with individuals and national governments on potential

exposure if there is a suspected or confirmed case of COVID-19 linked to the religious mass gathering. Two main broad topics could explain the worst mitigation score calculated for Babylon DOH. The poor public health awareness of COVID-19. Second, no specific religious mitigation measures were planned or executed for this event.

CONCLUSION

1. The risk for COVID-19 dissemination in the next Arbaeenia mass gathering in Iraq is assessed to be high.
2. Mitigation efforts in the majority of the engaged DOHs didn't even come close to the required level of efforts in such an event in Iraq in the context of COVID-19.
3. The overall risk of transmission and further spread of COVID-19 is assessed to be high.

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Abbreviations list: Coronavirus Disease (COVID-19), Directorates of Health (DoHs), Fédération Internationale de Football Association (FIFA), Ministry of Health (MoH), World Health Organization (WHO).

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