

# Mass gathering in Aqaba, Jordan, during Eid Al Adha, 2010

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## الحشود في احتفالات عيد الأضحى، بمدينة العقبة، الأردن، 2010

سلطان عبد الله، غازي شرخس، نبيل صبري، إبراهيم إبلان، محمد العبدلات، سحر جريصات، بسام حجواوي، رشا خنفر، مهند النصور

الخلاصة: خلال 5 أيام عطلة عيد الأضحى المبارك. العقبة واحد من أكبر التجمعات الجماهيرية في الأردن. ومن أمثلة مخاوف الصحة العمومية أثناء هذه المناسبة: الأمراض المنقولة عن طريق الأغذية والمياه، والغرق، والإصابات بسبب الكائنات البحرية، وحوادث السير على الطريق، ووجود ضغط على أقسام الطوارئ بالمستشفيات. وتهدف الدراسة إلى التعرف على المخاطر الرئيسية أثناء عيد الأضحى في العقبة وترتيبها حسب الأولوية، مع وضع نظام لترصّد مخاوف الصحة العمومية الرئيسية. وقد أُجريت دراسة شاملة للقطاعات في مدينة العقبة في الفترة من 16 إلى 20 تشرين الثاني/نوفمبر 2010. وشارك في هذه الدراسة كافة أصحاب المصلحة المعنيون. كما أجرى الباحثون زيارة استكشافية إلى مدينة العقبة، وعقدوا حلقة عملية تعريفية للمشاركين في الدراسة. وجمّعوا البيانات ذات الصلة باستخدام استمارات صمّموها خصيصاً لهذه الدراسة. وقد قُورنت النتائج بالأرقام المسجّلة قبل حلول عيد الأضحى بأسبوع. ولم يتم الإبلاغ عن أي فاشيات للتسمم الغذائي أثناء فترة العيد. وكانت هناك زيادة بمقدار 23% في التردد على قسم الطوارئ، و33% في معدل الإدخال بالمستشفيات، كما ارتفعت الحوادث المرورية بما يزيد على 300%. وكان الذكور أكثر تأثراً من الإناث بالمخاوف الصحية.

ABSTRACT During the 5-day Eid Al Adha holiday, Aqaba is the site of one of the largest mass gatherings in Jordan. Public health concerns during this holiday included: food- and waterborne diseases, drowning, injuries by marine creatures, road traffic crashes, and pressure on emergency departments at hospitals. This cross-sectional study was carried out in Aqaba during the period 16–20 November 2010 and aimed to identify and prioritize the major public health risks and to overview the preparedness plans of the Health Directorate during previous Eid events in Aqaba. All related stakeholders participated in the study. An exploratory visit to Aqaba was made and an introductory workshop was conducted for participants. Relevant data were collected and compared with the figures for the week prior to the event. No food poisoning outbreaks were reported during the event. There was a 23% increase in emergency department attendance, a 33% increase in hospital admissions, and road traffic crashes increased by more than 300%. More males were affected than females.

## Rassemblement de masse à Aqaba pendant l'Aïd Al-Adha (Jordanie), 2010

RÉSUMÉ Pendant les cinq jours de l'Aïd Al-Adha, Aqaba est le théâtre d'un des plus grands rassemblements de masse en Jordanie. Durant ce congé, les problèmes de santé publique sont notamment les suivants : maladies d'origine alimentaire et hydrique, noyades, blessures causées par des animaux marins, accidents de la circulation routière et surcharge des services des urgences dans les hôpitaux. La présente étude transversale avait pour but d'identifier et de hiérarchiser les principaux risques pour la santé, et de présenter les grandes lignes des plans de préparation établis par la Direction de la Santé lors des précédentes fêtes de l'Aïd à Aqaba. Toutes les parties prenantes ont participé à cette étude. Une visite d'exploration a eu lieu à Aqaba et un séminaire-atelier préliminaire s'est tenu à l'intention des participants. Des données pertinentes ont été recueillies et comparées avec les chiffres de la semaine précédant l'événement. Pendant le rassemblement, aucune flambée épidémique due à une intoxication alimentaire n'a été signalée. La fréquentation au service des urgences a augmenté de 23 %, les hospitalisations de 33 % et les accidents de la route de plus de 300 %. Davantage d'hommes que de femmes ont été affectés.

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## Introduction

Mass gatherings are characterized by large crowds of spectators and participants, and are an increasingly common feature in many cultures. There is growing recognition of public health concerns in mass gatherings. These include water and sanitation management, emergency preparedness, transportation, crowd management and bioterrorism. All of these are challenges to control during mass gatherings [1]. Enhanced surveillance is needed to detect events in a timely manner and to communicate information on public health concerns. Other methods of surveillance during mass gatherings include additional community-based systems and setting up event-specific surveillance [2]. Integration and coordination of surveillance systems is critical to ensuring comprehensive and coherent results [3].

Extensive planning and preparedness are required in the provision of public health services for mass gatherings, and important to the planning is a thorough knowledge of the incidence and types of health problems that may occur [4].

Studies have been done at mass gathering events in many countries. In Virginia, United States of America, health authorities conducted a daily syndromic surveillance to monitor diseases symptoms and injuries at a sport summer camp. Gastroenteritis outbreaks and heat-related injuries were recorded [5]. A study conducted at a 9-day agricultural and horticultural show in Australia in 2002 demonstrated the high injury burden and the increased strain this placed on medical services [6]. Another study in Australia during a World Youth Day celebration in 2008 showed that implementing continuous re-evaluation of case definitions and ongoing laboratory testing helped in the early identification of an influenza outbreak among attendees [7]. All this suggests a definite role for planning

strategies to reduce injury outcomes, including live surveillance of injury type and cause, risk management and public education.

Many mass gatherings are held in the Middle East and North Africa region, however only the Hajj has been addressed in the literature [8,9]. This is one of the largest mass gathering events in the world: millions of pilgrims from almost every country gather annually over several days. Throughout its long history, Hajj has been witness to a series of major health issues, with respiratory infections the most frequently reported complaints [10]. There is also the potential for further spread infectious diseases when participants return home from mass gatherings. This was demonstrated after Hajj 2000 and 2001, when clusters of meningococcal cases (serogroup W135) were reported [11]. These were linked to either a history of recent returnees from the Hajj or of household contact with returned pilgrims.

The lack of information regarding other mass gatherings in the region has highlighted the importance of concentrating on this ignored area, which is of great consequence to public health.

Jordan has a population of 6 million [12]. It has a stable political, social, and economic situation that encourages hundreds of thousands of people to visit the country. Annually, many mass gathering events are held, including religious, cultural, and recreational events. To the best of our knowledge, no studies have been conducted to investigate public health concerns during such mass gatherings in Jordan.

Aqaba, population 70 000, is the only coastal city in Jordan. It is located on the Red Sea 350 km south of the capital, Amman. It is visited by large number of people, mainly young adults and families, from Jordan, the region, and other countries for tourism. Aqaba is also a duty free zone, and is visited for trading purposes. The number of visitors increases greatly during Eid, a

Muslim religious occasion, and a national holiday in Jordan.

Eid Al Adha (5 days) occurs during the Hajj. The timing depends on the Islamic (Hijri) calendar, which is 11–12 days shorter than the solar year. The majority of visitors come to Aqaba by car via the Dead Sea highway and the Desert highway. Visitors participate in a number of activities including swimming, cruising and shopping.

The aims of this study were to overview the preparedness plans executed by Aqaba Health Directorate and other stakeholders during previous Eid events in Aqaba and review the success, effectiveness, and limitations of these plans. We also aimed to identify, prioritize, and analyse public health risks during the Eid mass gathering, and create tools for the surveillance of public health concerns that are not included in the current Jordanian surveillance system, e.g. drowning.

## Methods

Eid Al Adha vacation lasted for 5 days (16–20 November) in 2010. The expected number of visitors to Aqaba during this period ranges from 30 000 to 70 000.

Our study was multisectoral; stakeholders (partners in this project) included: the Communicable Diseases Directorate; Aqaba Health Directorate; the Islamic Hospital; the Modern Aqaba Hospital; Princess Haya Hospital; Aqaba Governorate; the Police Directorate; the Civil Defence Directorate; Aqaba Special Economic Zone Authority; and the Tourism Directorate.

The existing surveillance system in Jordan is basically passive (notification by health facilities), and is monitored by the Ministry of Health Directorate of Communicable Disease. The list of about 45 notifiable diseases and events is divided into 2 groups: Group A, diseases which must be notified to the public health authorities within 24

hours (e.g. cholera, food poisoning) and Group B, diseases and events that must be notified via the weekly report (e.g. chicken pox, hepatitis) [13]. For surveillance purposes, health centres, clinics, and hospitals report to one of the 21 reporting sites, which in turn report to the Directorate of Communicable Diseases.

Health facilities in Aqaba include 1 military hospital (127 beds), 2 private hospitals (40 beds each), 4 Ministry of Health health centres and many private clinics. All of these facilities report to Aqaba Health Directorate. Aqaba Special Economic Zone Authority is responsible for food safety, and during Eid the authority strengthens the measures on food safety in the city to prevent food poisoning outbreaks. In the event of an outbreak food poisoning, the epidemiological investigation is done by the surveillance department in Aqaba Health Directorate under the supervision of the Directorate of Communicable Diseases, while food and environmental investigation is done by the Aqaba Special Economic Zone. The Food and Environmental Department in Aqaba Health Directorate is responsible for water safety in the city in collaboration with the Directorate of Environmental Health in Amman. Sources for drinking water and the water network are tested chemically and biologically. Once contamination is detected, provision of water is discontinued immediately till the contamination is removed.

### Preparedness

The main stakeholders in Aqaba, such as hospitals, the Health Directorate and the police administration, were visited by the Field Epidemiology Training Programme study team on 20 October, 2010. These visits aimed to examine the experiences of all partners during previous Eid holidays, the expected number of visitors, and the preparedness of each partner for the

coming Eid holiday. Visits also targeted hospitals to check their capacity to deal with expected events. An introductory workshop was conducted on 20 October 2010, where the study objectives, its importance to public health, and cooperation between stakeholders were addressed and discussed.

The available data from hospitals, police administration, and Civil Defence administration for the Eid events during the previous 2 years were analysed to assess public health concerns during the holiday. These data included the number of patients who attended emergency departments, numbers admitted to hospital, and numbers of road traffic crashes and drownings. Preventive measures were also identified. These were discussed and agreed upon by stakeholders so they could be implemented during Eid Al Adha 2010.

### Surveillance system for the Eid event, 2010

This cross-sectional study was approved by the Ministry of Health and Aqaba Governorate.

Surveillance activities began 14 days before the event and extended until 10 days afterwards. An enhanced surveillance system was conducted between 2 and 30 November 2010. The existing surveillance system was enhanced by:

- operating an additional paper-based reporting system from hospitals, police administration, and Civil Defence administration;
- increasing the frequency of reporting from weekly to daily (case definitions were the same as in the surveillance guidebook);
- including drowning in the system;
- enhancing laboratory capacity and reporting by facilitating the immediate delivery of laboratory samples to Amman in cases (e.g. meningitis and food poisoning) where the local laboratory is not qualified to perform the tests;

- enhancing awareness among clinicians during visits of the FETP team to hospitals;
- training clinicians on the new paper-based surveillance system and case definitions of diseases;
- strengthening ties with clinicians and other partners;
- collecting data on a form specifically designed for the purposes of the study, covering age, sex, nature and time of the concern, and outcome.

During Eid Al Adha, the Jordan Field Epidemiology Training Programme team as well as the Ministry of Health focal point were present in Aqaba. Daily meetings to follow the situation with relevant focal points, receiving and reviewing daily reports, and daily visits to health facilities were among the team activities during the event.

### Post event activities

A closeout workshop was held in Aqaba on 3 December, 2010 to present the study.

### Previous data review

No baseline data could be drawn up owing to the poor quality of the information in their reporting forms. The reports from hospitals, the police administration and the Civil Defence administration during 2008 and 2009 were in the main administrative rather than epidemiological.

### Risk assessment

Through reviewing the reports as well as from discussions with stakeholders, the following public health issues were given priority since all are of high likelihood and have urgent consequences:

- food- and waterborne diseases,
- drowning,
- injuries by marine creatures which are present in the Red Sea,
- road traffic crashes,
- pressure on emergency departments at hospitals.

**Table 1 Variation in public health concerns during Eid Al Adha, Aqaba, 2010**

Incident	No. of cases in week before Eid	No. of cases during Eid	Increase <sup>a</sup>
Road traffic crash	11	39	345%
Hospital admission	56	75	33%
Emergency room attendance	1442	1766	23%
Injury caused by marine creatures	0	22	+22
Drowning	0	7	+7
Food poisoning	0	0	0

<sup>a</sup>Expressed as percentage or absolute number.

## Preventive measures

The following preventive measures were introduced:

- strengthening of control measures on food and drinks street vendors to prevent food- and waterborne diseases;
- preparedness of health facilities including health personnel, equipment, etc.;
- establishing a mobile health station on the beach to deal with emergency cases promptly and effectively;
- advising people to swim in safe places and only where lifeguards are available (health messages were delivered via signs/signals placed on beach);
- banning driving in specific streets identified (based on previous experience) as being crowded with pedestrians;
- banning visitors from camping in the streets and other areas in the city.

## Results

During the 5 days of the event, the weather was moderate with temperatures ranging between 15 °C and 29 °C.

The number of drownings increased from 0 in the previous week to 7 during the event. There was a more than 3-fold increase in road traffic crashes. No food poisoning outbreaks were detected during the study period. The main public health events are shown in Table 1.

Males accounted for 92% of road traffic crash victims, 87% of injuries by marine creatures, and 71% of drownings (Table 2).

There were 39 road traffic crashes during the Eid period. Collisions were the most common type (69%) followed by being run over (18%) (Table 3).

All the preventive measures that were introduced were implemented except preventing camping in the streets.

## Discussion

For this study, the reviewed data and reports from previous similar events in Aqaba demonstrate the poor capacity of the existing surveillance system to identify cases of public health concern during mass gathering events.

To ensure public health safety during mass gatherings, the surveillance system must provide sufficient numerical findings to plan, implement, and evaluate public health actions related to the event.

Our results showed a considerable increase in the occurrence of certain public health risks during the Eid holiday in Aqaba even though many preventive measures had been implemented. Large numbers of participants in mass gatherings usually lead to increased demand on food vendors; consequently, the incidence of foodborne diseases often increases. A study in Saudi Arabia showed that diarrhoea was the third most common cause of hospitalization during the Hajj [14]. Many factors may contribute to this problem including inadequate standards of food hygiene, shortage of water, the presence asymptomatic carriers of pathogenic bacteria, and inappropriate storage of food. However, the strict monitoring measures on food and water safety in force during the event we studied may explain the absence of food poisoning outbreaks. The health authorities responded appropriately

**Table 2 Distribution of public health concerns according to sex, Eid Al Adha, Aqaba, 2010**

Incident	Males		Females	
	No.	%	No.	%
Emergency room attendance	905	53	861	47
Hospital admission	39	52	36	48
Drowning	5	71	2	29
Injury caused by marine creatures	19	87	3	13
Road traffic crash	36	92	3	8

**Table 3 Distribution of road traffic crashes according to type, Eid Al Adha, Aqaba, 2010**

Type	No.	%
Collision	28	72
Run over	7	18
Overtaking	4	10
Total	39	100

to the increased population during the Eid event.

The number of hospital admissions and emergency cases increased noticeably during the Eid period. The location of Aqaba so far from other cities may also have increased the load on the city health facilities.

Swimming is one of the main activities enjoyed by visitors, since the Gulf of Aqaba is the foremost place in Jordan for outdoor swimming. Many visitors, however, go swimming without adequate training. These are the most likely reasons for the increase in drowning cases and injuries by marine creatures during the Eid event. This would,

of course, be reflected in the increase in hospital admissions.

Most of the participants use their own cars to visit Aqaba. Thus, the vastly increased number of vehicles within a small confined area resulted in the huge increase recorded in the number of traffic crashes, again having an effect on the hospital admission figures.

There was a predominance of males in the public health consequences during Eid in Aqaba, particularly for drownings, injuries caused by marine creatures and road traffic crashes. The greater numbers of males taking part in these activities is likely to be the reason for this.

## Recommendations

There is a need to strengthen the preventive measures during the Eid holiday period in Aqaba. The enhanced surveillance system that was put into place was effective in linking the related sectors with the public health situation on a daily basis.

- A permanent committee should be established headed by the health authorities to deal with public health issues during Eid.
- This study should be shared with decision-makers to highlight the importance studies on mass gatherings.
- Rigid control measures on food and water safety should be continued.
- Educational pamphlets should be prepared for future Eid events targeting road traffic crashes, drowning, and injuries by marine creatures. These pamphlets should be distributed to visitors before they arrive in Aqaba.
- Assess the safety of beaches and the possibility and efficacy of employing lifeguards.

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