

Introduction

- Alkhurma (or Alkhumra) Hemorrhagic Fever Virus (AHFV) is a newly emerging viral hemorrhagic fever in KSA
- Direct contact with animals and animal products has been suggested as mode of transmission for AHFV; camels, goats, and sheep have been linked to Alkhurma virus transmission
- Alkhurma viral RNA was detected in soft ticks (*Ornithodoros Savignyi*) and hard ticks (*Hyalomma dromedarii*)
- Understanding of epidemiology and etiological factors of AHFV is needed by public health policymakers in Saudi Arabia to enhance detection and prevention efforts

Objectives

Examine reported cases of AHFV in Saudi Arabia over a period of four years (2011 – 2014):

- Describe the annual and seasonal time trends of AHFV occurrence
- Describe geographical distribution of AHFV
- Describe person-related characteristics of AHFV cases (age, gender, nationality, occupation)

Figure 1. Map of Kingdom of Saudi Arabia, with regions where Alkhurma Hemorrhagic Fever Virus cases were reported (represented by red dots)



Methods

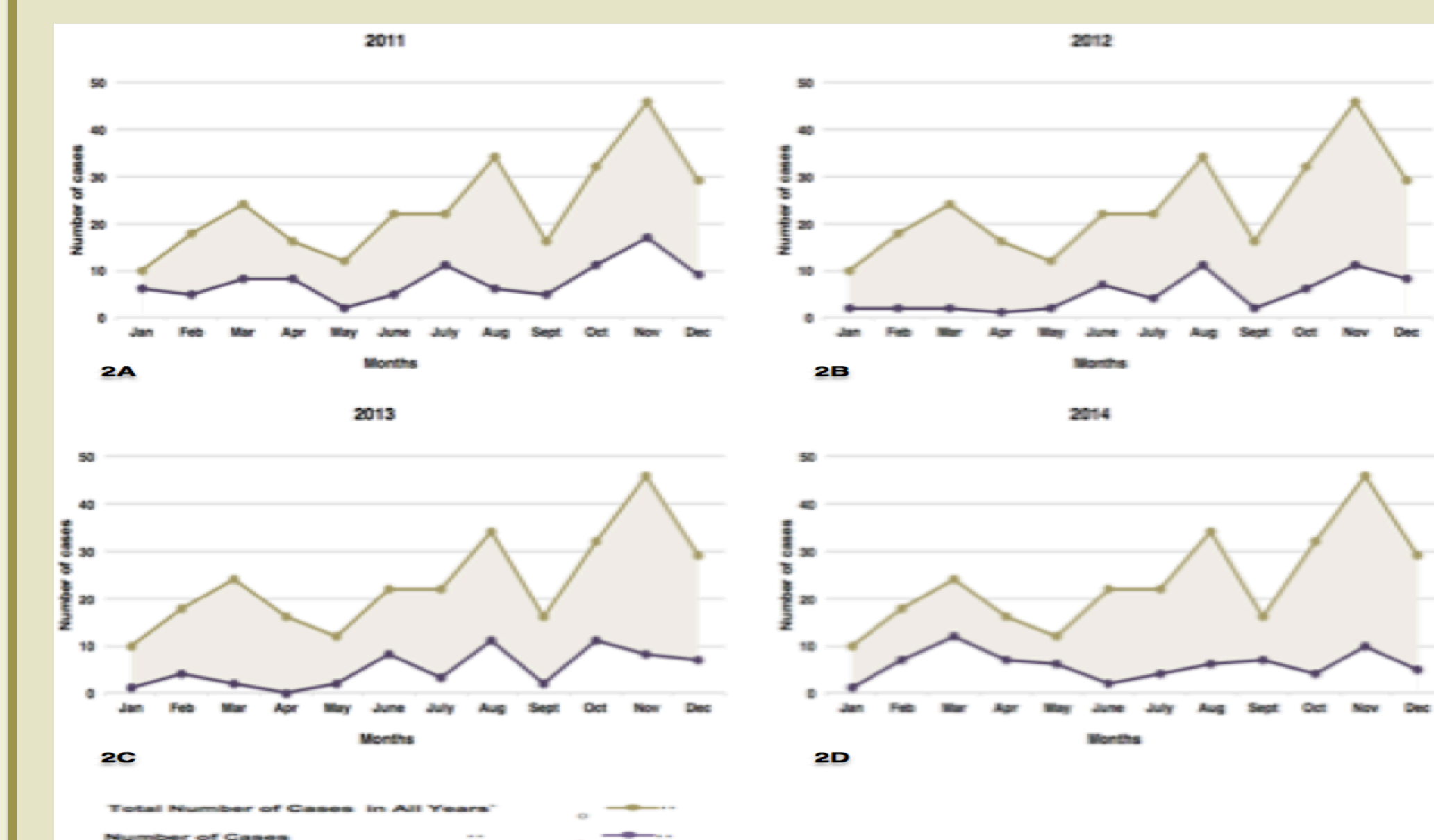
- Dataset used in this study was generated as part of AHFV notifiable surveillance system of the Saudi Ministry of Health.
- Dataset included laboratory confirmed cases of AHFV from 2011 to 2014 and their epidemiologic data (age, gender, nationality, occupation, time of diagnosis)
- Total of 281 AHFV cases reported in KSA from 2011-2014
- Data was de-identified; study was exempt from IRB review
- Descriptive analysis of data was performed
- Bivariate analyses were conducted to examine the association between the study variables

Results

Time

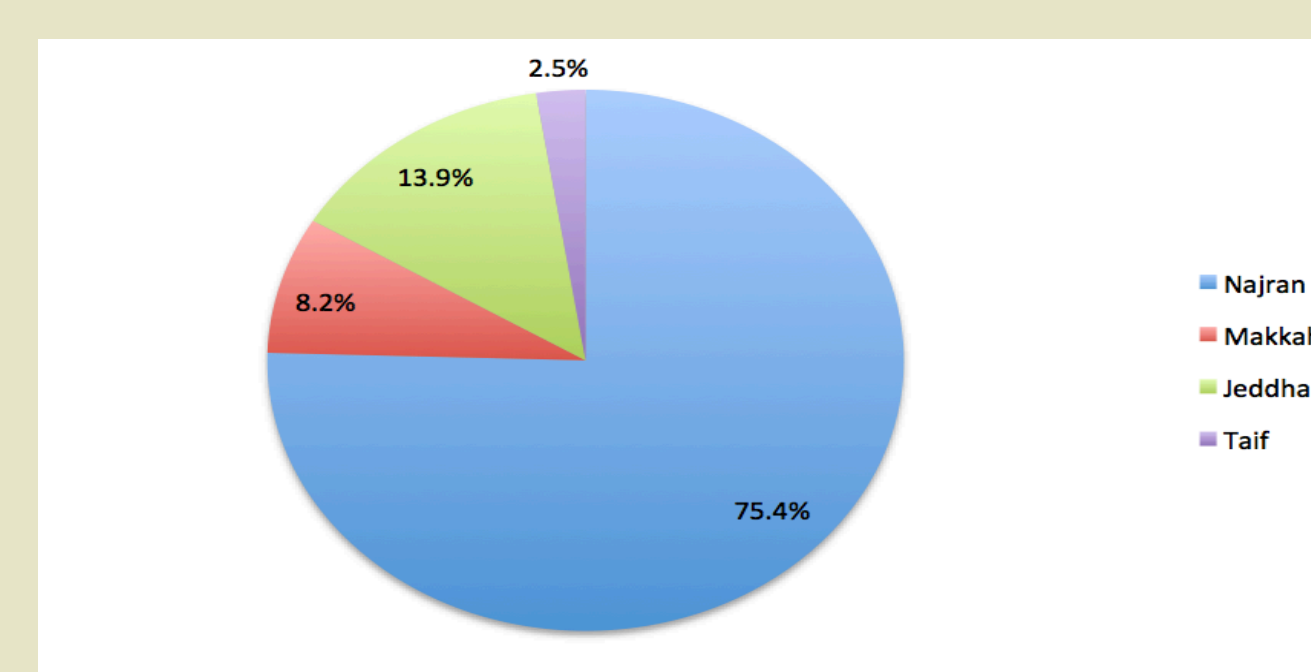
- Trend for cases was non-linear
- Two peaks (August and November)

Figure 2. Monthly distribution of Alkhurma Hemorrhagic Fever Virus over a four-year period in Saudi Arabia (2011-2014)



Place

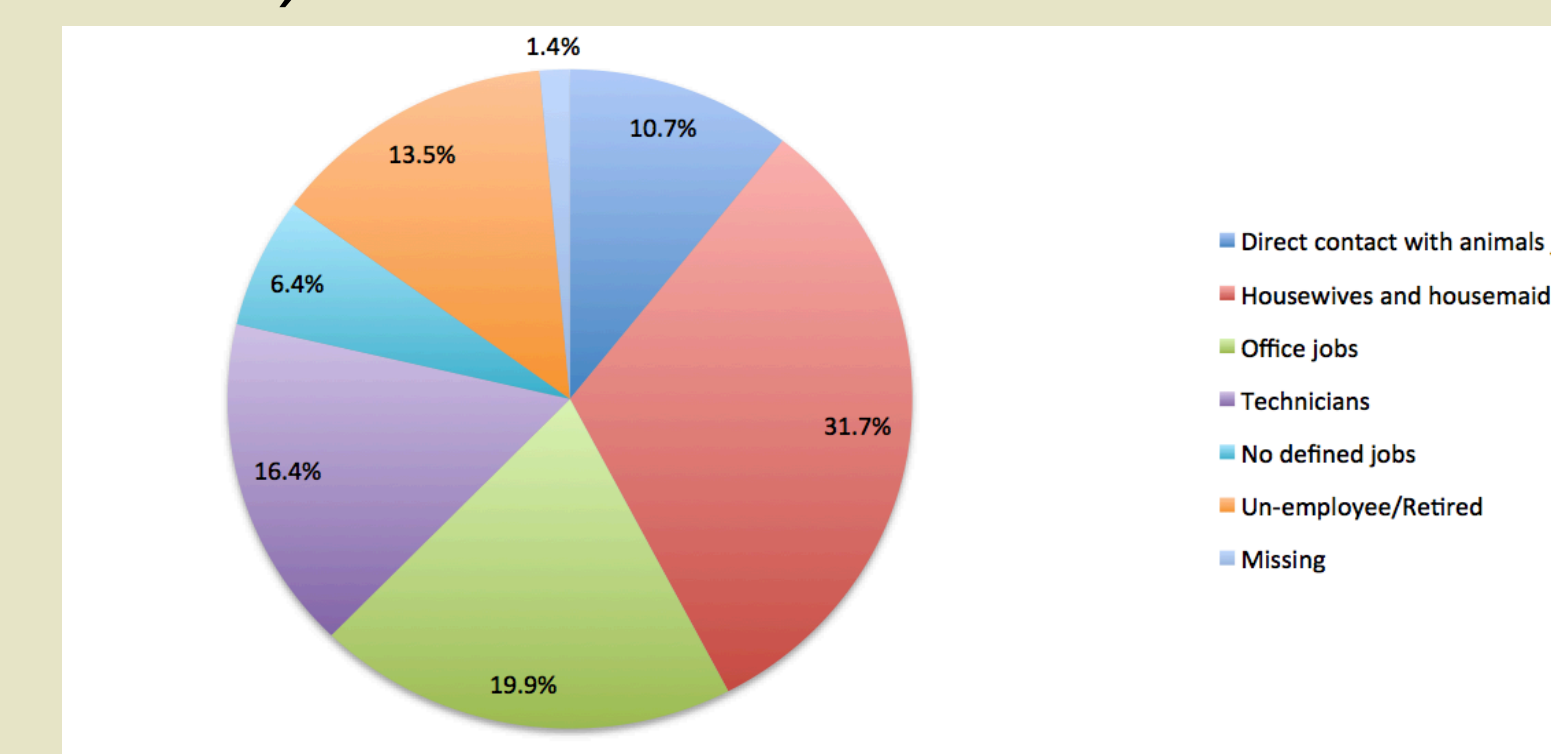
Figure 3. Geographical distribution of Alkhurma Hemorrhagic Fever Virus in Saudi Arabia (2011-2014)



Person

- The mean age of patients was 37.6 years (SD=17.6 years)
- Proportion of AHFV cases higher among Saudi nationals (63.7%)
- Cases were predominantly male (63.3%)

Figure 4. Occupation groups among Alkhurma Hemorrhagic Fever Virus cases in Saudi Arabia (2011-2014)



- The largest occupational group was housewives and housemaids. This group was entirely female
- The second largest occupational group was those with office jobs. This group was younger on average than other occupational groups, with an average age of 24.7 years (± 11.5)
- Technicians and direct contact with animals jobs groups were entirely male

Table 1. Demographic characteristic of patients with Alkhurma Hemorrhagic Fever Virus in Saudi Arabia by year (2011-2014)

	Year				
Demographic Characteristics	2011	2012	2013	2014	Total
Age group (year) *					
0-14	4 (18.2)	6 (27.3)	3 (13.6)	9 (40.9)	22
15-24	11 (22.5)	7 (14.3)	17 (34.7)	14 (28.6)	49
25-34	21 (29.6)	17 (23.9)	17 (23.9)	16 (22.5)	71
35-44	24 (41.4)	12 (20.7)	5 (8.6)	17 (29.3)	58
45-54	14 (36.8)	9 (23.7)	10 (26.3)	5 (13.1)	38
55+	19 (44.2)	7 (16.3)	7 (16.3)	10 (23.3)	43
Gender					
Male	51 (28.7)	39 (21.9)	43 (24.2)	45 (25.3)	178
Female	42 (40.8)	19 (18.5)	16 (15.5)	26 (25.2)	103
Nationality					
Saudi	60 (33.5)	30 (16.8)	42 (23.5)	47 (26.3)	179
Non-Saudi	33 (32.4)	28 (27.5)	17 (16.7)	24 (23.5)	102
Occupation group *					
Direct contact with animals jobs	2 (6.7)	9 (30)	6 (20)	13 (43.3)	30
Housewives and housemaids	38 (42.7)	16 (18)	15 (16.9)	20 (22.5)	89
Office jobs	13 (23.2)	12 (21.4)	12 (21.4)	19 (33.9)	56
Technicians	18 (39.1)	8 (17.4)	10 (21.7)	10 (21.7)	46
No defined jobs	3 (16.7)	3 (16.7)	8 (44.4)	4 (22.2)	18
Un-employed/Retired	19 (50)	9 (23.7)	8 (21.1)	2 (5.3)	38
Missing	0	1 (25)	0	3 (75)	4
Region *†					
Najran	75 (35.4)	40 (18.9)	50 (23.6)	47 (22.2)	212
Makkah	7 (30.4)	1 (4.4)	8 (34.8)	7 (30.4)	23
Jeddah	10 (25.6)	17 (43.6)	0	12 (30.8)	39
Taif	1 (14.3)	0	1 (14.3)	5 (71.4)	7
Total	93	58	59	71	281 (100%)

* p-value <0.05 (Chi-square test for association)

† p-value might be false positive because there were regions that had zero case in some year

Case fatality rate was 1.8%; two deaths in 2012 and three deaths in 2013. No deaths in 2011 and 2014.

Discussion

- Study provides a descriptive epidemiology profile for AHFV and identifies high-risk groups and regions. Results can inform efforts to modify current measures and policy for prevention, control, diagnosis and management of AHFV in KSA
- The high proportion of cases in Najran, bordering Yemen, and the occurrence of peak numbers of AHFV cases in the weeks following the Hajj period – a high livestock importation period – calls attention to the possibility of virus circulation in neighboring countries
- Occurrence of AHFV cases in Taif for the first time suggests possibility of AHFV underreporting in other regions in KSA that have not reported cases yet
- Direct contact with animals could still be main possible mode of transmission in those occupation groups not involving direct contact with animals
- Exposure to the Alkurma virus among housewives and housemaids might be explained by possible contact with raw meat during food preparation or by exposure to livestock and ticks when taking care of livestock

Recommendations

- Continuous monitoring, evaluation and improvement of AHFV surveillance program
- Conducting further studies to understand etiology
- Increasing public awareness of taking protective measures while handling animals or animal products
- Controlling livestock trade and importation with neighboring countries

Acknowledgments

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