UPDATE OF RIFT VALLEY FEVER

IN

YEMEN




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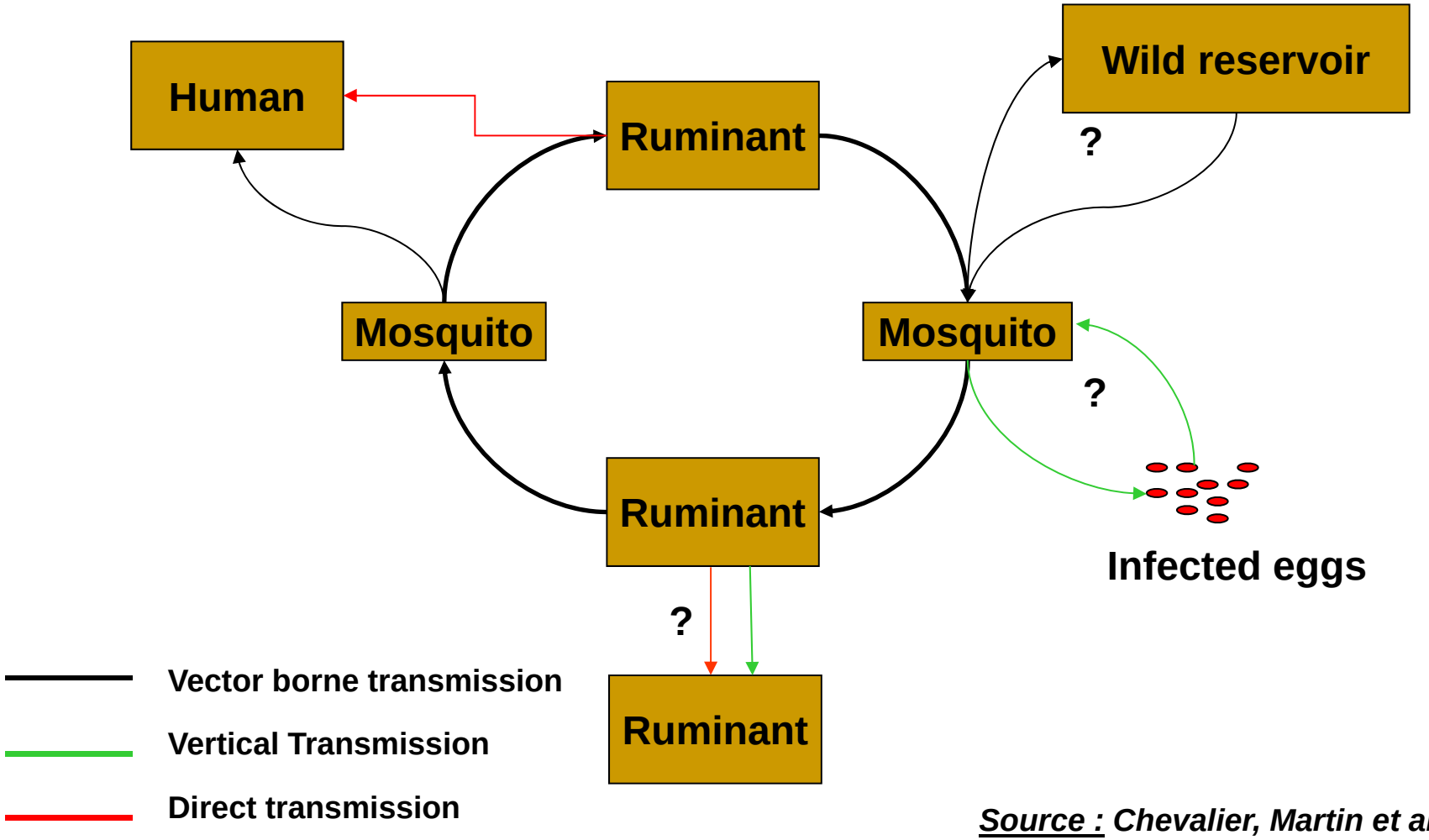
Outline

- Introduction
- Brief descriptive study of RVF in 2000
- Sero-Surveillances of RVF from 2003 to 2011
- Brief of socio-economic impact of Rift Valley Fever in Yemen
- Discussion and perspectives

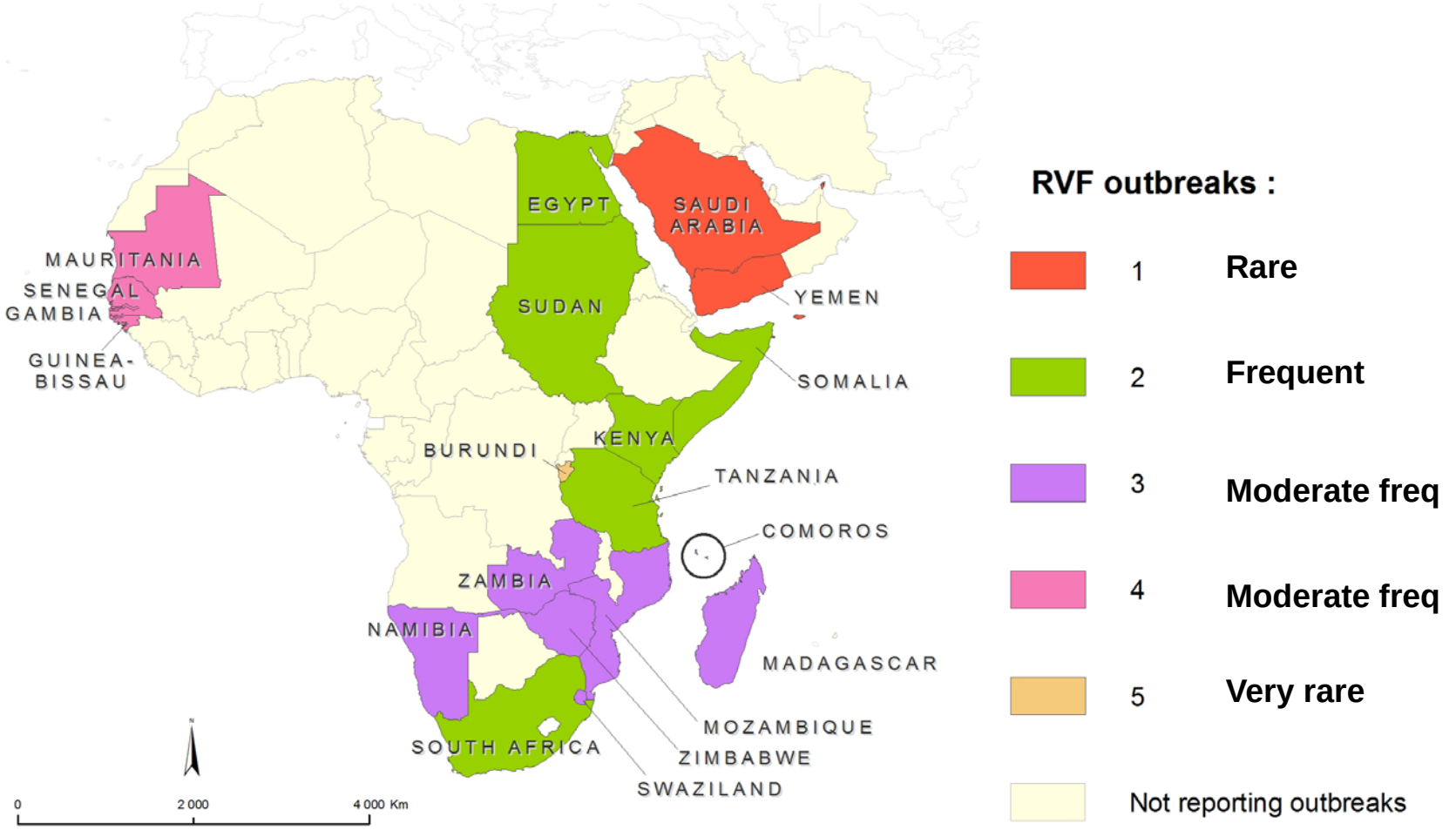
INTRODUCTION

Epidemiological Cycle of RVF



Source : *Chevalier, Martin et al. 2008*

Geographic distribution of RVF in the world, 1930 - 2012



Context

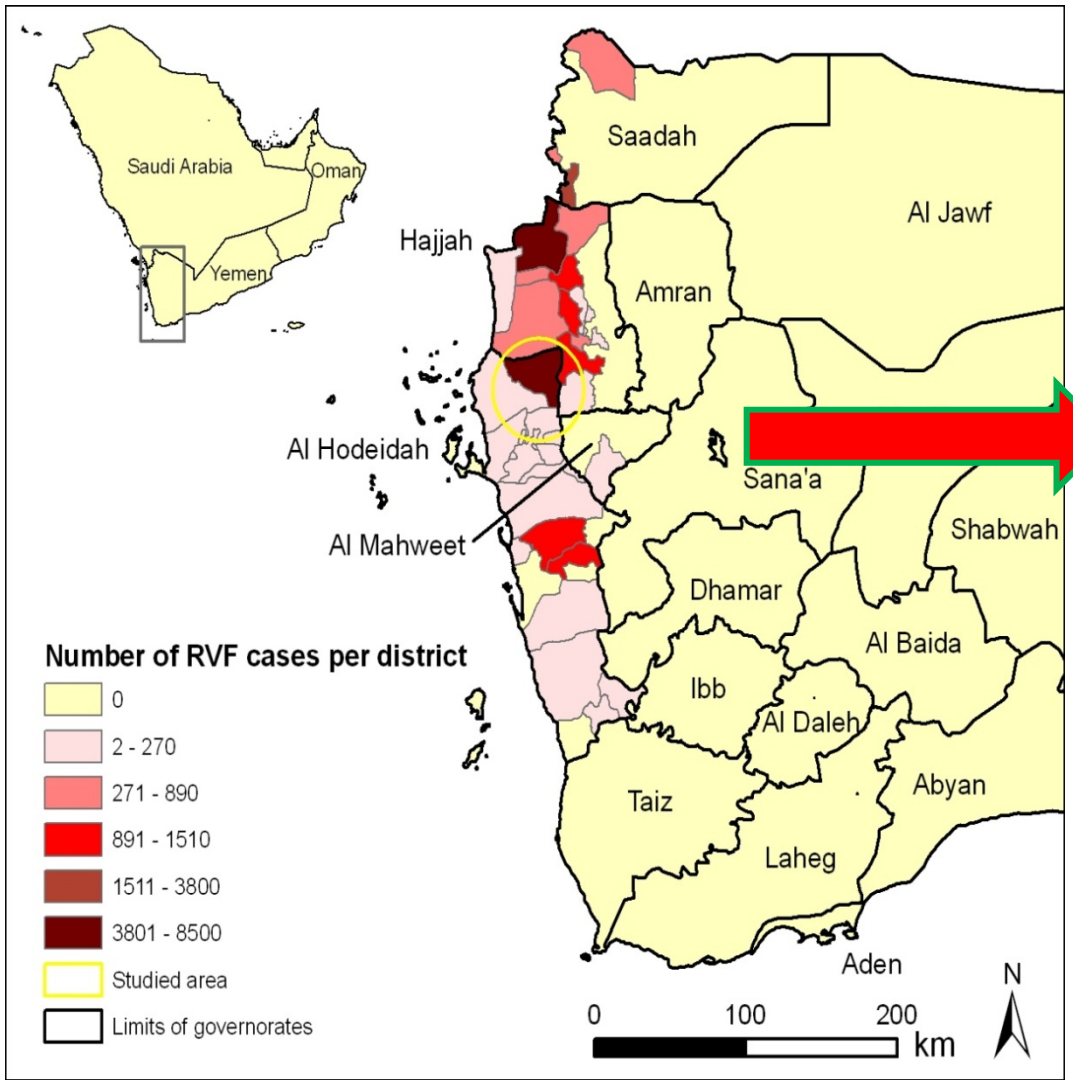
- Rift Valley Fever has long history in the East and West of Africa since 1930

- In 2000, for the first time, a severe outbreak of RVF hits Yemen and KSA

➡ Many questions about the factors associated with this outbreak with different assumptions.

Descriptive and Epidemiology of Rift Valley Fever Outbreak in Yemen

National scale study: infected districts in Yemen, 2000-2001

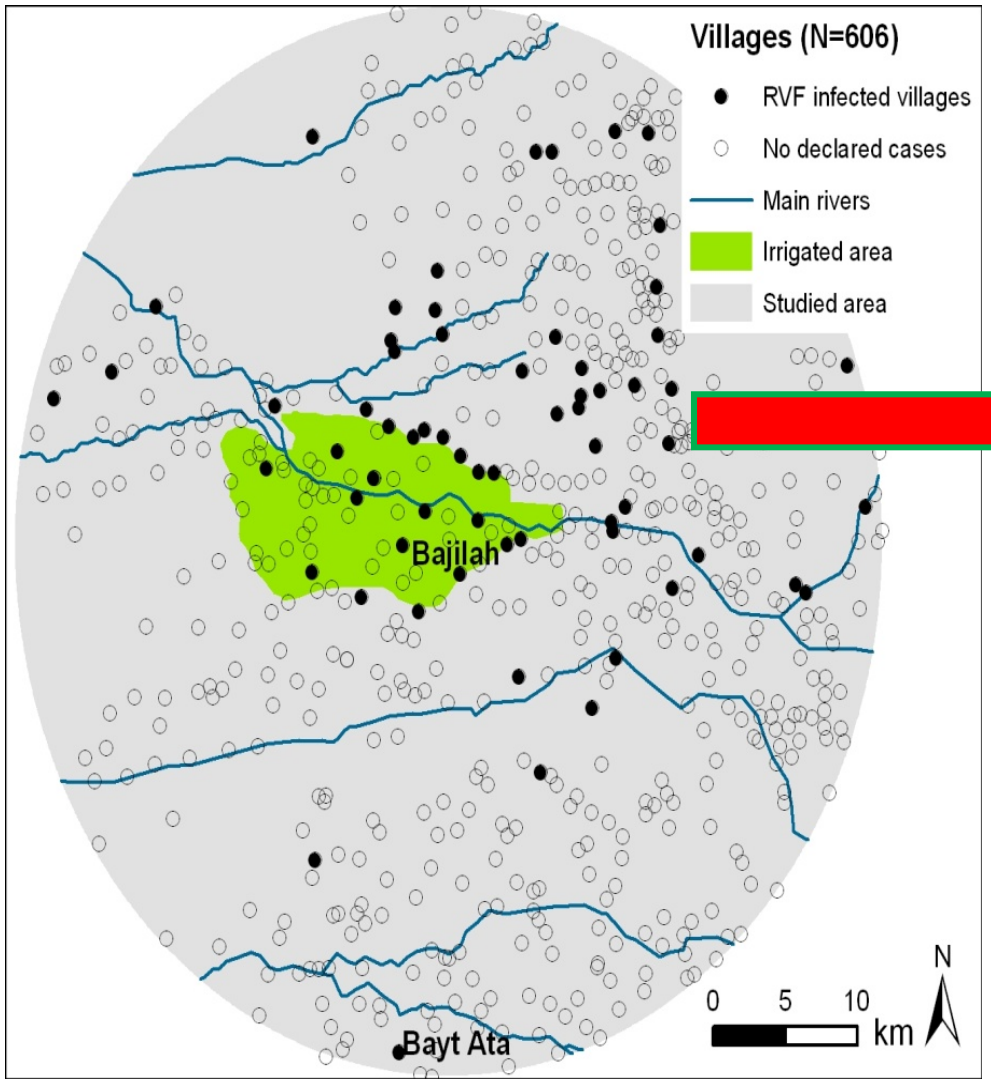


The Tihama coast was the most affected area in Yemen:

- Sa'adah, Hajjah and Al-Hodaidah governorates

- An area characterized by « Wadis »

Local scale study: infected villages in the Wadi Mawr, 2000-2001



Study area: 30 km radius area around Bajilah, Wadi Mawr

- Infected village

= at least one death or abortion of cattle, sheep, goat or camel

- All the infected villages situated < than 300 m

(between Sept. 2000 and Feb. 2001)

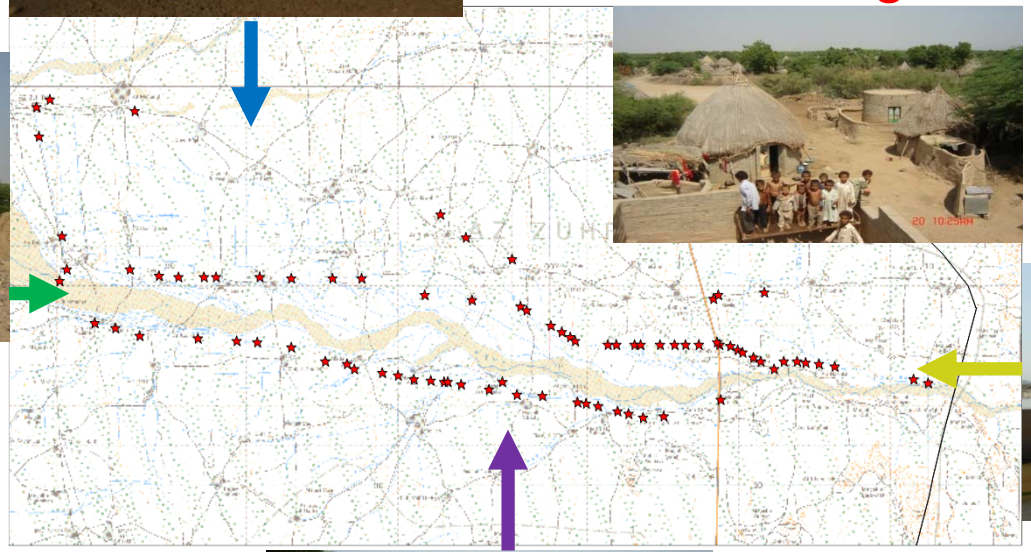
Reports to the national veterinary services (passive surveillance data)

Wadi Mawr from East to West

Northern canal
Irrigation schemes

★ Village

Bed of wadi



Main dam

Southern
canal

Local scale descriptive study: main results

- Most of the infected villages were located in the irrigated zone or close to a water stream (valleys)

➡ Relationship between water bodies and risk of infection

➡ Identification of risk areas

Sero-surveillance of RVF samples from Tihamah Area and Quarantine Station 2003 - 2011

Samples Al-Daher District, Sa'adah Novembre 2003

Age group	No tested	IgM Results	IgG Results
<2 years ago	75	0	2
2 years and > 2 years old	171	0	46
Unknow	114	0	4
Total	360	0	52

Surveillance samples tested for RVF IgM, May 2005-June 2006

Governorate	Tested Samples for RVF IgM			Notes
	Sheep	Goat	Cattle	
Hajjah	81	89	14	
Al-Hodaidah	596	911	89	1 positive RVF IgM-2005 in sheep 1 positive RVF IgM-2006 in Goat
Raimah		6		
Sa'adah	80	115	0	
Al-Mokha (Quarantine	183	290	458	
Total	**940**	**1411**	**561**	**2 positives (0.07%)**

RVF IgM ELISA Results
July 2006 – Dec. 2006

Governorate	Sheep		Goat		Cattle	
	Tested	Pos.	Tested	Pos.	Tested	Pos.
Al-Hodaidah	184	0	186	0	18	0
Hajjah	22	0	0	0	0	0
Sa'dah	5	0	21	0	0	0
Taiz (Quarantine)	16	0	12	0	47	0
Total	**227**	**0**	**219**	**0**	**65**	**0**

RVF IgG ELISA Results
July 2006 – Dec. 2006

Governorate	Sheep		Goat		Cattle	
	Tested	Pos.	Tested	Pos.	Tested	Pos.
Al-Hodaidah	90	3	88	3	8	0
Taiz (Quarantine)	16	2	12	0	47	0
Total	**106**	**5**	**100**	**3**	**55**	**0**

RVF Survey in Tihamah (Al-Hodaidah and Hajjah governorates) 2007 IgG RVF ELISA

Age group	Samples tested	Positives RVF IgG
Less than one year	42	2
1 – 2 years	129	10
More than 2 – 3 years	115	8
More than 3 – 5 years	346	19
More than 5 years	430	36
Unknown	237	11
Total	**1299**	**86 (6.6%)**

Surveillance samples tested for RVF IgM during 2007

Governorate	Tested Samples for RVF IgM	Pos.	Notes
Taiz (Al-Mokha Quarantine)	1622	7	**The positives cases found during the RVF outbreak in Kenya and south Somalia**
Al-Hodaidah	1079	2	
Hajjah	62	1	
Hadramout	46	0	
Total	**2809**	**10**	

RVF IgM during July- Dec. 2008 from Tihamah Area and quarantine

Governorate	Sheep		Goat		Cattle	
	Tested	Pos.	Tested	Pos.	Tested	Pos.
Al-Hodaidah	114	0	129	0	4	0
Hajjah	13	0	0	0	0	0
Sana'a	0	0	0	0	2	0
Taiz	21	0	81	0	118	0
Overall total	**148**	**0**	**210**	**0**	**124**	**0**

Sero- surveillance jan 2008-April 2009

Results of the samples collected from the villages-Tihamah Area						**Results of the samples collected from the Quarantine Station**					
Sheep		**Goats**		**Cattle**		**Sheep**		**Goats**		**Cattle**	
tested	+ve	tested	+ve	tested	+ve	tested	+ve	tested	+ve	tested	+ve
219	**0**	**280**	**0**	**7**	**0**	**79**	**0**	**165**	**0**	**162**	**0**

Total 2005 to 2009

Results of the samples collected from the villages -Tihamah Area						Results of the samples collected from the Quarantine Station					
Sheep		**Goats**		**Cattle**		**Sheep**		**Goats**		**Cattle**	
tested	+ve	tested	+ve	tested	+ve	tested	+ve	tested	+ve	tested	+ve
1,767	**3**	**2,185**	**2**	**168**	**0**	**481**	**2**	**770**	**1**	**1,810**	**4**

RVF Surveillance and Lab testing 2010- 2011

Governorates	Surveillance results 2010				Surveillance results 2011			
	Inhibition ELISA		IgM ELISA		Inhibition ELISA		IgM ELISA	
	Tested	Pos	Tested	Pos	Tested	Pos	Tested	Pos
Al-Hodaidah	93	-	19	-	59		1	
Hajjah	8	7	7	6	-	-	-	-
Hadramout – Quarantine	59	-	-	-	30	-	-	-
Taiz – Quarantine	302	11	157	2	460	13	22	10
Total	**462**	**18**	**183**	**8**	**549**	**13**	**23**	**10**

Socio-economic Impact of Rift Valley Fever

Abdo-Salem .S, et al. A review of the socio-economic impact of the Rift Valley fever with a special focus on the Horn of Africa and the Arabic Peninsula.

Classification of economic and social impacts

- Direct impact on livelihoods of producers
- Direct impact on the industry's upstream and downstream
- Indirect impact related to trading ban
- Impact on public health
- Direct costs linked to disease control measures
- Long term effects

Assessment of these impacts from published papers in the literature and reports.

Estimated economic impact of RVF outbreak in Yemen in 2000-2001

Sector	Losses (in million USD)	% annual GDP(PPP) (product at purchasing power parity per capita)
Trading	50	0.4
Livestock industry	15	0.1
Vector Control	0.3	0.002
Public health (death only)	12	0.1
Tourism	30	0.2
Total	***107.3***	***0.8***

Handlos M. Assessment of the estimated costs of past disease outbreaks in Yemen. Sana'a , Yemen:, 2009; ICON-INSTITUT Public Sector GmbH and Jules van Lancker Consulting publication no IDA CR. No. 4220 YEM

Discussion

- **The real and global socio-economic impact of Rift Valley Fever is difficult to estimate but:**

- **RVF is one of the most threatening diseases for livestock and societies**
  - Production/productivity
  - Food insecurity
  - Change the structure of the meat market
  - Loss of employments
  - Political instability

- **Economical impact studies are needed for decision makers to make strategic disease management choices**

Discussion

Tihama Coast epidemiological system

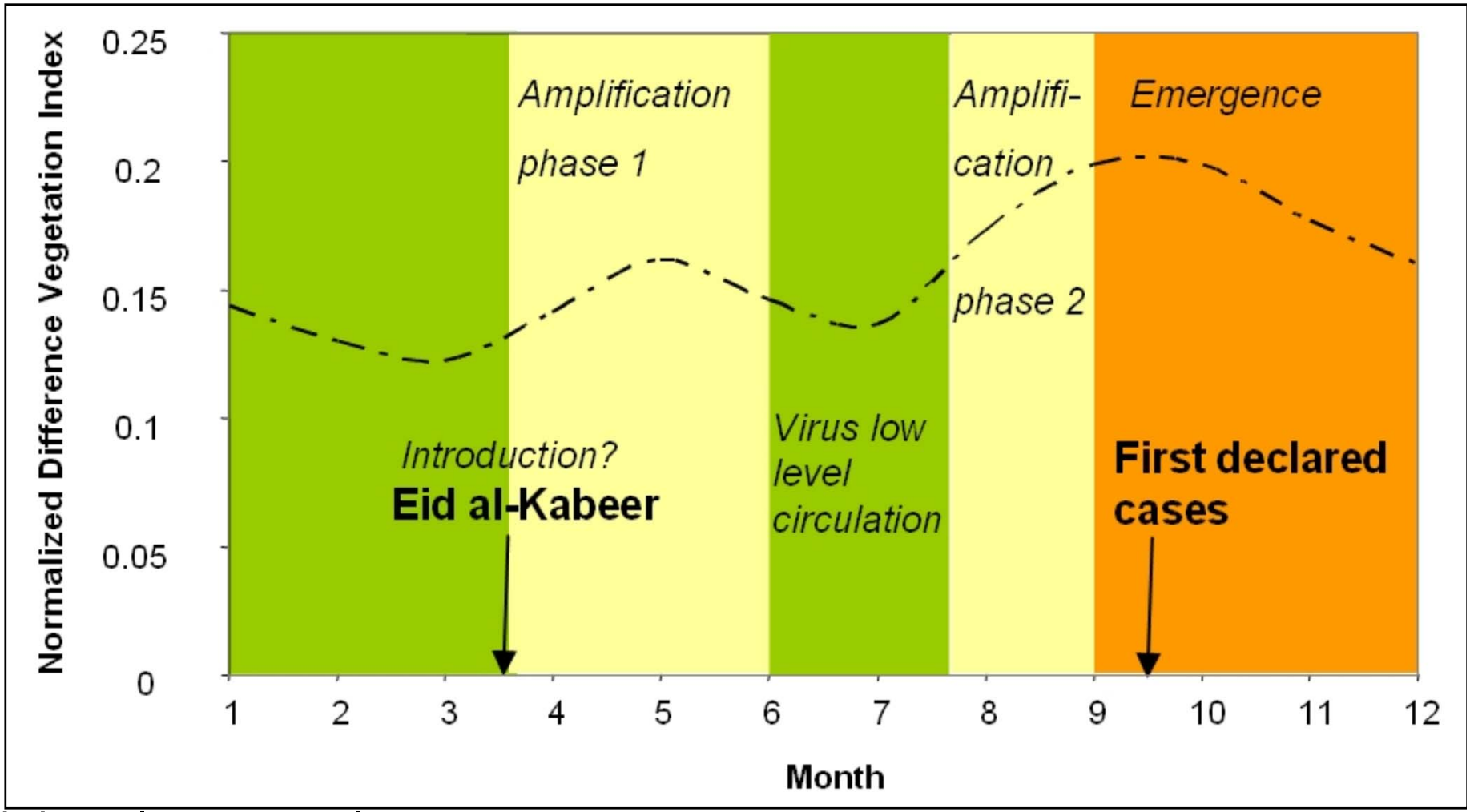
Rainfall (runoff)

Water bodies

Irrigation practices

Mosquito populations

Discussion



Abdo-Salem. S, et al 2011.

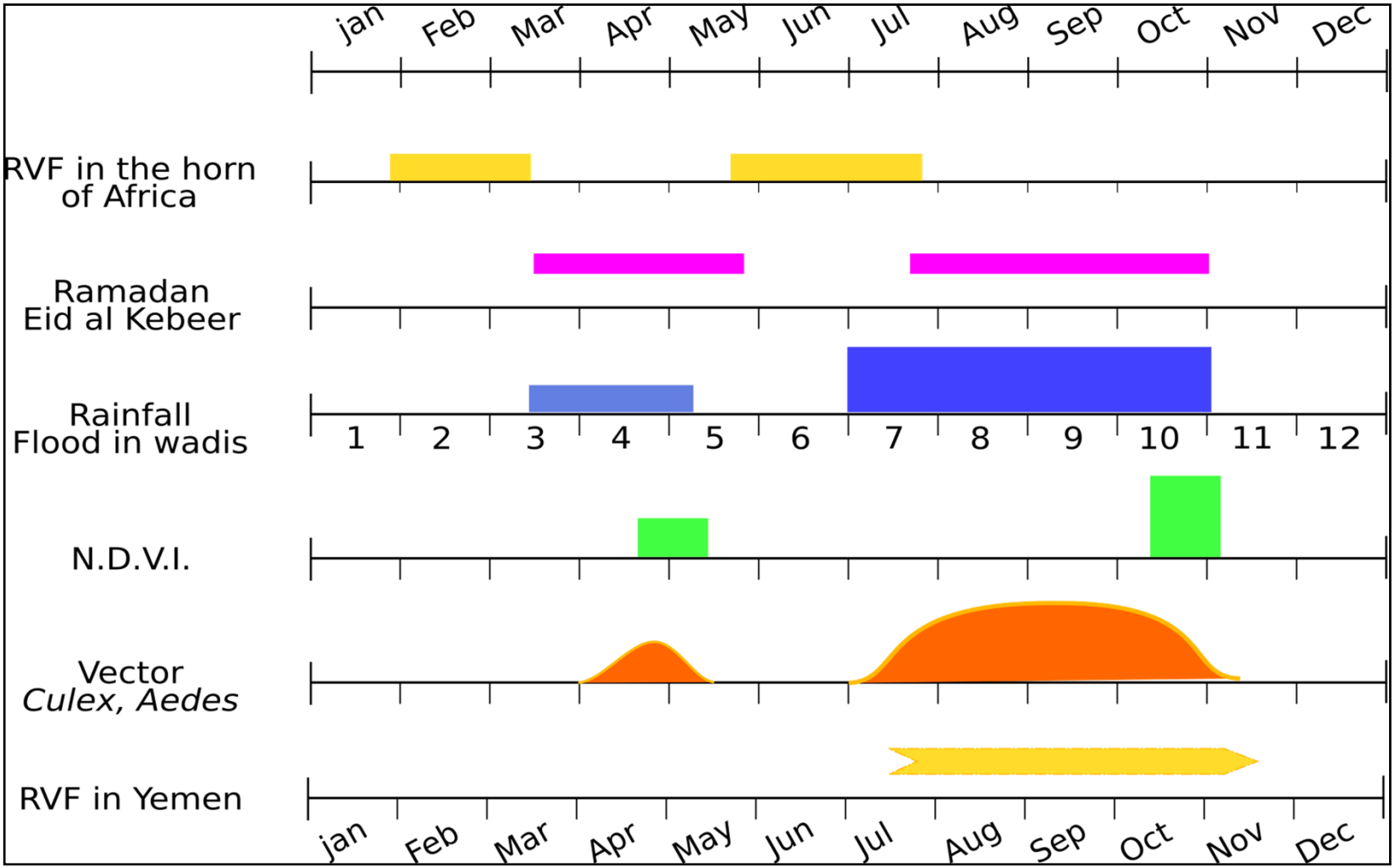
Schematic representation of Rift Valley Fever virus amplification and emergence in Yemen, 2000.

Conclusion & Perspectives

Conclusion

- The socio–economic impact of RVF is dramatic
- Importance of social variables as well as environmental ones
- Gap of knowledge's (entomology, virology, trade)
- Could the disease re-emerge? And can we predict it?

Conceptual model of Rift Valley Fever in Yemen



Abdullah.Shaif,2011

Perspectives

Predictive model: period and areas at risk

- Further studies are required to precise the successive links between rainfall, vegetation indices, and mosquito dynamics
- Improving surveillance system
- Improve capacity building of national laboratory
- Establishment of new lab's at the main entry quarantines Al-Mukah, Al-Mukkalah and Aden
- RVF Regional network

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THANK YOU FOR

YOUR ATTENTION