

**Surveillance for Patients with Acute Febrile Illness  
in Egypt, GEIS Program at NAMRU-3**

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# Background

## Acute Febrile Illness Surveillance (AFI) -- Egypt

- **Pathogens causing AFI are important public health problems in Egypt**
  - Typhoid is one of the most frequently reported diseases
  - Little information on brucellosis
- **Surveillance for patients with AFI is complex**
  - Wide variety of organisms
  - Limited laboratory capacity

# Objectives

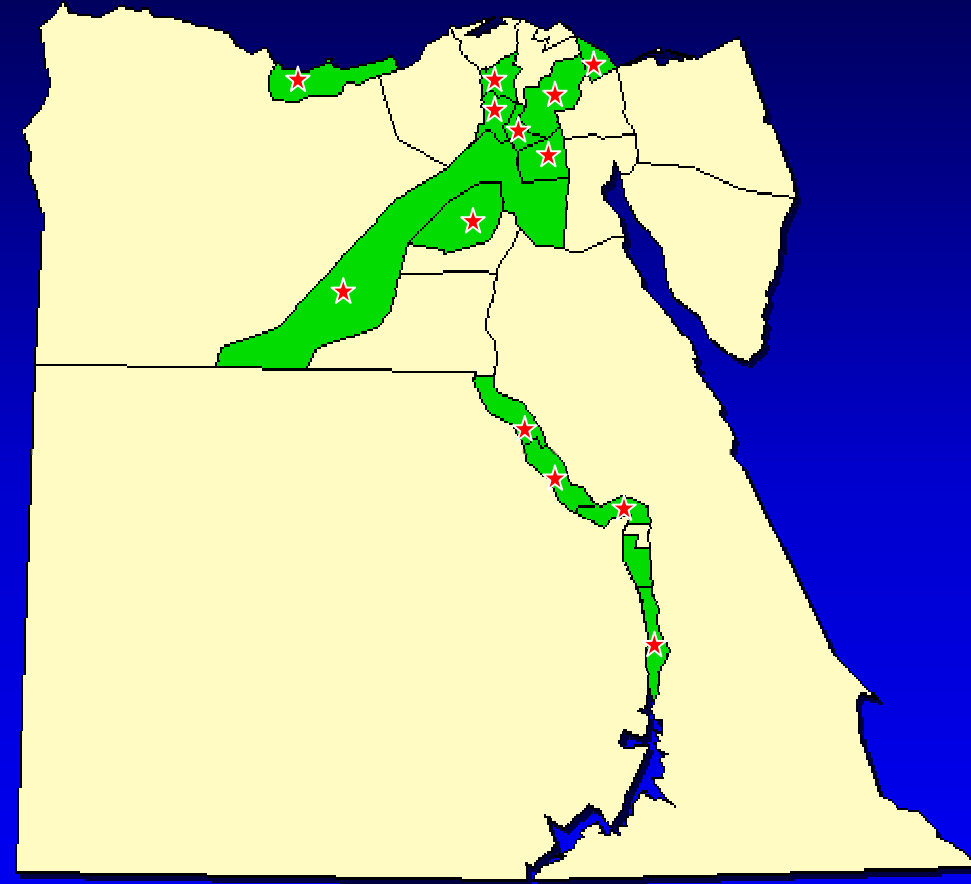
**AFI Surveillance - Egypt, March 99- August 01**

- **Upgrade laboratory and epidemiology capacity in the MOH for the prevention and control of infectious diseases causing AFI**
- **Characterize epidemiology of infectious agents causing AFI**
- **Identify risk factors for disease to target prevention strategies**

# Methods

AFI Surveillance - Egypt, March 99- August 01

- **Clinical case finding**
  - Infectious Disease Hospitals (n=13)
  - Clinicians trained:
    - identify AFI cases
    - blood culture on admission



Surveillance Network of Infectious Disease Hospitals in Egypt

# Methods

## AFI Surveillance - Egypt, March 99- August 01

- **Epidemiology**
  - Standardized surveillance form  
demographic, clinical, and risk factor data
  - Computerized database
  - Monthly site visits
  - Risk factors were evaluated by comparing patients with brucellosis to all other patients admitted with AFI

# Laboratory Methods

AFI Surveillance - Egypt, March 99- August 01

- **Blood culture**
  - 5-10 cc of blood in biphasic media
  - checked daily for growth
  - 3 week incubation time at 37<sup>0</sup>C
- **Serology**
  - WIDAL for typhoid fever
  - Brucella tube agglutination
- **Special studies**
  - arbovirus infections, selected rickettsial pathogens

# AFI Case Definition

AFI Surveillance - Egypt, March 99- August 01

## Clinical case definition

- any patient > 4 years of age
- fever for > 2 days
- admission temperature > 38.5° C
- no other identified cause of fever

or

- any patient with clinical diagnosis of typhoid fever or brucellosis

# Case Definitions for Typhoid Fever, Brucellosis, and Arbovirus Infections

## Typhoid

Probable: tube agglutination widal titer  $\geq 1/160$

Confirmed: isolation of *S. typhi*

## Brucellosis

Confirmed: isolation of *brucella Spp.*  
tube agglutination  $\geq 1:160$

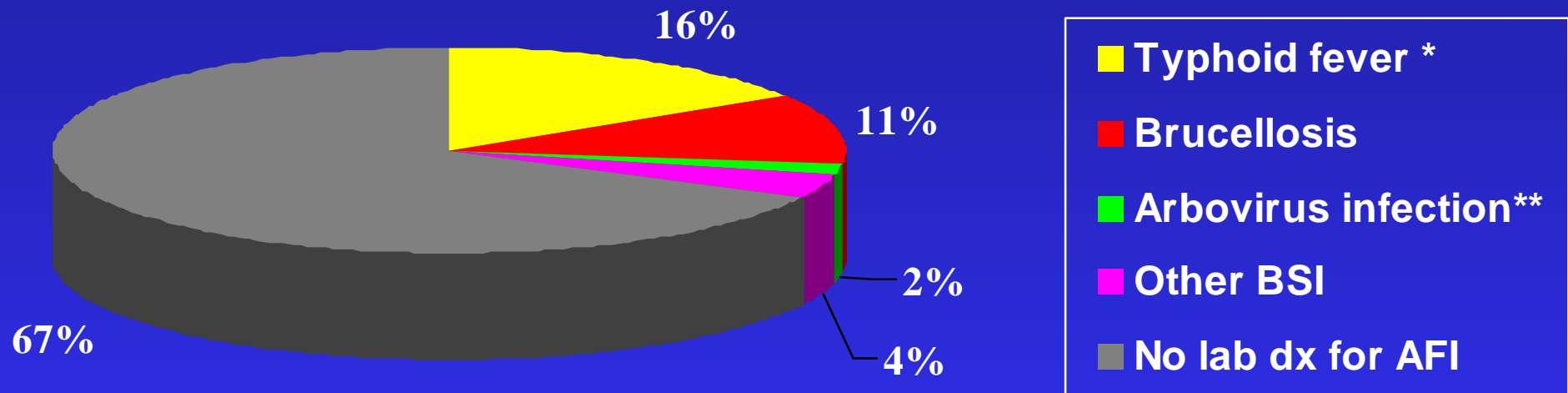
## Arbovirus infections

IgM antibody to RVF, Sandfly, Sindbis, West Nile viruses



# Results: Laboratory Diagnosed Etiologies of Acute Febrile Illness

4906 Patients Evaluated, March 99- August 01

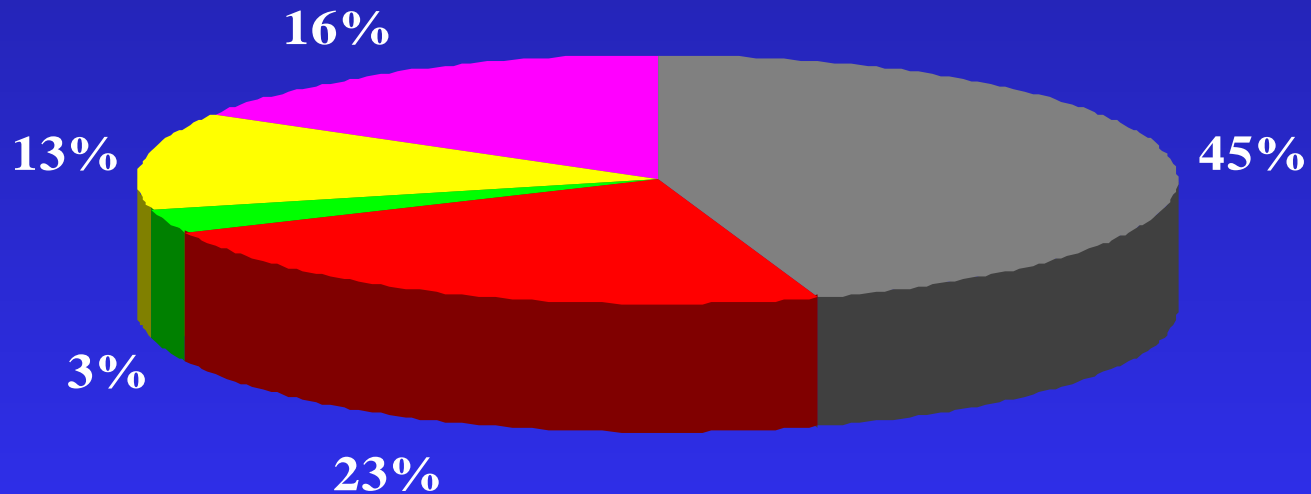


\* Confirmed and probable cases

\*\* Representative sample

# Results: Other Etiology of AFI

3330 Patients Diagnosed clinically  
March 99- August 01

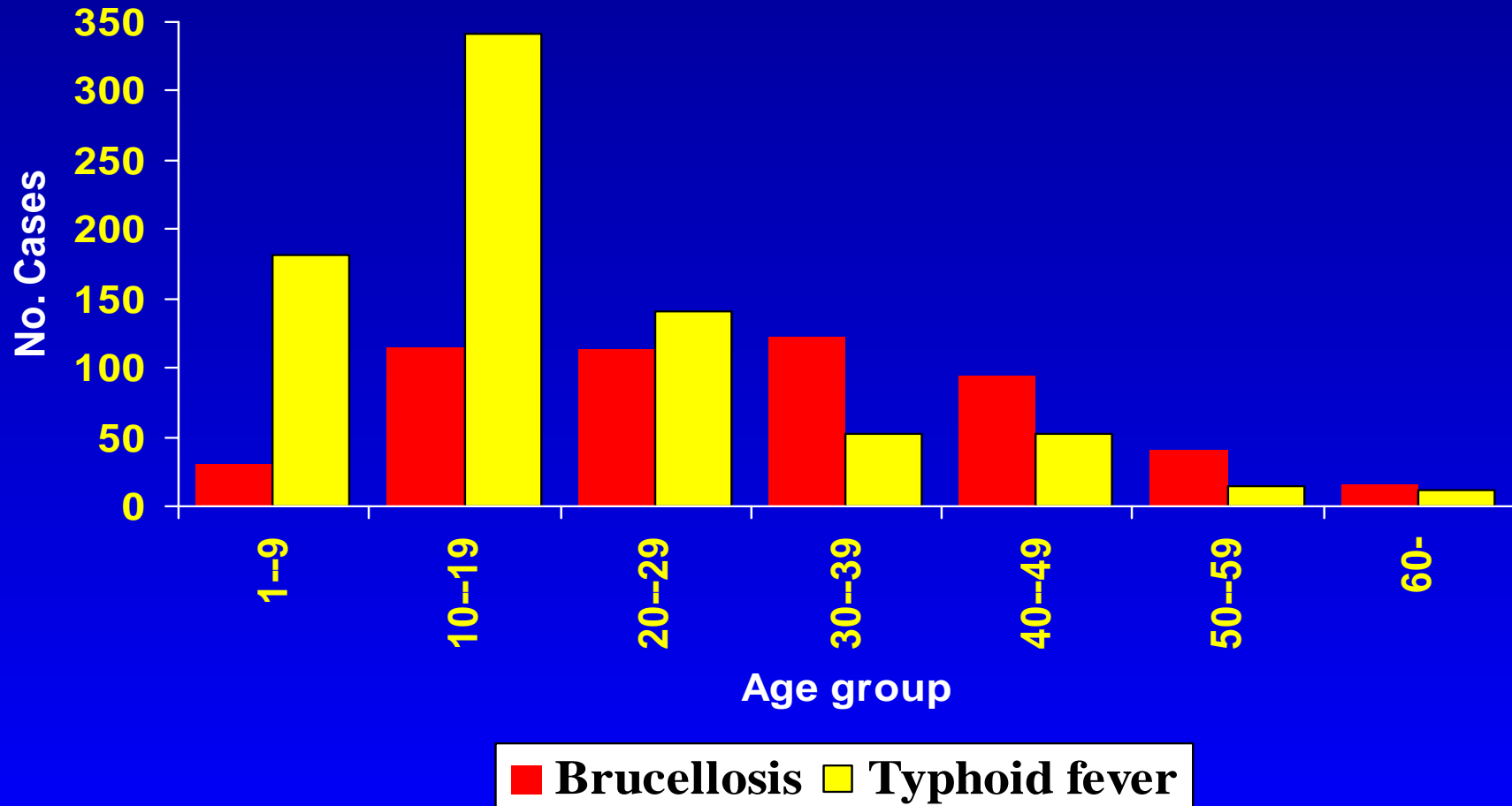


# Characteristics of Patients with Typhoid Fever and Brucellosis

Characteristics	Typhoid	Brucellosis	Others
Median age (yrs)	19.8	32.2	25
% Males	49.6	64.8	58
% Case fatality	0.5	1	5
Mean Days of Hospitalization	10.1	8.6	6.9
Mean Interval (onset-admission)	9.3	13	9
% received AB prior to admission	53	54	59

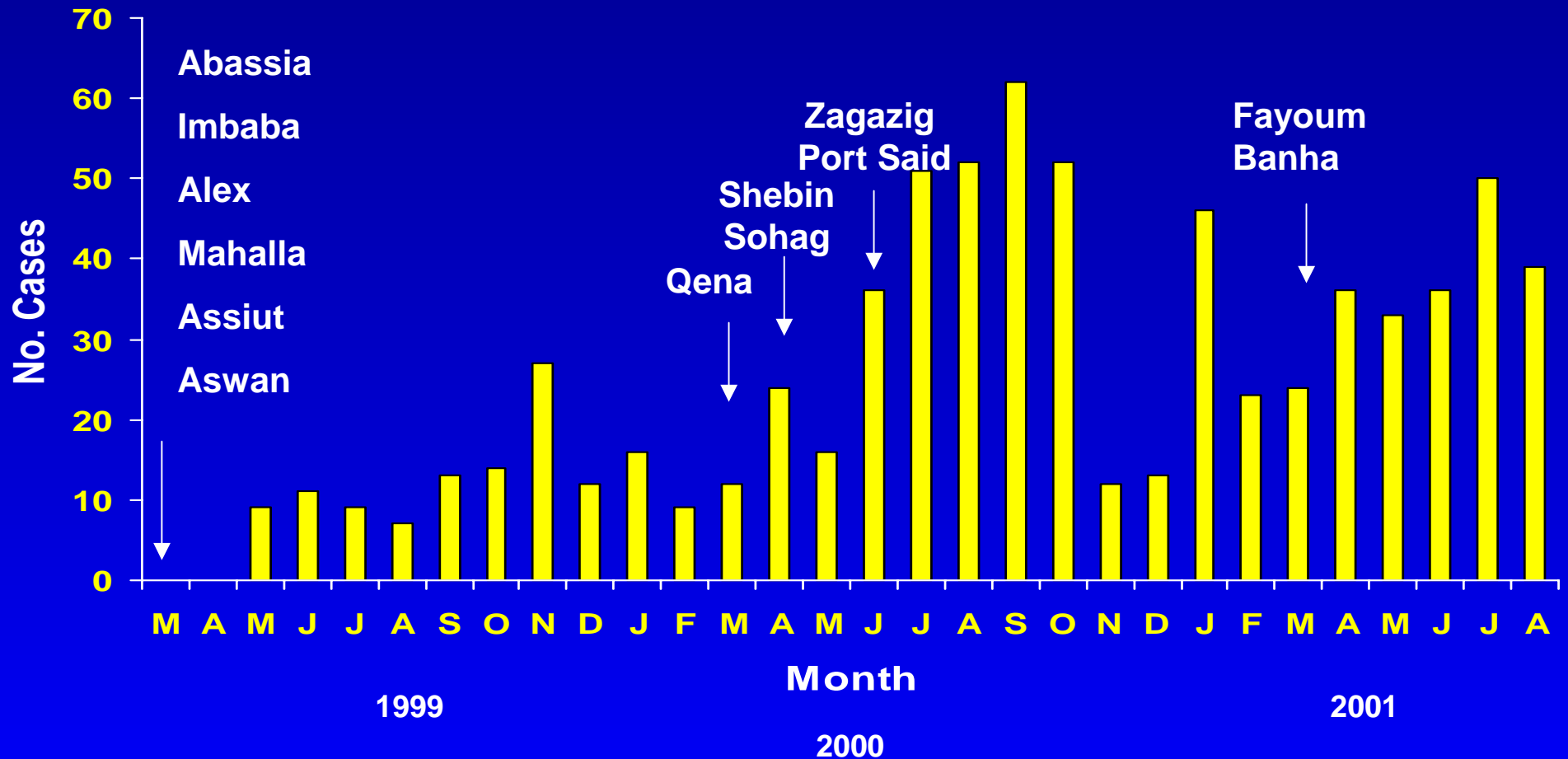
# Typhoid and Brucellosis Age groups

Acute Febrile Illness Surveillance (AFI) -- Egypt,  
March 99- August 01



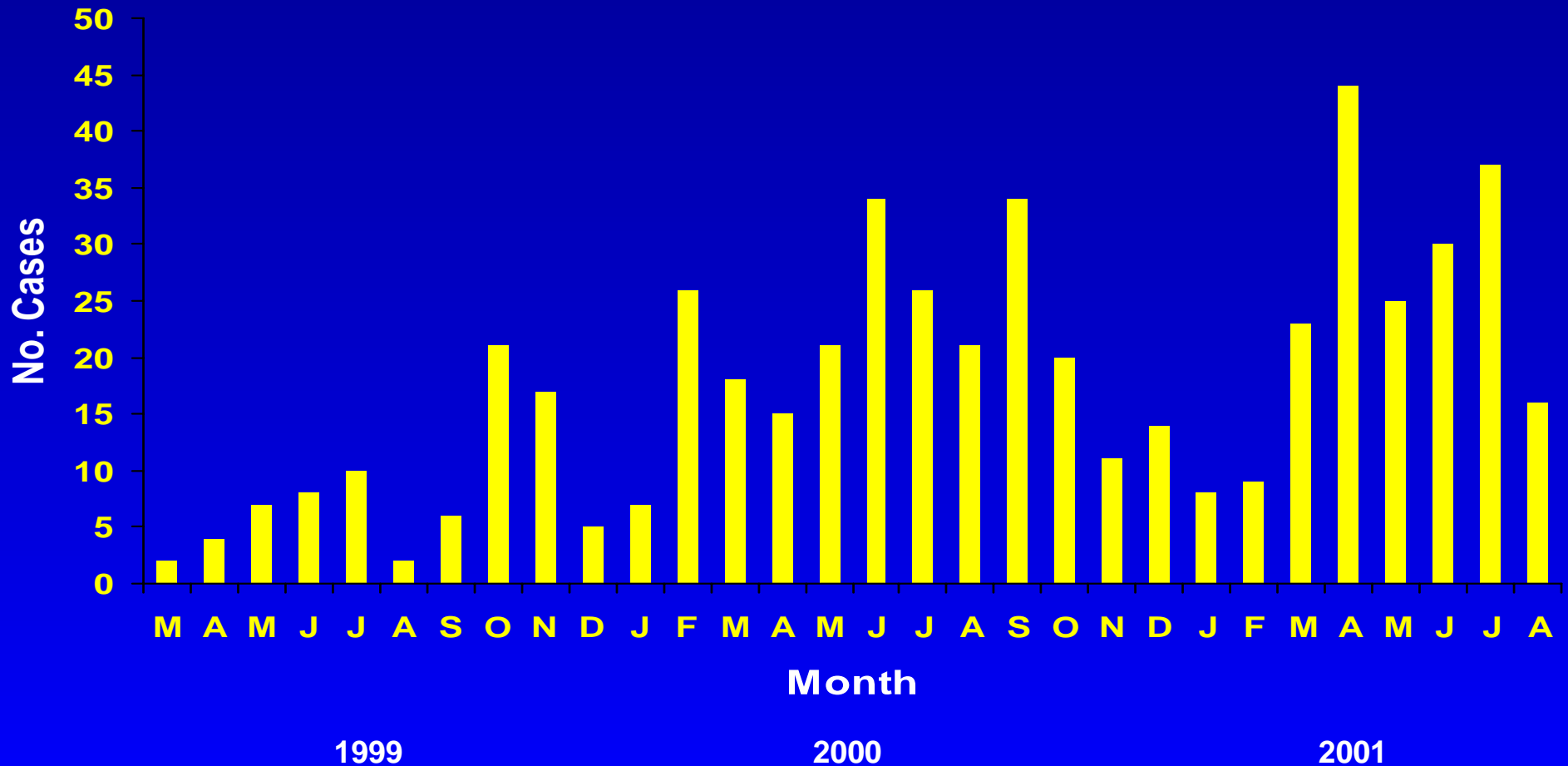
# Typhoid Seasonal Distribution

Acute Febrile Illness Surveillance (AFI) -- Egypt,  
March 99- August 01

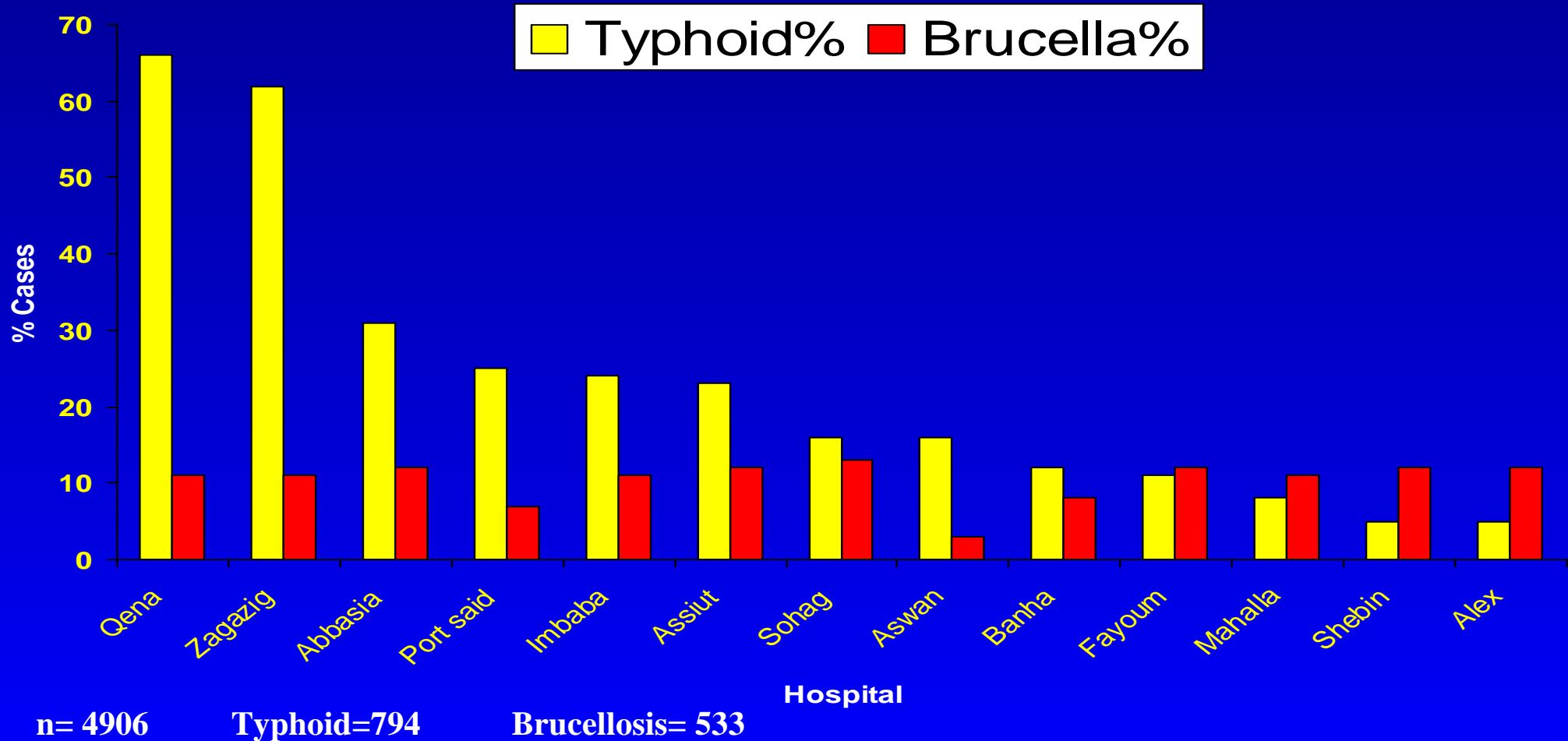


# Brucellosis Seasonal Distribution

Acute Febrile Illness Surveillance (AFI) -- Egypt,  
March 99- August 01



# Percent of AFI Patients with Typhoid Fever or Brucellosis by Hospital



# Typhoid and Brucellosis Symptoms

<b>Symptom</b>	<b><i>No. typhoid (%)</i></b>		<b><i>No. Brucella (%)</i></b>	
<b>Fever</b>	<b>792</b>	<b>(100%)</b>	<b>532</b>	<b>(100%)</b>
<b>Undulant fever</b>	<b>294</b>	<b>(37%)</b>	<b>389</b>	<b>(73%)</b>
<b>Headache</b>	<b>655</b>	<b>(83%)</b>	<b>476</b>	<b>(89%)</b>
<b>Arthralgia</b>	<b>249</b>	<b>(31%)</b>	<b>359</b>	<b>(67%)</b>
<b>Myalgia</b>	<b>302</b>	<b>(38%)</b>	<b>355</b>	<b>(67%)</b>
<b>Vomiting</b>	<b>384</b>	<b>(48%)</b>	<b>212</b>	<b>(40%)</b>
<b>Convulsions</b>	<b>231</b>	<b>(31%)</b>	<b>175</b>	<b>(34%)</b>
<b>Pharyngitis</b>	<b>256</b>	<b>(32%)</b>	<b>143</b>	<b>(27%)</b>



# Exposures associated with Brucellosis

## Age adjusted Prevalence Ratio (I)

Animal Contact	<u>No. exposed</u>		<u>%</u>		Age Adjusted PR	Confidence limit
	Brucellosis n= 511		Non- Brucellosis n= 4246			
<b>Camel</b>	21	4%	36	1%	5	2.5 – 7.7
<b>Sheep</b>	191	37%	657	16%	3.3	2.8 – 4.1
<b>Buffalo</b>	161	32%	637	32%	2.6	2.1 – 3.1
<b>Cattle</b>	152	30%	635	15%	2.4	1.9 – 2.9
<b>Donkey</b>	98	19%	430	10%	2.1	1.7 – 2.8

# Exposures associated with Brucellosis

## Age adjusted Prevalence Ratio (II)

Risk Factor	<u>No. exposed</u>		<u>%</u>		Age adjusted PR	Confidence limit
	Brucellosis n= 533	Non- Brucellosis n= 4373				
Handling animal abortus	99	19%	260	6%	3.2	2.5 – 4.1
Slaughtering animal	72	14%	271	6%	2.4	1.6 – 2.8
Handling raw meat	87	16%	388	9%	2.0	1.4 – 2.3
Drink unpasteurized milk	166	31%	855	20%	1.9	1.4 – 2.1
Eating soft cheese	395	74%	2830	65%	1.6	1.3 – 1.9

# Conclusion

- **Laboratory-based surveillance is important for proper diagnosis of patients with AFI**
- ***S. typhi* infection as a cause of AFI varies by region**
  - **most common in school-aged children**
  - **more common in summer months**
- **Brucellosis- as a cause of AFI does NOT vary by region**
  - **more common in adults, males, and animal handlers|**
  - **more common in summer months**
  - **risk factors include exposure to animals, eating unpasteurized dairy products**

# Limitations

- **Widal test is unreliable for diagnosis of typhoid fever**
- **Lab capacity, performance and supply availability at study sites is not constant**
- **Hospital based surveillance captures only a fraction of cases**

# Recommendation

- Institutionalize the surveillance system for AFI to include all infectious disease hospitals
- Enhance lab based surveillance in the participating sites
- Enforce food supervision regarding milk and milk products
- Health education for animal handlers