Cholera – Country Presentation
Pakistan

5th Initiative against Diarrheal and Enteric diseases in Asia (IDEA)

Prof. M. Ashraf Sultan
Prof. Iqbal Memon
Under Reporting

- Global cases (estimated) 3-5 M
- Deaths: 100,000-120,000
- Cases reported to WHO: 178,000 - 58,900

Why
- Limitation of surveillance system
- Lack of systematic studies
- Fear of trade and travel sanctions
Pakistan Statistics

- Population: 180 million
  - < 15 yrs. = 45% (81 million)
  - < 5 yrs. = 16% (28.8 million)
  - < 2 yrs. = 10% (18 million)

- Paucity of Epidemiological Data

- Health Provincial subject since 2012
Causes of under-five mortality (Pakistan)

- Neonatal deaths: 42.2
- Pneumonia: 15.4
- Diarrhoea: 13.2
- Measles: 5.5
- Injuries: 2.1
- Malaria: 0.2
- HIV/AIDS: 0.1
- Other: 22.2

PAKISTAN

Birth cohort 4.5 million
IMR 54/1000
U5MR 77/1000

Demographic survey of Pakistan

• 4-6 episodes of diarrhea per child per year
• < 5 year 28.8 million x 4 = 115.2 million episodes of diarrhea/ year
• Under five deaths per year from Diarrhea: 59,400 of 450,000 (13.2%)
PSLM 2014-15

- 16M do not have access to clean drinking water
- 27% consume tap water
- 86% have access to improved water source
- 73% have access to sanitation facilities
- 13% no toilet facility

Diarrhea cases across last 30 days
- Overall 9%
- Balochistan 11%
- Sindh 6%
# SEASONAL VARIATION OF *VIBRIO CHOLERAE* AND *VIBRIO MIMICUS* IN FRESHWATER ENVIRONMENT

A.H. Shar and Y.F. Kazi and N.A Kanhar

<table>
<thead>
<tr>
<th>City (Sampling site)</th>
<th>January-March</th>
<th>April-June</th>
<th>July-September</th>
<th>October-December</th>
<th>Average/site/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Khairpur</td>
<td>17%</td>
<td>33.33%</td>
<td>50%</td>
<td>0%</td>
<td>25.00%</td>
</tr>
<tr>
<td>Sukkur</td>
<td>0%</td>
<td>33.33%</td>
<td>67%</td>
<td>33.33%</td>
<td>33.41%</td>
</tr>
<tr>
<td>Rohri</td>
<td>33.33%</td>
<td>67%</td>
<td>83.33%</td>
<td>50%</td>
<td>58.41%</td>
</tr>
<tr>
<td>Average/quarter</td>
<td>17%</td>
<td>44.55%</td>
<td>67%</td>
<td>28%</td>
<td>39.00%</td>
</tr>
</tbody>
</table>

Table 3. Isolation Rate of *Vibrio cholerae* (2007).
Limitations and Sources

- No active case based surveillance in place
- Published articles
  Unpublished data from health facilities - Patchy
- Passive case based surveillance from large hospitals of major cities
- WHO EMRO Documents
- Reports of NGOs working in disaster situations.
# Epidemiology, Determinants and Dynamics of Cholera in Pakistan: Gaps and Prospects for Future...

<table>
<thead>
<tr>
<th>Year of publication</th>
<th>No. of articles published</th>
<th>Agent</th>
<th>Host</th>
<th>Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995-2000</td>
<td>2</td>
<td>1989-1992: Major serotype responsible was Ogawa 01</td>
<td>All ages and both gender are at risk of getting disease. Non-01 involved mostly adults, youngest child infected with cholera was 7 days old. Mean age for child affected with El Tor was 31+/34 months.</td>
<td>Environmental factors of cholera infection were not explored in this period in Pakistan.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1993-94: Reappearance of non-01 (O139)</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>1990-98: Ogawa biotype El Tor predominant</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1999: Emergence of classical Ogawa 01 serotype</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2001-2005</td>
<td>8</td>
<td>2000-2001: Predominant serotype non-01 (O139). However, classical Ogawa also exist in this period. 2002-2004: El Tor biotype of Ogawa responsible for outbreaks and epidemics of cholera in this period.</td>
<td>Mean age for non 01 infection was 40 years while for 01 it was 23 years. Both gender at risk. Poverty and low education were also important host factor determinants. Severity of infection and fever along with symptoms of diarrhea common with non 01.</td>
<td>No primary research done in Pakistan to explore environmental aspect of cholera infection.</td>
</tr>
<tr>
<td>2006-2010</td>
<td>7</td>
<td>2004-2005: upsurge in the isolation of <em>Vibrio cholerae</em> Inaba. 2008: predominant serotype 01 biotype El Tor.</td>
<td>Involvement of both children and adults with younger age affected with Ogawa 01 and older age in non-01 infection.</td>
<td>Environmental factors such as water contamination with <em>V. cholerae</em>, use of toilet other than flush system associated with increased infection.</td>
</tr>
</tbody>
</table>
# Local Studies

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Total No</th>
<th>+ ve</th>
<th>Isolated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Siddiqui FJ (LHR)</td>
<td>1990-96</td>
<td></td>
<td>888</td>
<td>Serogroup O1, 64% Serogroup O139, 36%</td>
</tr>
<tr>
<td>Nizami et al (KHI)</td>
<td>1990-95</td>
<td>4346</td>
<td>348</td>
<td>V. cholerae 01 Ogawa biotype El Tor V. cholerae 0139 (14%)</td>
</tr>
<tr>
<td>Hussain S et al (ISB)</td>
<td>1994-99</td>
<td></td>
<td>212</td>
<td>V. cholerae El Tor Serotype Ogawa</td>
</tr>
<tr>
<td>Memon IA (KHI)</td>
<td>2002</td>
<td>846</td>
<td>161</td>
<td></td>
</tr>
<tr>
<td>Jabeen et al (KHI)</td>
<td>2000-01</td>
<td></td>
<td>545</td>
<td>Vibrio cholerae O1 V. cholerae O139</td>
</tr>
<tr>
<td>Shams R (ISB)</td>
<td>2005</td>
<td></td>
<td></td>
<td>V. Cholera El Tor biotype Ogawa (100%)</td>
</tr>
</tbody>
</table>
Cholera burden and risk
in the Eastern Mediterranean region: Mapping exercise

Heather McKay, Justin Lessler, Sean Moore, Andrew Azman,
Department of Epidemiology
Johns Hopkins Bloomberg School of Public Health
Cumulative number of cholera cases and deaths reported from the Eastern Mediterranean Region by Country, 2011 - 2015

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Cases</td>
<td>Deaths</td>
<td>Cases</td>
<td>Deaths</td>
<td>Cases</td>
</tr>
<tr>
<td>Afghanistan</td>
<td>3733</td>
<td>44</td>
<td>12</td>
<td>0</td>
<td>3957</td>
</tr>
<tr>
<td>Djibouti</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Iran</td>
<td>1187</td>
<td>12</td>
<td>53</td>
<td>0</td>
<td>256</td>
</tr>
<tr>
<td>Iraq</td>
<td>0</td>
<td>0</td>
<td>4693</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Pakistan</td>
<td>11489</td>
<td>219</td>
<td>3395</td>
<td>31</td>
<td>1069</td>
</tr>
<tr>
<td>Somalia</td>
<td>77636</td>
<td>1130</td>
<td>22576</td>
<td>200</td>
<td>6864</td>
</tr>
<tr>
<td>Sudan</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Yemen</td>
<td>31789</td>
<td>134</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>125834</td>
<td>1539</td>
<td>30729</td>
<td>235</td>
<td>12,147</td>
</tr>
</tbody>
</table>
Eastern Mediterranean Region (EMR)

**PAKISTAN:** 2010-2014
- 20,880 suspected cases
- 343 deaths

**SUDAN:** 2006-2007
- 9,495 suspected cases
- 358 deaths

**AFGHANISTAN:** 2007-2014
- 735,726 suspected cases
- 1,837 deaths

**IRAN:** 2005-2014
- 2,638 confirmed cases
- Missing death data

**SYRIA:** 2008-2009
- 6,553 suspected cases
- 5 deaths

**IRAQ:** 2007-08, 2015
- 399 confirmed cases
- 2 deaths

**YEMEN:** 2010-2012
- 34,190 suspected cases
- 134 deaths

**SOMALIA:** 2012-2015
- 38,309 suspected cases
- Missing death data

**Cumulative Cases 2005-2015**
- 845,153 suspected cases
- 3,037 confirmed cases
- 2,679 confirmed deaths
Country: The Islamic Republic of Pakistan
Population (2010): 170,043,918
Data received (years): 2010-2014
Cases: 20,880 (suspected)
Deaths: 343

Case fatality, Pakistan, 2010-2014

Cumulative 5-year Incidence (per 100,000) 2010-2014
Swat, Swabi, Malakand, Lower Dir districts (Khyber Pakhtunkhwa)
Islamabad
Quetta district (Baluchistan)
Mirpur Khas district (Sindh)
Afghan-Pakistan border
### Suspected cholera cases/deaths by province: Pakistan, 2010-2014

<table>
<thead>
<tr>
<th>Administrative Division</th>
<th>Cases/Deaths¹</th>
<th>% of total cases</th>
<th>Case fatality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sindh</td>
<td>6,537/174</td>
<td>31.3</td>
<td>2.7</td>
</tr>
<tr>
<td>Khyber Pakhtunkhwa</td>
<td>6,017/65</td>
<td>28.8</td>
<td>1.1</td>
</tr>
<tr>
<td>Balochistan</td>
<td>4,832/46</td>
<td>23.1</td>
<td>1.0</td>
</tr>
<tr>
<td>Azad Kashmir</td>
<td>1,776/19</td>
<td>8.5</td>
<td>1.1</td>
</tr>
<tr>
<td>Punjab</td>
<td>1,330/33</td>
<td>6.4</td>
<td>2.5</td>
</tr>
<tr>
<td>FATA</td>
<td>237/2</td>
<td>1.1</td>
<td>0.8</td>
</tr>
<tr>
<td>Gilgit-Baltistan</td>
<td>93/1</td>
<td>0.4</td>
<td>1.1</td>
</tr>
<tr>
<td>Islamabad</td>
<td>58/1</td>
<td>0.3</td>
<td>1.7</td>
</tr>
</tbody>
</table>

¹Total cases = 20,880 and total deaths = 341 between 2010 and 2014, DEWS.
WHO EMRO
Incidence Rate for countries like Pakistan (calculated 2011)

- Infants 7.16/1000
- 1-4 year 7.01/1000
- 5-14 year 2.19/1000
- >14 year 0.93/1000

Annual incidence 1.64/1000
Case fatality rate 3.63-41.56
First cases of cholera are reported in Pakistan, say aid agencies

Nayanah Siva LONDON
The first suspected cases of cholera have been reported in flood-stricken Pakistan, and cases of acute diarrhoea are rife, aid agencies report.

“We have seen a lot of suspected cholera cases in more than one district,” said Ahmed Mukhtar, medical coordinator for Médecins Sans Frontières in Pakistan. “It seems there is some kind of alarming trend.” Dr Mukhtar said that several cases were suspected throughout the country but that he was still awaiting laboratory confirmation from samples that had been sent for testing. Most of the suspected cases were reported in the Swat valley in the northwestern province of Khyber Pakhtunkhwa. “In the Swat [district] we saw 60 patients with acute diarrhoea who fulfilled the clinical case description of cholera,” Dr Mukhtar said. “We had another 11 cases in a neighbouring area, the Malakand district, and another four suspected cases in another district, Lower Dir.

“We are following all suspected cases closely and have started to treat them as if they are cholera cases.”

Cite this as: BMJ 2010;341:c4525

Medical supplies and water are thrown from a rescue helicopter
Table 2: Countries for which reports of cholera occurring during 2004 have been identified but who did not report cholera to WHO, by report

<table>
<thead>
<tr>
<th>Region</th>
<th>Country</th>
<th>Case Details</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asia</td>
<td>Bangladesh</td>
<td>78 laboratory-confirmed cases; &gt;3740 estimated cases total</td>
<td>Flooding</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thousands of isolations reported to the International Centre for Diarrhoeal Disease Research, Bangladesh (eg, approximately 5500 in Sept, 2004)</td>
<td>Continuing analysis</td>
</tr>
<tr>
<td></td>
<td>Indonesia</td>
<td>One case imported by an Australian tourist</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Burma</td>
<td>“Scores of cases, several deaths”</td>
<td>Flooding, and damage to sewerage systems</td>
</tr>
<tr>
<td>Pacific</td>
<td>Pakistan</td>
<td>At least 25 deaths</td>
<td>Contaminated water, drought</td>
</tr>
<tr>
<td>Disaster</td>
<td>Pakistan</td>
<td>At least 12 deaths</td>
<td></td>
</tr>
<tr>
<td>Management</td>
<td>Pakistan</td>
<td>Epidemic resulting in at least four deaths</td>
<td></td>
</tr>
<tr>
<td>Information</td>
<td>Pakistan</td>
<td>One case imported by a UK tourist</td>
<td></td>
</tr>
<tr>
<td>Network</td>
<td>Taiwan</td>
<td>One case imported from the Philippines</td>
<td>Contaminated seafood</td>
</tr>
<tr>
<td></td>
<td>Thailand</td>
<td>One case imported by a tourist from the USA</td>
<td>Contaminated seafood</td>
</tr>
<tr>
<td></td>
<td>Thailand</td>
<td>One case imported by a German tourist</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thailand</td>
<td>One case imported by an Australian tourist</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thailand</td>
<td>Eight cases imported by Japanese tourists</td>
<td></td>
</tr>
<tr>
<td>Europe</td>
<td>Austria</td>
<td>Two cases imported from India</td>
<td></td>
</tr>
<tr>
<td>Oceania</td>
<td>New Zealand</td>
<td>One case, travel history unknown</td>
<td></td>
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</tbody>
</table>

*=not reported.*
Year Wise Reported Cases

Acute Diarrhea VS Susp Cholera

Punjab Information Technology year wise data

- 2013
- 2014
- 2015
- 2016

Acute Diarrhea
Suspected Cholera
2016 Lahore Data

Top Five Diseases Pie Chart

- 7 Cholera +ve cases
- 518,746
- 238,613
- 33,502
- 26,209
- 18,216

Legend:
- ACUTE (UPPER) RESPIRATORY INFECTIONS
- DIARRHOEA (ACUTE)
- PYREXIA OF UNKNOWN ORIGIN (PUO)
- ACUTE WATERY DIARRHEA/SUSPECTED CHOLERA
- SCABIES
Risk factors for cholera in the EMR

- **Complex emergencies** (at-least 76 million people in 9 out of 22 countries in the region are in complex emergencies)

- **Increased population movement** in the region (IDPs, Refugees and religious mass gathering)

- **Hard to reach areas** in some of the geographically remote places;

- **Poor infrastructure** and limited access to health care

- **Poor sanitation and hygiene practice** in some countries
Regional Cholera Strategic Priorities

• **Coordinating** the cholera preparedness and response interventions at regional and country levels

• **Improve preparedness and response** capacity for potential cholera epidemic

• **Improve surveillance system** for early detection, verification and response

• **Improve Laboratory capacity** to confirm cholera epidemics

• **Build the human capacities** to support the cholera response

• **Monitor water, sanitation and food safety** activities
Regional Cholera Strategic Priorities

• **Improve environmental health** management to prevent or contain cholera epidemics

• **Regular risk assessments** to identify high-risk or hotspot areas

• **Improve case management and infection control practice** to reduce the morbidity and case fatality rate to less than 1%

• **Invest risk communication** and social mobilization

• **Oral Cholera vaccination** campaigns (pre-emptive and reactive)

• **Emergency stockpiles** of drugs and other supplies
Main Challenges

- Recurrent humanitarian emergencies
- Weak surveillance system and underreporting
- Limited laboratory capacity in some countries
- Countries are not well prepared to respond major cholera epidemics
- Under resources of the public health control activities
- Poor water and sanitation condition in conflict affected countries
- Lack of cross border collaboration between the neighboring countries
- Recurrent cholera outbreak in some countries with complex emergencies
THANK YOU
Pakistan Statistics

- Population: 180 million
  - < 15 yrs. = 45% (81 million)
  - < 5 yrs. = 16% (28.8 million)
  - < 2 yrs. = 10% (18 million)

- Paucity of Epidemiological Data

- No Systemic analysis or evaluation even in affluent population.
In the last recent 5 years (2009-2015):

- **At risk of epidemic**: has annual report => 1 year & < 3 years
- **Endemic with low incidence**: has annual report at least 3 years, and the annual cumulative incidence < 1 per 10000
- **Endemic with high incidence**: has annual report at least 3 years, and the annual cumulative incidence > 1 per 10000
Current situation of cholera in the WHO Eastern Mediterranean Region

Dr Abdinasir Abubakar
Pandemic and Epidemic Disease
World Health Organization
Regional Office for Eastern Mediterranean
November 17-19, 2015; Amman, Jordan