Study: Pollution Kills 8.3 Million People Annually

Estimated number of premature pollution-related deaths per year*

- India: 2.33m
- China: 1.87m
- Nigeria: 279,318
- Indonesia: 232,974
- Pakistan: 223,836
- Bangladesh: 207,922
- United States: 196,930
- Russia: 118,687
- Ethiopia: 110,787
- Brazil: 109,438

* Exposure to toxic air, water, soil, and chemical pollution
Source: Global Alliance On Health And Pollution

statista
Deaths from diarrheal diseases, by age, India, 1990 to 2017

Annual deaths from diarrheal diseases, differentiated by age categories.

Source: IHME, Global Burden of Disease (GBD)
Extending the ENSO teleconnections to Health is just a start
Lots of No-Regret Decisions can be taken even if Forecast Skill is Low.

**HEALTH ALERT**

Three-year data of water-borne diseases in Gujarat

<table>
<thead>
<tr>
<th>Disease</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diarrhoea</td>
<td>6,40,602</td>
<td>6,19,174</td>
<td>7,29,132</td>
</tr>
<tr>
<td>Typhoid</td>
<td>45,970</td>
<td>41,794</td>
<td>56,390</td>
</tr>
<tr>
<td>Hepatitis</td>
<td>3,573</td>
<td>3,838</td>
<td>7,325</td>
</tr>
<tr>
<td>Cholera</td>
<td>88</td>
<td>85</td>
<td>106</td>
</tr>
</tbody>
</table>

Source: Directorate of Health Services of States/UTs

**Guidelines for prevention of water-borne diseases**

- Avoid outside food when you are not sure of hygiene.
- Try to carry your own water during travels. Quality of bottled water cannot be trusted always.
- Do not consume water directly from stream, river, lake or well.
- Get your water tank cleaned periodically, get the water quality checked.
- Make washing of hands before and after consuming food or work a habit.
DID YOU KNOW

8 Million People
In India Are Affected By Water Borne Diseases Every Year

Quantity
Quality
Access
Typhoid/Paratyphoid Incidences and Mortality – India is the Worst Hit

https://www.thelancet.com/journals/laninf/article/PIIS1473-3099(18)30685-6/fulltext
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Fig. 1. (a) Map of Ahmedabad city limits in 1986 and the wards added in 2006 (b) Map of Surat city limits in 1986 and the areas added in 2006 (Illustration based on data from Directorate of Census, not to scale).

Fig. 2. Temporal trend in monthly Normalized Enteric Fever (NEF) cases for Ahmedabad and Surat. Fig. 2a. Monthly NEF cases (per 100,000 population) from 1995 to 2017, with corresponding ENSO phase, Fig. 2b. Boxplots of monthly cumulative NEF cases in Ahmedabad and Surat (per 100,000 population) during 1997–2017.
### Enteric Fevers

**Why Ahmedabad Has More Cases of Enteric Fever Than Surat**

<table>
<thead>
<tr>
<th>Why Ahmedabad Has More Cases</th>
<th>Surat Spent 65% of Its Budget Allocation on Water and Sewerage While Ahmedabad Spent Only 32% During 23 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Researchers studied 20,544 enteric fever (EF) cases in Ahmedabad and 8,692 cases of Surat spanning 23 years</td>
<td>Ahmedabad already had relatively many more human reservoirs of typhoidal Salmonellae bacteria than Surat, historically</td>
</tr>
<tr>
<td>During warmer El Nino months, the risk of enteric fevers increased by 64% in Ahmedabad but reduced by 25% in Surat.</td>
<td>India accounts for the highest burden of EF in the world, ranging between 377 to 550 cases per lakh people</td>
</tr>
<tr>
<td>Strong La Niña significantly reduced the risk for EF in Ahmedabad by 31% and moderate La Niña increased risk in Surat by 21%</td>
<td>The low number of enteric fever cases in Surat was because of its unique clean-up strategies since 1994 and improved sewage management</td>
</tr>
</tbody>
</table>

FRAMEWORK

Components of risk according to IPCC AR5:
- Hazard
- Vulnerability
- Exposure

Multi-attribute decision-making to generate the components

Components multiplied to obtain Risk Index

Ranking and mapping of all indices for the a) current, b) 2001 scenarios and c) their difference

INSIGHTS

- First cartographic product representing risk and its components for entire coastline of India
- Eastern coast of India is more prone to hazard, and hazard has increased since 2001
- Eastern coast of India is more vulnerable, however vulnerability of most districts has decreased since 2001