THE IMPORTANCE OF DIARRHOEAL DISEASE ATTRIBUTABLE TO UNSAFE WATER, SANITATION AND HYGIENE IN SOUTH AFRICA:

AN OVERVIEW OF THE BURDEN OF DISEASE APPROACH

M. Steyn and B. Genthe
History of Burden of Disease

- 1st Burden of Disease Study
  - India 1993

- 35 NBOD since then

- WHO and World Bank 1996
  - Global Burden of Disease Study
    - Summary measures of Population health
Burden of Disease continue

• Resources getting more scarce
  - Makes sense to make most of it
  - Prioritisation and decision making Important!

• We need to take morbidity into account

Albert Schweitzer “Pain is a more terrible lord of mankind than even death itself”
Disability Adjusted Life Years (DALYs)

- Introduce new measure of population health
- Disability Adjusted Life Year (DALY)
- Single measure to summarise population health
- Combines information on
  - Morbidity (disease or disability)
  - Mortality (death)
Outcomes of Disease

- **DALY = YLL + YLD**
- **YLL =**
  - Years of Life Lost
- **YLD =**
  - Years Lived with Disease
Hypothetical survival curve (WHO, 2001)

Proportion surviving

Age

Time lived in sub-optimal health

Time spent in good health

Time lost due to death
Data required to calculate DALYs

- Incidence of disease or risk factor
- Prevalence of risk factor / disease
- Mortality of population per sex and age group
- Mortality due to particular cause / disease
- Population size per age and sex
- Relative Risk of Mortality
- Duration of Disease
- Remission (if applicable)
Sources of Info

- Disease/death registers
- Population surveys
- Epidemiological studies
- Health facility data
- Uncertainty
  - Incomplete and inconsistent

Why use it?

- Allows for comparison of
  - Populations
  - Sex groups
  - Age groups
- Enable prioritisation
  - Decision making
- Allows for cost-effectiveness analyses by means of multiple criteria
  - Monetary and non-monetary costs
Who should/could use it?

- **Department of Health**
  - Prioritise actions in terms of health care
- **DWAF**
  - Risk based approach
  - Water Safety Plans
  - Decision making for water supply provision
- **Decision makers**

- **Researchers**
• "Access to improved water supply is not only a fundamental need and human right, it also has considerable health and economic benefits to households and individuals".

WHO

• "Diarrhoea, which is spread easily in an environment of poor hygiene and inadequate sanitation, kills about 2.2 million people each year, most of them children under five"

UNICEF
Setting the scene......DIARRHOEA

- Globally estimated 2.2 million deaths
  - 90% = children < 5 years
  - 88% attributable to unsafe water supply, sanitation and hygiene

- In SA
  - 8th leading cause of death for all age groups
  - 3rd leading natural cause of death
For SA
- estimated 84% of all deaths due to diarrhoeal disease
- 13 368 deaths
- attributable to water, sanitation and hygiene

- 66.4% in children under five
- 8 871 deaths

Diarrhoeal deaths 9.2% of all deaths in children under five - WSH 3rd highest risk factor

- 1st = HIV
- 2nd = Undernutrition
- 3rd = Diarrhoeal disease
• Diseases of poverty
• low birth weight, diarrhoeal diseases, lower respiratory infections, and high protein-energy malnutrition
• 30% of child deaths

• HIV = 40% of child deaths

• Health challenges immense – with budgets extremely scarce
• Giving “wrong” priority to programs
• Unique health challenges in SA
• Social determinants play a huge role in disease burden
- SA only 4% health workers and 25% of global burden of disease
- America’s have 37% of health workers and only 10% of disease burden

- South Africa have unique health challenges – Isaakidis et al 2002
- Meta – analysis making use of a burden of disease approach – diarrhoea received least attention (interaction between nutrition and diarrhoeal disease)
Access of people to safe water and sanitation has increased
Total Population without access to PRIVATE water
Diarrhoea as underlying natural cause of death for people of all ages 1997 – 2005 (STATS SA, 2005)
Leading causes of death and DALYs

### Causes of Death

1. HIV/AIDS
2. Ischemic Heart Disease
3. Stroke
4. Tuberculosis
5. Interpersonal Violence
6. Lower Respiratory Infections
7. Hypertensive Disease
8. Diarrhoeal Disease
9. Road Traffic Accidents
10. Diabetes Mellitus

### Causes of DALYs

1. HIV/AIDS
2. Interpersonal Violence
3. Tuberculosis
4. Road Traffic Accidents
5. Diarrhoeal Disease
6. Lower Respiratory Infections
7. Asthma
8. Low Birth Weight
9. Unipolar Depressive Disorders
10. Stroke
<table>
<thead>
<tr>
<th>Age group</th>
<th>YLL Male</th>
<th>YLL Female</th>
<th>YLD Male</th>
<th>YLD Female</th>
<th>DALY Male</th>
<th>DALY Female</th>
<th>Total</th>
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<td>155 940</td>
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<tr>
<td>75+</td>
<td>13 097</td>
<td>21 413</td>
<td>75+</td>
<td>93</td>
<td>200</td>
<td>75+</td>
<td>13 191</td>
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<tr>
<td>Total</td>
<td>212 002</td>
<td>211 642</td>
<td>Total</td>
<td>1 393</td>
<td>1 419</td>
<td>Total</td>
<td>213 395</td>
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</table>
Records of people **ill** with diarrhoea are not kept in South Africa, except for administering oral rehydration solution or therapy to children below the age of five years.
Diarrhoeal DALYs

Summary Measures of Population Health

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Person Years</th>
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<tbody>
<tr>
<td>0-4</td>
<td>Female</td>
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<td>5-14</td>
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<td>65-74</td>
<td>Female</td>
</tr>
<tr>
<td>75+</td>
<td>Female</td>
</tr>
<tr>
<td>Total</td>
<td></td>
</tr>
</tbody>
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# Correlation between number of diarrhoea episodes and possible causes of diarrhoea

<table>
<thead>
<tr>
<th></th>
<th># diarrhoea episodes in &lt; 5 yrs</th>
<th>Surface Water Quality</th>
<th>Water supply backlog</th>
<th>Total HIV</th>
<th>Deprivation Index</th>
<th>No Access to Piped Water</th>
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</thead>
<tbody>
<tr>
<td>Number of diarrhoea episodes in children under 5 yrs</td>
<td>1.000</td>
<td>0.185</td>
<td>0.131</td>
<td>0.683</td>
<td>0.202</td>
<td>-0.068</td>
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<tr>
<td>Surface Water Quality</td>
<td>0.185</td>
<td>1.000</td>
<td>-0.053</td>
<td>0.423</td>
<td>-0.174</td>
<td>0.159</td>
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<tr>
<td>Water supply backlog</td>
<td>0.131</td>
<td>-0.053</td>
<td>1.000</td>
<td>0.156</td>
<td>0.669</td>
<td>-0.782</td>
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<tr>
<td>Total number HIV+</td>
<td><strong>0.683</strong></td>
<td>0.423</td>
<td>0.156</td>
<td>1.000</td>
<td>-0.030</td>
<td>0.057</td>
</tr>
<tr>
<td>Deprivation Index</td>
<td>0.202</td>
<td>-0.174</td>
<td>0.669</td>
<td>-0.030</td>
<td>1.000</td>
<td>-0.868</td>
</tr>
<tr>
<td>No access to <strong>piped</strong> water</td>
<td>-0.068</td>
<td>0.159</td>
<td>-0.782</td>
<td>0.057</td>
<td>-0.868</td>
<td>1.000</td>
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<tr>
<td>No access to <strong>private</strong> water</td>
<td>0.669</td>
<td>0.182</td>
<td>0.542</td>
<td>0.617</td>
<td>0.400</td>
<td>-0.365</td>
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<tr>
<td>Access to private water supply <strong>AND</strong> HIV+</td>
<td><strong>0.785</strong></td>
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</tr>
</tbody>
</table>
Conclusion

- BoD valuable tool
- Aid in decision making process
- Although access to water supply has improved
- Prioritisation needed in terms of access to PRIVATE access
- Still far in terms of reducing the unnecessary burden / avoidable burden of death and disease due to easily preventable causes
- Although HIV major factor and contributor to death – preventing disease is even more important now
- Diarrhoeal DALYs high in spite of incomplete data
Thank you