**DALY Brief**

**DALY Calculation for Oral Rehydration Salts (ORS)**

1,000 ORS sachets = 23 DALYs averted in children aged 0-4 in Democratic Republic of Congo (DRC)

The sale of 1,000 sachets of oral rehydration salts (ORS) to prevent dehydration from mild and acute watery diarrhea among children under five in DRC averts 23 DALYs. In other words, 23 years of healthy life would have been lost in the absence of these 1000 sachets of ORS.

**DALY calculation for 1,000 ORS sachets**
ORS prevents and treats dehydration, which causes 60 to 70% of diarrhea-related deaths. In this example, the products are being used to treat children under five years of age who are suffering from acute watery diarrhea. The calculation of the DALYs averted from the sale of ORS is based on the following factors:

- **Demographic sub-groups** (in this example, children under five years);
- **Protective benefit** (the amount of product required to treat one episode, and the estimated wastage, adherence and efficacy of the product in preventing negative outcomes. \(^1\))
- **The burden of the disease** being treated in the sub-group.

With wastage (15%) and adherence (81%), one thousand ORS sachets will result in the treatment of an estimated 344 episodes of mild, acute watery diarrhea. ORS is estimated to be 89% effective in treating diarrhea-related dehydration, so about 306 of the children who use ORS will get better as a result (344 treated * 89% efficacy = ~306 children treated successfully).

Diarrhea is common in DRC, where children aged 0-4 have an average of 3.4 episodes per year. Yet only a small proportion of such episodes lead to death, with a case fatality rate averaging 0.2397% (or a probability of 0.002397). This means that by selling 1,000 sachets of ORS in DRC, PSI prevents 0.734 deaths (306 episodes treated * case fatality rate of 0.002397).

Each child death that has been averted through successful treatment of diarrhea-related dehydration is equivalent to averting about 31 years of lost life (YLL) – i.e. preventing the loss of 31 years of life. Thus, in this example, an estimated 23 YLL are averted with 1,000 sachets of ORS in DRC. Since ORS does not prevent diarrhea, total DALYs averted are also 23.

*For more details on these calculations, please turn the page.*

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\(^1\) *Wastage* refers to the proportion of product that never gets sold due to product expiration, damage or other reason. *Adherence* refers to the proportion of product that is actually used by the purchaser, allowing for the fact that some users may not use the full amount, may not use it as directed, or may not use it at all after purchase.
Details for Number Crunchers

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**:: Targeting**
In this example, each ORS sachet is used by a child, aged 0-4 years, with mild, acute watery diarrhea.

**:: Estimating health impact**

\[
\text{Number of episodes treated: } \left( \frac{1,000 \text{ sachets}}{2 \text{ sachets per episode}} \right) \times (1 - 0.15) \times 0.81 = 344.25
\]

Episodes effectively treated: 344.25 episodes treated \times 89\% efficacy = 306.4

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**:: Years of Life Lost due to premature death (YLL)**

\[
\text{Case fatality rate} \times \text{discounted value of life years lost to diarrhea}
\]

- Case fatality rate: imputed from number of deaths per year divided by number of cases per year. Mortality rate from diarrheal illnesses is 815 per 100,000 children under 5 in Democratic Republic of Congo (DRC), or 0.00815. The average number of episodes per child is 3.4. The implied case fatality rate in DRC is therefore \(0.0081500 / 3.4 = 0.002397\).
- YLL: 1.8 is used as the average age of death from diarrhea in children, and this is then subtracted from the internationally constant optimal life expectancy of 81.25 years. Those years lost are then discounted by 3% per year to estimate their value in the current year. This yields 31 YLL per child death.

YLL calculation: 306.4 episodes effectively treated \times Case fatality rate of 0.002397 \times 31 YLL per child death = 23

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**:: Years Lost to Disability or illness (YLD)**

\[
\text{Number of episodes per year} \times \text{disability weight} \times \text{average duration of episode}
\]

- Since ORS treats diarrhea-related dehydration but does not prevent diarrhea, this part of the DALY calculation provides no benefit and the YLD is valued at 0.

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**:: Total DALYs averted**

\[
\text{DALYs averted} = \text{YLL} + \text{YLD}
\]

- 23 YLL + 0 YLD = 23 DALYs averted.

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**:: Cholera**

Cholera epidemics lead to a higher than average case fatality rate for diarrheal disease. PSI’s DALY model has four separate categories that apply when a country or region experiences greater than average cholera incidence. Baseline cholera levels are incorporated into the general calculation, but setting cholera to medium (endemic), high (endemic) or epidemic level results in greater estimated health impact of ORS based on the higher case fatality rate associated with higher levels of cholera as a proportion of all diarrheal disease. For example, the outcomes for sales of 1000 ORS sachets in DRC at various levels of cholera are:

- Baseline: 23 DALYs averted
- Medium: 26 DALYs averted
- High: 31 DALYs averted
- Epidemic: 51 DALYs averted

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