1. Summary

This document is a compilation of main facts, existing evidence and remaining research gaps regarding the link between inadequate sanitary conditions and its underestimated impact on undernutrition and stunting, particularly for children under five years of age. It is a clear plea for more rigorous research, policy coherence and cooperation between Health and Nutrition, WASH, Mental Health, Care Practices and Food Security sectors, and the need to adequately address and consider WASH\textsuperscript{1} as an integral part of nutrition interventions. It particularly highlights the impact of WASH interventions on mothers and children's (under five years of age) nutritional and health status. An estimated 30% of all children in low-income countries suffer from undernourishment\textsuperscript{2} and WASH services can help to alleviate this:

"More than 3.5 million mothers and children under five die unnecessarily each year due to the underlying causes of undernutrition, and millions more children are permanently disabled by the physical and mental effects of a poor dietary intake in the earliest months of life.\textsuperscript{3}\"  

The aim of this fact sheet is to offer a compilation of relevant studies showing evidence on the link between sectors and to lobby for more cooperation between them.

2. Key Facts about WASH in Nutrition

Overview on the Health Status of Children under 5 years of age (WHO, 2014)

- Globally, there are 1.7 billion cases of diarrheal

\begin{figure}
\centering
\includegraphics[width=0.5\textwidth]{chart.png}
\caption{Chart showing the distribution of mortality causes among children under 5 years of age.}
\end{figure}

2.1 million children (31\%) die directly or indirectly from WASH related diseases

3.1 million children (47\%) die from under nutrition

Globally, 6,549,602 children died in 2012

\begin{figure}
\centering
\includegraphics[width=0.5\textwidth]{chart.png}
\caption{Chart showing the distribution of mortality causes among children under 5 years of age.}
\end{figure}

\begin{itemize}
  \item Under 5 years old’s Mortality - World (WHO 09-2014 on data 2012)
\end{itemize}

\begin{itemize}
  \item Neonatal (0 – 27 days)
  \item ARI, pneumonia
  \item Diarrhoea
  \item Malaria
  \item Other non communicable diseases
  \item Other conditions
  \item HIV
  \item Measles
  \item Injuries
\end{itemize}

\begin{itemize}
  \item 3.1 million children (47\%) die from under nutrition
\end{itemize}

\begin{itemize}
  \item 2.1 million children (31\%) die directly or indirectly from WASH related diseases
\end{itemize}

\begin{itemize}
  \item 6,549,602 children died in 2012
\end{itemize}

\begin{itemize}
  \item Water, Sanitation and Hygiene
  \item World Health Organization, 2014.
  \item The Lancet’s Series on Maternal and Child Undernutrition, 2013.
\end{itemize}

\textsuperscript{1} Water, Sanitation and Hygiene
\textsuperscript{2} World Health Organization, 2014.
\textsuperscript{3} The Lancet’s Series on Maternal and Child Undernutrition, 2013.
disease annually, resulting in 628,500 (9.5%) of children deaths.

- 60% of children’s deaths from diarrhea are caused by unsafe water, pathogen-contaminated foods, lack of sanitation, and poor hygiene practices, and are therefore preventable.
- Malaria results in 476,192 children deaths, which is 7% of the annual children death toll.
- Pneumonia and Acute Respiratory Infections (ARI), strongly related to an improper environment, accounts for 996,520 (15%) of children death toll.
- 47% of children deaths are estimated to be linked with undernutrition, accounting for 3.1 million per year.
- 161 million (24.5%) children are affected by stunting (low height for age).
- 51 million (8%) by wasting (low weight for height).
- 99 million (15%) by underweight (low weight for age).

WASH Interventions’ Impact on Children’s Nutritional & Health Status

- WASH interventions can impact positively on stunting incidence rates (Cochrane, 2013).
- WASH intervention effect is an equivalent to a reduction of 15% in global prevalence of stunting (Cochrane, 2013).
- There is a significant impact of sanitation on stunting (Spears & Hammer, 2013).
- Growth faltering is strongly associated with diarrheal disease cases (Weitz, 2011).
- There is strong evidence of a positive impact of WASH interventions on child infections (Fewtrell Review, 2005).
- Improved WASH conditions can reduce parasitic intestinal infections such as worm infestation that impacts nutritional status (Pruss-Ustun, 2006).
- Symptoms from nematode parasites (such as hookworm) include loss of blood and consequently increased anemia prevalence leading to chronic fatigue and stunting (Black, 2013).
- High pathogen environments induce recurring infections in the gut that limit proper absorption of nutrients, known as Environmental Enteropathy (Humphrey, 2009).
- Children younger than 5 years old in households that received plain soap and handwashing promotion had a 50% lower incidence of pneumonia than in control groups (Luby, 2005).

What are the main WASH routes to Undernutrition?

The 5 A’s is a new framework of analysis for undernutrition

Adapted from “Sanitation and Stunting in India, Undernutrition’s Blind Spot”, Robert Chambers & Gregor von Medeazza, 2013.
The last three “A’s” can be impacted positively by improved WASH facilities and services. Nutrition interventions typically focus on quantity and quality of food, feeding programs, and issues of governance and rights. This new framework of 5 A’s presents a more comprehensive analysis of undernutrition with attention to the role of fecal-transmitted infections (FTI) represented in the last 3 A’s. Among FTIs, diarrhea incidences received the most attention, but environmental enteropathy (damage of small intestine wall due to ingestion of fecal bacteria) is also nutritionally very significant. Recent research establishes the direct link with undernutrition and open defecation (OD) as well as its associated unhygienic conditions and practices.

The Link between Sanitation and Child Height (Stunting)\(^6\)

The last three “A’s” can be impacted positively by improved WASH facilities and services. Nutrition interventions typically focus on quantity and quality of food, feeding programs, and issues of governance and rights. This new framework of 5 A’s presents a more comprehensive analysis of undernutrition with attention to the role of fecal-transmitted infections (FTI) represented in the last 3 A’s. Among FTIs, diarrhea incidences received the most attention, but environmental enteropathy (damage of small intestine wall due to ingestion of fecal bacteria) is also nutritionally very significant. Recent research establishes the direct link with undernutrition and open defecation (OD) as well as its associated unhygienic conditions and practices.\(^7\)

WASH in Nutrition Strategy: The Five Main Axes

1. Ensure geographical / programatic integration of WASH and Nutrition projects by focusing WASH projects in high undernutrition prevalence areas
2. Prioritize the ‘mother / child’ unit
3. Ensure a WASH minimum package (kit, messages & standards) both in health & nutrition centers and at the household level
4. Place emphasis on behavior change
5. Ensure that both coordination bodies (WASH and Nutrition) include representation from the other sector

Remaining Key Questions

- Does a safe WASH environment at household- or community-level have an impact upon the prevalence of Global Acute Undernutrition?
- Can a short-term WASH intervention have an effect upon Global Acute Undernutrition incidence rates?
- Does a WASH intervention, implemented during the treatment of a Severe Acute Malnourished (SAM) child, improve effectiveness and efficiency of the treatment (time and cost reduction) and reduce risks of post-recovery relapse?
- What is the impact of the “quantity of water available at household level” indicator on undernutrition?

6 FTI: Faecal Transmitted Infections
7 IDS working paper Volume 2014, no 450, Robert Chambers & Gregor von Medeazza, p. 10.
8 There is indeed less scientific evidence available on the link between WASH and child wasting. However, some studies can be consulted on this topic such as this study carried out in Ethiopia, where safe drinking water was related to reducing underweight and wasting and that handwashing with soap (at critical times) could help reduce acuate malnutrition. Here is the link:
3. Maps related to WASH and Nutrition

Percentage of Children under five years of age who are moderately or severely stunted

Diarrhea – Children’s (under five years of age) Mortality Rate (UNICEF 2014)

---

10 UNICEF global databases, 2012. Based on Multiple Indicator Cluster Surveys, Demographic and Health Surveys, and national surveys. Data refer to the most recent year available for each country.
5. Main Studies on WASH in Nutrition and Key Results

<table>
<thead>
<tr>
<th>AUTHOR</th>
<th>YEAR</th>
<th>COUNTRY</th>
<th>RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hassan, et al.</td>
<td>1985</td>
<td>Bangladesh</td>
<td>Hand-pumps, latrines and hygiene promotion reduce diarrhea incidence by 25%.</td>
</tr>
<tr>
<td>Hassan, et al.</td>
<td>1985</td>
<td>Bangladesh</td>
<td>There is no significant impact of these interventions on children’s nutritional status. Very general statement, would leave this one out as it is not so clear what the interventions were.</td>
</tr>
<tr>
<td>Esrey</td>
<td>1996</td>
<td>Multicountry</td>
<td>40% reduced diarrhea prevalence between an optimal sanitation and less optimal sanitation when both groups have unimproved water (urban context).</td>
</tr>
<tr>
<td>Esrey</td>
<td>1996</td>
<td>Multicountry</td>
<td>13% reduced diarrhea prevalence between an optimal sanitation and less optimal sanitation when both groups have intermediate water (urban context).</td>
</tr>
<tr>
<td>Esrey</td>
<td>1996</td>
<td>Multicountry</td>
<td>19% reduced diarrhea prevalence between an optimal sanitation and less optimal sanitation when both groups have optimal water (urban context).</td>
</tr>
<tr>
<td>Esrey</td>
<td>1996</td>
<td>Multicountry</td>
<td>Improvements on sanitation have no effects on diarrhea prevalence in rural context.</td>
</tr>
<tr>
<td>Esrey</td>
<td>1996</td>
<td>Multicountry</td>
<td>Improvements between weak sanitation to an intermediate sanitation increase height between 0,8 - 1,1 cm of 18-month old babies.</td>
</tr>
<tr>
<td>Esrey</td>
<td>1996</td>
<td>Multicountry</td>
<td>Improvements between weak sanitation to an optimal sanitation increase height between 1,5 - 1,9 cm on 18-month old babies.</td>
</tr>
<tr>
<td>Author(s)</td>
<td>Year</td>
<td>Region</td>
<td>Result</td>
</tr>
<tr>
<td>-----------</td>
<td>------</td>
<td>--------</td>
<td>--------</td>
</tr>
<tr>
<td>Esrey</td>
<td>1996</td>
<td>Multicountry</td>
<td>Improvements on sanitation lead to a reduction of growth deficit between 22% - 53% in urban context.</td>
</tr>
<tr>
<td>Esrey</td>
<td>1996</td>
<td>Multicountry</td>
<td>Improvements on sanitation lead to a reduction of growth deficit between 4% - 37% in rural context.</td>
</tr>
<tr>
<td>Esrey</td>
<td>1996</td>
<td>Multicountry</td>
<td>Improvements on sanitation lead to a reduction of weight deficit between 11% - 41% in urban context.</td>
</tr>
<tr>
<td>Esrey</td>
<td>1996</td>
<td>Multicountry</td>
<td>Improvements on sanitation lead to a reduction of weight deficit between 5% - 35% in rural context.</td>
</tr>
<tr>
<td>Alam, Marcks, Baquil, Yunus y Fuchs</td>
<td>2000</td>
<td>Bangladesh</td>
<td>Dysentry is associated with an annual loss of 0.5kg and 1.15 cm on children under 5 years old.</td>
</tr>
<tr>
<td>Checkley, et al.</td>
<td>2004</td>
<td>Perú</td>
<td>24-month old babies living in the worst WASH conditions are 1 cm shorter than those living in the best WASH conditions.</td>
</tr>
<tr>
<td>Checkley, et al.</td>
<td>2004</td>
<td>Perú</td>
<td>24-month old babies living in the worst WASH conditions have 54% more diarrhea episodes than those living in the best WASH conditions.</td>
</tr>
<tr>
<td>Checkley, et al.</td>
<td>2004</td>
<td>Perú</td>
<td>24-month old babies with smaller storage containers have 28% more diarrhea episodes than those with bigger storage containers.</td>
</tr>
<tr>
<td>Checkley, et al.</td>
<td>2004</td>
<td>Perú</td>
<td>Lack of sewage disposal explains 0.9cm of deficit growth of 24-month old babies.</td>
</tr>
<tr>
<td>Checkley, et al.</td>
<td>2004</td>
<td>Perú</td>
<td>Children who live in households with water connection, but without adequate sewage disposal and small storage containers, are 1.8 cm shorter than those who live in households with adequate sewage disposal and storage containers.</td>
</tr>
<tr>
<td>Luby, et al.</td>
<td>2006</td>
<td>Pakistán</td>
<td>55% reduced diarrhea prevalence with bleach and storage container interventions.</td>
</tr>
<tr>
<td>Luby, et al.</td>
<td>2006</td>
<td>Pakistán</td>
<td>51% reduced diarrhea prevalence with hand-washing with soap interventions.</td>
</tr>
<tr>
<td>Luby, et al.</td>
<td>2006</td>
<td>Pakistán</td>
<td>64% reduced diarrhea prevalence with disinfectant interventions.</td>
</tr>
<tr>
<td>Luby, et al.</td>
<td>2006</td>
<td>Pakistán</td>
<td>55% reduced diarrhea prevalence with disinfectant and hand-washing with soap interventions.</td>
</tr>
<tr>
<td>Bhutta, et al.</td>
<td>2008</td>
<td>Multicountry</td>
<td>30% reduced diarrhea incidence with hygiene practice promotion.</td>
</tr>
<tr>
<td>Bhutta, et al.</td>
<td>2008</td>
<td>Multicountry</td>
<td>Each diarrhea episode increases by 4% the possibility of suffering stunting.</td>
</tr>
<tr>
<td>Bhutta, et al.</td>
<td>2008</td>
<td>Multicountry</td>
<td>Hygiene coverage of 99% reduces stunting prevalence by 2.4% in under 36- month old children.</td>
</tr>
<tr>
<td>Langfor, Lunn y Panter-Brick</td>
<td>2011</td>
<td>Nepal</td>
<td>41% reduced diarrhea morbidity with hand-washing interventions.</td>
</tr>
<tr>
<td>Langfor, Lunn y Panter-Brick</td>
<td>2011</td>
<td>Nepal</td>
<td>Hand-washing interventions do not reduce gut mucosal damage or immune stimulation.</td>
</tr>
<tr>
<td>Dangour, et al.</td>
<td>2013</td>
<td>Multicountry</td>
<td>Solar disinfection of water, provision of soap and improvement of water quality slightly improve height growth on children under 5 years old.</td>
</tr>
<tr>
<td>Reference</td>
<td>Year</td>
<td>Setting</td>
<td>Summary</td>
</tr>
<tr>
<td>-----------</td>
<td>------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>Kosek, et al.</td>
<td>2013</td>
<td>Multicountry</td>
<td>Children with maximum punctuation on Environment Enteropathy outcome grow 1.08cm less, in six months, than those with the minimum punctuation.</td>
</tr>
<tr>
<td>Lin, et al.</td>
<td>2013</td>
<td>Bangladesh</td>
<td>22% reduced stunting prevalence on children when living in healthy and clean environments, compares to those living in contaminated environments.</td>
</tr>
</tbody>
</table>

5. References


