BABYWASH AND THE 1,000 DAYS

A PRACTICAL PACKAGE FOR STUNTING REDUCTION

Contribution to malnutrition reduction through a multi-sector approach

ACTION AGAINST HUNGER

A PRACTICAL PACKAGE FOR STUNTING REDUCTION

CONTRIBUTION TO MALNUTRITION REDUCTION THROUGH A MULTI-SECTOR APPROACH

TABLE OF CONTENTS

Action Against Hunger - July 2017

Author:
Eva Iráizoz Dominguez, *Global Health Professional, Action Against Hunger*

Contributors:
Celia González Otálora, *WASH technical advisor, Action Against Hunger*
Nicolás Villeminot, *WASH senior technical advisor, Action Against Hunger*

Review Panel:
Antonio Vargas Brizuela, *Nutrition senior technical advisor, Action Against Hunger*
Catherine Darriulat, *WASH technical advisor, Action Against Hunger*
Elena Ruiz Martín, *operations department collaborator, Action Against Hunger*
Jovana Dodos, *WASH and nutrition consultant, Action Against Hunger*
Maria Jesús Blanco Montero, *technical department collaborator, Action Against Hunger*
Marisa Sánchez Peinado, *Nutrition senior technical advisor, Action Against Hunger*
Michael Brodsky, *operations department collaborator, Action Against Hunger*
Natalia Uribe Pando, *WASH advocacy advisor, Action Against Hunger*
Verónica Lázaro Diarte, *operations project manager, Action Against Hunger*
Zvia Shwirtz, *Research Uptake technical advisor, Action Against Hunger*

Design:
Begoña San Miguel Recio

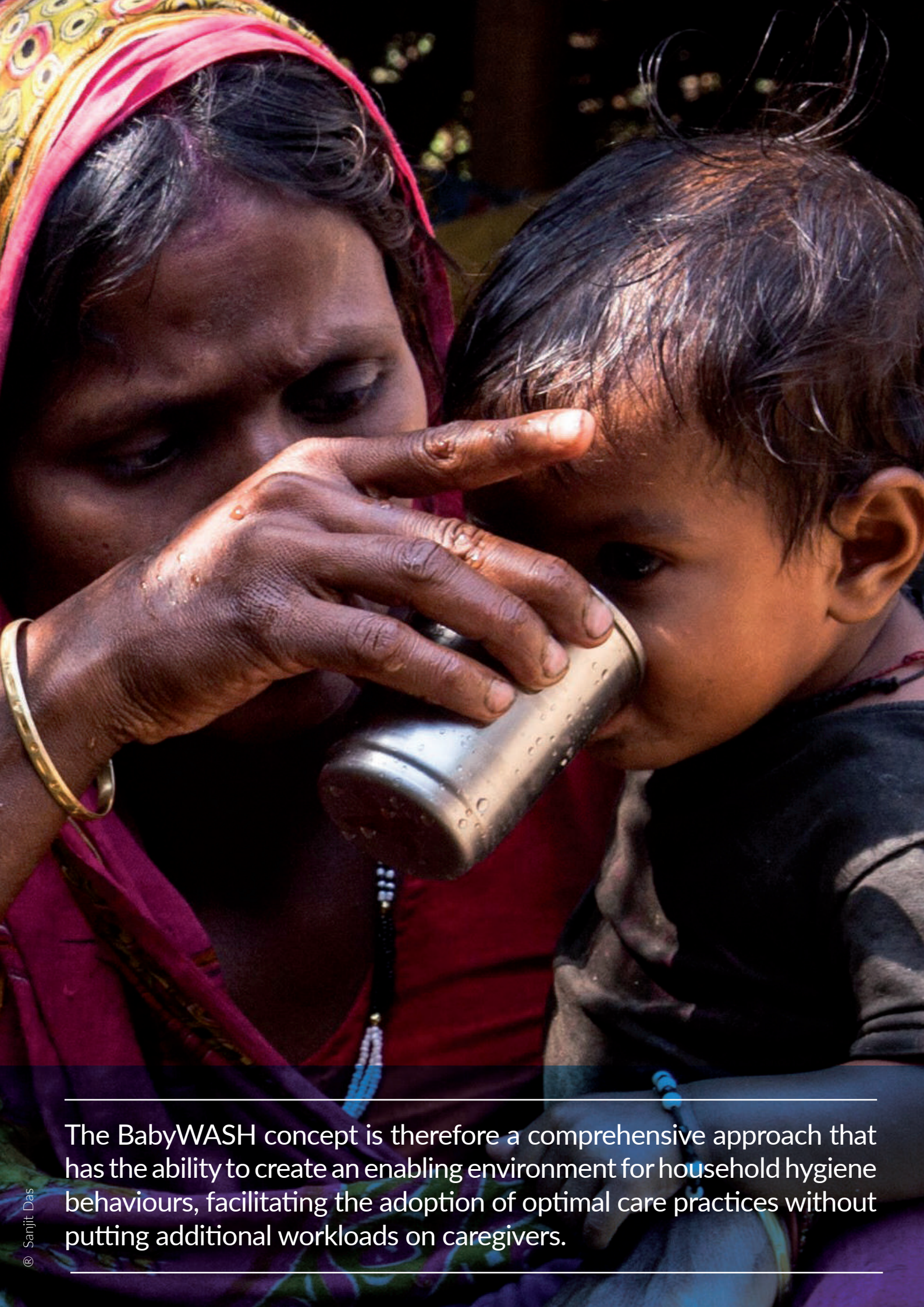
Cover photo:
® Diane Moyer

Nutrition security goes beyond the traditional concept of food security and recognises that nutritional status is dependent on a wide and multi-sectoral array of factors.

TABLES AND FIGURES

LIST OF ACRONYMS

ECD	Early Child Development
EED	Environmental Enteric Dysfunction
HAD	Height-for-age Difference
HAZ	Height-for-age-Z-score
HIV	Human Immunodeficiency Virus
ICN	International Conference on Nutrition
LRTI	Lower Respiratory Tract Infection
NGO	Non-governmental Organisation
SDGS	Sustainable Development Goals
SUN	Scaling Up Nutrition
UNICEF	United Nations Children's Fund
WASH	Water, Sanitation and Hygiene



The BabyWASH concept is therefore a comprehensive approach that has the ability to create an enabling environment for household hygiene behaviours, facilitating the adoption of optimal care practices without putting additional workloads on caregivers.

INTRODUCTION

Linear growth failure is the most prevalent form of undernutrition. Chronic undernutrition, also called stunting, reveals a gradual, cumulative and chronic process starting from conception, especially developing during the first 2 years of life (1).

Globally, it is estimated that **24% of children under 5 are stunted** and regionally, Asia and Sub-Saharan Africa carry most of this burden (2).

Stunting has severe short and long-term consequences for children and their development. Causes are multiple and complex, not only restricted to dietary intake.

Poor WASH conditions are thought to be one of the main causes of child stunting. The household environment in which children develop and grow is highly related to their nutritional status. Direct and indirect pathways exist between WASH and stunting, from diarrheal diseases and Environmental Enteric Dysfunction (EED), to socio-economic conditions and time constraints to child care practices.

The **BabyWASH concept** has recently emerged to link the WASH, Nutrition, Maternal, Newborn and Child Health and Early Childhood Development sectors. Its goal is to have a more profound impact on child health outcomes in order to improve well-being in the first 1,000 days of life. The prevention of stunting is probably the most significant impact expected from this approach through the reduction of the EED pathway and other WASH links.

This document will present how the BabyWASH approach can contribute directly to Action Against Hunger's vision of eradicating hunger and undernutrition in all its forms, and in particular, stunting. A package of activities is proposed in order to integrate WASH, nutrition and health sectors around the 1,000 days for stunting prevention. The package has been conceived to focus on household level with the objective of complementing already existing programmes that address other WASH needs, such as health centres and schools.

1. BABYWASH FOR STUNTING REDUCTION

1.1. WASH AND STUNTING: CAUSES AND PATHWAYS

Linear growth failure is the most prevalent form of chronic undernutrition, or stunting, and it presents severe short and long-term consequences for child development. Maternal nutritional status, feeding practices, WASH conditions, frequency of infections and access to healthcare are major determinants of growth in the first 2 years of a child's life (3).

Stunting is both a major cause and an effect in the cycle of poverty triggered by inadequate WASH conditions which determine nutritional status through multiple pathways: social, environmental, health-related and economic (4) (5).

Several studies have shown the association between improved WASH conditions, child growth and stunting reduction (6–10). One study in Peru found a positive association between improved water sources and child growth, demonstrating that this effect was greater when the intervention was combined with improved sanitation facilities (7). A cross-sectional analysis of health surveys in India showed that the risk of stunting decreased significantly when caregivers reported, in addition to sanitation improvements, optimal handwashing practices (10). In their meta-analysis, Dangour, et al. (11) found a modest but significant effect of different interventions that aimed to improve water quality and handwashing in the height-for-age Z-score (HAZ)[1] of children under 5; and this effect was greater in children under 2 years of age.

[1] Height-for-age Z-score: Height- for- age (H/A) is an anthropometric indicator of linear growth. The Z-score or standard deviation system expresses the anthropometric value as a number of standard deviations or Z-scores below or above the reference mean or median value.

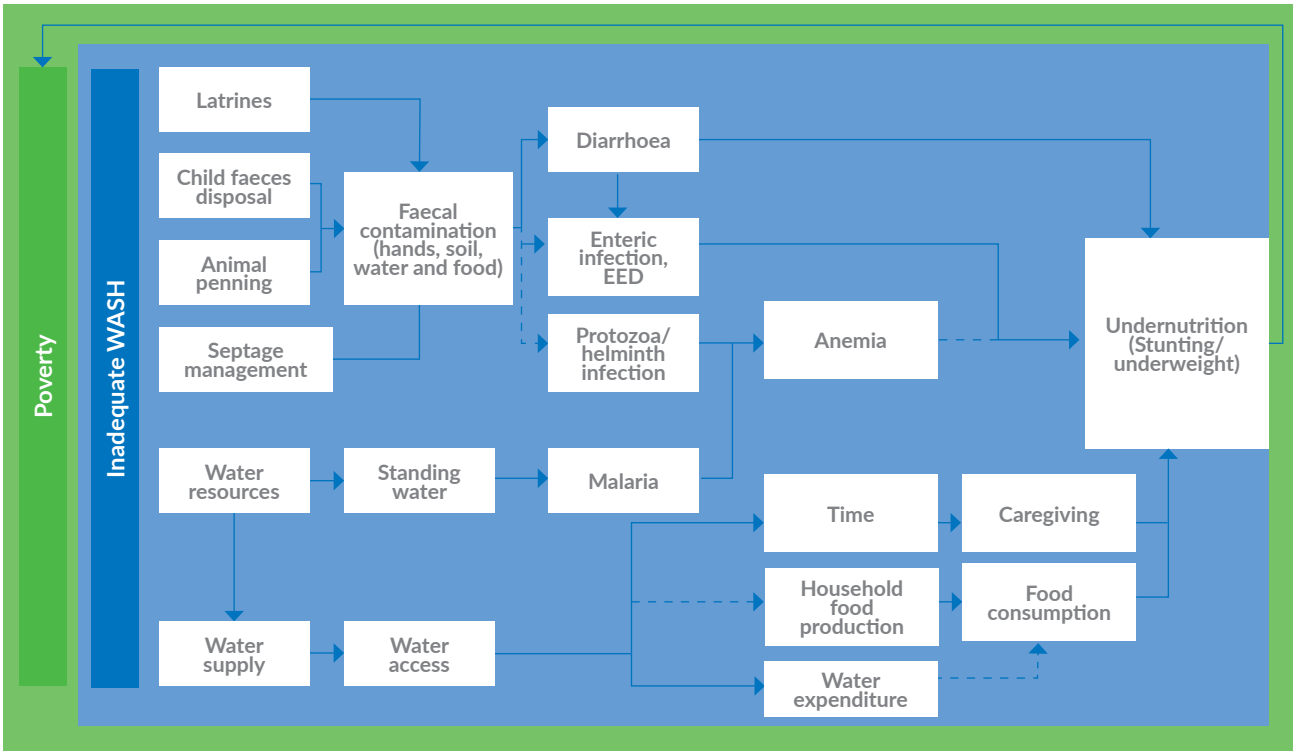


Figure 1. **Pathways linking WASH and nutrition.** Source: Chase and Ngure, 2016 (4)

Inadequate WASH impacts child nutritional status in different ways through multiple pathways (Figure 1). At the biological level, 3 main pathways have been identified: **repeated diarrhoea episodes, soil- transmitted infections (helminths) and EED.** Other infections, such as **malaria or acute respiratory infections**, often associated with poor WASH conditions and exacerbated by poor hygiene practices, are other health risks linking WASH and undernutrition. However, evidence is limited when referring to stunting.

Lastly, WASH conditions also impact **non-biological causes** of undernutrition. A wide variety of social and economic costs related to lack of access to domestic water and sanitation exist, such as water expenditure, time spent in fetching water, or cost for the treatment of diseases linked to poor hygiene and lack of access to domestic water and sanitation. This could all lead to time constraints for the caregivers, mainly women, and may impact their physical and mental health, influencing the quality of care provided to the children by lack of privacy or insecurity in accessing distant facilities.

A more detailed review of evidence of these multiple pathways linking WASH and chronic undernutrition, and some of the studies available which would demonstrate this association is summarised in the annexes.

EED COULD BE THE MAIN CAUSAL PATHWAY BETWEEN WASH AND STUNTING

Recently, there has been an increased interest around the EED pathway. According to recent studies, EED appears to be a key mediator of the link between WASH and stunting. Moreover, some authors have already suggested that this relationship could even be independent from diarrhoea (18–20).

This could explain the failure of classical WASH interventions in stunting prevention reported by Bhutta et al. (12,13). They estimated that WASH interventions at scale, with a 99% coverage would be able to reduce only 2.5% child stunting prevalence. A possible explanation for this failure is the fact that these WASH interventions had been designed to improve child growth through the reduction of diarrhoea prevalence, with no other potential pathways being taken into account. (cf. Annex)

In turn, this has motivated researchers and humanitarian actors from the WASH sector to search for new approaches and solutions for stunting prevention around the 1,000 days.

1.2. THE BABYWASH APPROACH

The ingestion of faecal matter and the extended exposure to faecal microorganisms associated with poor WASH conditions at the household level have been found to be an important pathway from WASH to stunting in children under 2 years of age, mainly linked to age-related practices. Some studies have suggested that nutrition-sensitive WASH interventions have focused too much on caregiver's handwashing, improved water sources, point-of-use water treatment and improved sanitation, however no attention has been given to exploratory ingestion of soil and animal faeces that occurs in early childhood (12).

Nevertheless, to avoid ingestion of soil, or other habits common amongst children: hand-mouth activities, like chewing on play objects, in this age group is usually difficult. In addition, caregivers, usually women, may suffer important time constraints in their everyday life as they have many tasks and duties both at home and outside, resulting in them being overwhelmed and not able to devote more time to caregiving activities or child surveillance.

THE 1,000 DAYS WINDOW OF OPPORTUNITY

The first 1,000 days of life are defined as the period from conception to 2 years of age. Ensuring a proper nutritional status during this period is crucial for child growth and development.

Nutrient deficiency is more likely to impair growth development if the deficiency occurs during these first 1,000 days when the need for nutrients for neurodevelopment is higher. Therefore, the 1,000 days represent an important window of opportunity to prevent or reverse the impact of these consequences. (For more information, please, see Annex B)

The faecal-oral pathway has been shown to be a main contamination route for children under 2, although existing WASH interventions have not been successful in protecting infants and young children from ingesting soil and faecal microorganisms at this critical growth and development stage (37).

In response to this concern, a new **BabyWASH approach** has been proposed as an additional component of early childhood development programmes (9), with the main objective of **breaking the cycle of faecal-oral exposure and transmission pathways in children under 2.**

This approach has been defined by the **BabyWASH Coalition**[2], as an approach which *aims to integrate water, sanitation and hygiene into Maternal, Newborn and Child Health (MNCH), Early Childhood Development (ECD) and nutrition, to have a more profound impact on child health outcomes in the first 1,000 days of life* (13).

Interventions that exclusively focus on hygiene behaviours may put additional workloads on caregivers and may be inefficient at obstructing children's faecal-oral transmission. Adopting this new approach, WASH interventions would be carefully designed to break this prominent route of faecal-oral transmission and to reduce animal faecal contamination a child's environment (12).

The BabyWASH concept is therefore a comprehensive approach that has the ability to create an enabling environment for household hygiene behaviours, facilitating the adoption of optimal care practices.

[2] The BabyWASH Coalition is a multi-stakeholder platform launched in September 2016. It recognises the importance of multisectoral collaboration to ensure better health for children, their mothers and their caregivers. (For more information, please see chapter 4.1)

2. BABYWASH IN ACTION AGAINST HUNGER

For Action Against Hunger, the prevention of stunting may be the most significant outcome expected from the BabyWASH concept, limiting the EED pathway and other WASH links.

In support of the Baby WASH Coalition effort, and in line with its own mandate to eradicate undernutrition, Action Against Hunger has defined activities for stunting reduction to be incorporated in our WASH and Nutrition interventions at the household and individual levels. These activities are adapted to the 1,000 days chronology in order to break off the main faecal-oral contamination pathways related to risk factors and habits of these periods.

Moreover, the BabyWASH approach provides a platform to strengthen integration of sectors in progamming. While ensuring basic nutritional and WASH services are delivered, programmes reinforcing nutrition and health-related care practices will tackle, in a more integrated way, the underlying causes of maternal and child undernutrition, and prevent or reverse child stunting.

The BabyWASH approach aims to integrate water, sanitation and hygiene interventions with those of health and nutrition targeting mothers and children.

Main objectives:

- To reduce faecal environmental exposure.
- To break the main faecal-oral contamination pathways in children under 2 and pregnant women (1,000 days): water, hands, soil, food and child objects.
- To achieve optimal health and nutritional-related care practices.

Specific objectives:

- To improve household sanitary and hygienic conditions.
- To improve personal hygiene practices.
- To avoid ingestion of faecal matter during children's mouthing and exploratory play.
- To achieve the safe storage and use of water.
- To maintain good hygiene practices in the preparation and storage of complementary food (food safety).
- To ensure exclusive breastfeeding up to 6 months and safe introduction of complementary food and water.
- To promote health-seeking behaviours for pregnant women, newborns and infants, and to raise awareness about disease signs and symptoms, in particular for undernutrition.

According to the impact pathway hypothesis (Figure 2), a BabyWASH intervention would reduce faecal exposure and faecal-oral transmission, through the improvement of WASH environmental conditions and maternal and child care practices. This would lead to an improvement in child's health status (EED, diarrhoea and soil-transmitted infections) which will have a positive effect on stunting reduction, and ultimately, a positive impact on child growth and development.

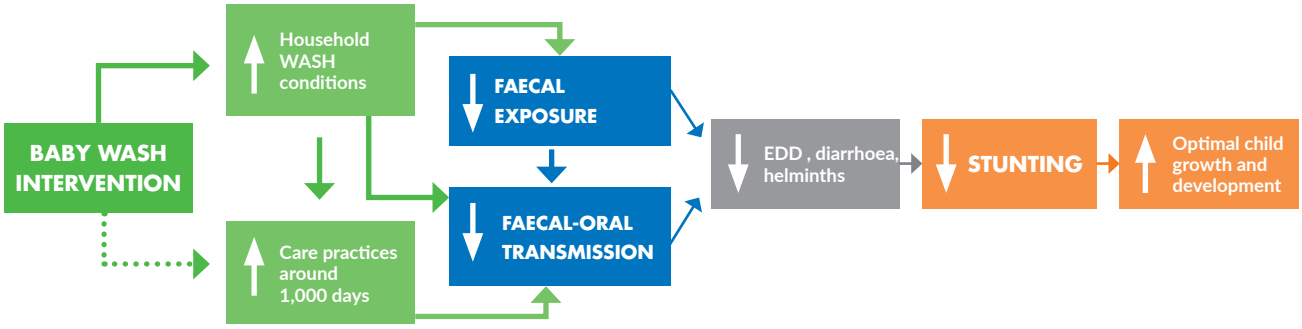


Figure 2. **BabyWASH impact pathway hypothesis.**
Source: Action Against Hunger

2.1. BABYWASH ACTIVITIES FOR AN INTEGRATED PACKAGE

According to the available evidence, Action Against Hunger proposes the adoption of a practical package developed as a **set of activities at household and individual levels, that complement the traditional WASH, nutrition and health programmes.**

This integrated package of activities has been developed based on the definitions and recommendations of various experts in the field and from the BabyWASH Coalition. **This is not an exhaustive list of activities;** it illustrates some of the main BabyWASH activities addressing the prevention of the chronic undernutrition during the first 1,000 days, which should be **adapted by context.**

This package takes into account resources needed *(supply side)* and behaviour change strategy *(demand side)* based on promotion of optimal care practices. The timeline is illustrative and promotion of good practices should be continuous along the 1,000 days. However, key moments have been identified, such as the weaning transition with introduction of foods, when babies begin to increase mobility and when they begin to grab thinks or walk without help. All of these moments increase the contact with faecal microorganisms.

Figure 3 and Table 1 below, propose a non-exhaustive list of examples illustrating concrete activities for the BabyWASH approach. Context-specific activities may be added, and Action Against Hunger will continue working with partners, in particular through the BabyWASH Coalition, to develop guidance and additional activities.

The activity package has been designed with the objective of breaking the cycle of faecal-oral exposure and transmission pathways within the 1,000 days window.

Figure 3.

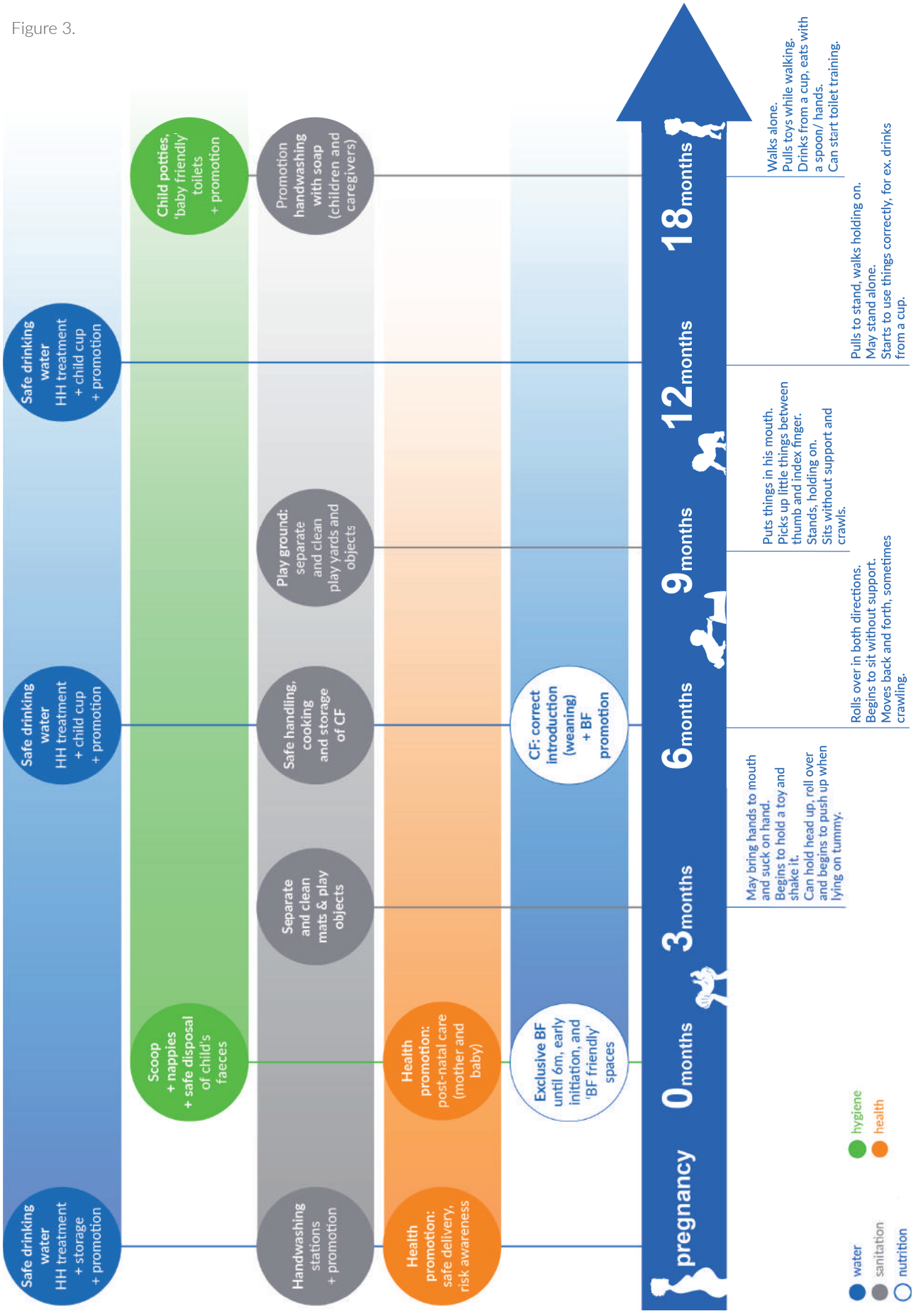


Figure 3. **Integrated package for stunting reduction along the 1,000 days.**
HH: household; BF: breastfeeding; CF: complementary feeding.
Source: Action Against Hunger

WHY TARGETING THE ACTIVITIES AT AN INDIVIDUAL OR HOUSEHOLD LEVEL?

This integrated package of activities has been designed to break the faecal-oral exposition and transmission in 1,000 days, which would appear to be a key pathway in the association WASH-stunting.

Unlike other children, babies under 2 years of age spend most of the time in their households, with their mothers or caretakers. It therefore makes sense that the focus is placed at this level, where children exposition to faecal matter is greater, and care practices are key factors in their nutritional status.

This does not exclude other WASH activities that are implemented regularly in traditional programmes, such as the improvement of facilities and services in health centres, schools and at water points and community sanitation levels.

Table 1.

OBJECTIVE	ACTIVITY		TIMING	CRITICAL MOMENT
	RESOURCES	PROMOTION		
WATER-RELATED				
To ensure **safe storage** and **use** of drinking water	Household water treatment: boiling, solar disinfection, filtration Water container, jerry can Child-friendly cups and containers for exclusive use	Water use: safe drinking water Correct timing for introduction of drinking water (> 6 months) Cleaning and maintenance of water storage containers at point of use and child's cup	Pregnancy to 24 months	6 months (weaning)
SANITATION-RELATED				
To improve **household sanitary conditions:** access, adaptation and use of toilets	Reusable cloth nappies Baby-friendly toilets or potties Scoop	Safe disposal of child faeces/ nappies Cleaning of nappies and potties	Pregnancy to 24 months	0 months 18 months

HYGIENE-RELATED				
To improve **individual hygiene practices and household hygienic conditions**	Handwashing stations (kitchen and toilets) Soap (if possible, or ash) Domestic cleaning kit Separation of domestic animals: corrals, fences Improvement of domestic hygiene conditions (type of floor, walls, cleanliness, etc.)	Handwashing with soap or ash (mother to child and child alone) Nail cutting Household basic hygiene and cleanliness Prevention of animal excreta in vicinity of baby	Pregnancy to 24 months	Always
To avoid **ingestion of faecal matter** during children's mouthing and exploratory play	Safe and clean play spaces: mats/ plastic sheets and/or play yards Pacifier chain and clip	Baby's exclusive use Cleaning and maintenance of play spaces and objects (toys, pacifier , etc.)	>3- 18 months	3 months 9 months
To maintain good hygiene practices in the **preparation and storage of complementary food**	Box or lid to protect food from flies, rats and other animals Dish and cooking utensils rack	Handling, preparation, reheating and storage of child food Hygiene in the kitchen and feeding spaces Clean cooking and serving utensils	>6- 24 months	6 months (weaning)
To avoid pollution caused by the presence of **solid waste** at household level	Trash bin/ Incineration pits	Adequate management of solid waste in order to avoid vectors	Pregnancy to 24 months	9 months 18 months

Care practices: HEALTH-RELATED				
To promote **health-seeking behaviours** for pregnant women, newborns and infants.	Handwashing stations with soap or ash, and safe Availability of safe water Mosquito nets Oral rehydration solution	Awareness raising about signs and risks of diseases and undernutrition Pre and post -natal medical consultations, and referral to health centres for diseases Early rehydration in case of diarrhoea, while seeking professional health advice Breast hygiene while breastfeeding Malaria prevention Support for reducing workload during pregnancy and after delivery	Pregnancy to 24 months	Pregnancy 0 months 6 months (weaning)
CARE PRACTICES: NUTRITION-RELATED				
To ensure **early initiation of breastfeeding, exclusive breastfeeding** up to 6 months and correct introduction of **complementary food.**	Calm, clean and safe spaces for breastfeeding (especially for internally displaced people, refugee camps or other crisis scenarios)	Early initiation after delivery. Exclusive breastfeeding until 6 months Correct introduction of complementary food and water (weaning)	Pregnancy to 24 months	Pregnancy 0 months 6 months (weaning)

Table 1. **BabyWASH activities for stunting reduction along the 1,000 days.**
Source: Action Against Hunger

2.2. ENSURING BABYWASH PROGRAMMING IS SUCCESSFUL

Thanks to its multisector and integrated approach, this proposed package of activities has the potential to tackle likely causes of stunting. In addition, it presents the advantage of not adding complexity to programmes; on the contrary, it presents small, simple and doable solutions for the everyday life of caregivers and their children. However, there are some aspects to be taken into account for successful BabyWASH programming.

First of all, the nutrition and hygiene promotion component should be designed under the umbrella of a well-planned **behaviour-change strategy.** Behavioural changes and new household practices might be hard to achieve or to maintain for the long term.

Moreover, **beneficiary acceptance and needs require further exploration** before the inclusion of these activities into existing programmes. Usual household and cultural practices and traditions must be taken into account, ensuring that the package will be adapted to the specific context. In addition, it would be useful to **identify successful pre-existing WASH and care practices,** in order for the BabyWASH activities to be reinforced with them. A barrier analysis can help understanding the dynamics in the households and support the definition of an adequate behaviour change strategy.

THE IMPORTANCE OF EXPLORING BENEFICIARY ACCEPTANCE

One recent study in Sierra Leone has found that keeping small children in a clean enclosed area was not accepted by any household, despite their initial interest (14).

Caregiver's **social support** is also a critical issue for the success of this type of programme. It is therefore necessary to gain the support from family and community actors (men, elders, traditional birth attendants…); therefore, the implementation of the activities and the adoption of habits are reinforced and fostered by the own community.

A **gender lens** is essential to ensure buy-in of decision-makers in the household, and to address cultural differences between male and female babies. It will be necessary to identify and engage all the caregivers, not assuming only the mother needs to be targeted: elder children or grandparents can jeopardise improved practices from mothers. For this reason, it is crucial to work with a specific approach for these groups, understanding their responsibilities and influence in guaranteeing optimal outcomes.

Finally, we also need to consider the challenge of improving child **care without putting additional workloads** on caregivers. This issue remains a challenge and needs to be seriously taken into account following the principle of "do no harm".

3. WHY DOES IT MAKE SENSE FOR US?

3.1. BABYWASH AND ACTION AGAINST HUNGER'S GUIDING PRINCIPLES AND STRATEGY

The BabyWASH approach is directly in line with two of our **guiding principles**: *to address the **causes** of undernutrition through an **integrated approach** and to promote **long-term and sustainable solutions** to the causes of undernutrition.*

The BabyWASH approach takes into account the multi-causal nature of stunting, and seeks to prevent it in a simple, sustainable and integrated way in order to ensure optimal maternal and child nutrition, and development for the long-term.

A gender lens is essential to ensure buy-in of decision-makers in the household. It will be necessary to identify and engage all the care-givers, without assuming that only the mother should be targeted.

WASH'NUTRITION STRATEGY

The WASH'Nutrition Strategy, developed by Action Against Hunger and partners, seeks to demonstrate the importance of both complementing nutrition programmes with WASH activities and adapting WASH interventions to include nutritional considerations, for instance, making them more nutrition-sensitive and impactful on nutrition.

The BabyWASH approach fits in this strategy and responds to some of its main pillars (figure 4):

- **Pillar 1 - Integration:** Improving coordination and enhancing partnership so as to ensure the **integration of health and nutrition goals in all WASH projects** from the start.

- **Pillar 2 - Focusing on the "mother/caretaker – malnourished child" dyad:** special attention is given to the **mother and child couple in relation with the 1,000-day window of opportunity,** as the prevention of undernutrition during this period is crucial.

- **Pillar 3 - Placing emphasis on behaviour change:** it enhances the importance of **behaviour change**, knowing that provision of hardware only (access to water and sanitation facilities) brings little benefit to health if it is not accompanied with suitable hygiene behaviours.

- **Pillar 4 - Coordination:** need to ensure **proper coordination with other organisations and partners,** as well as appropriate choices depending on the specific characteristics of each project.

- **Pillar 5 - Ensuring a WASH minimum package for households:** a **set of measures** needed to ensure that mother/caretakers and children have access to safe water in sufficient quantities, adequate sanitation facilities and can practice good hygiene at home. It contains a combination of WASH service deliveries, and promotion of good practices.

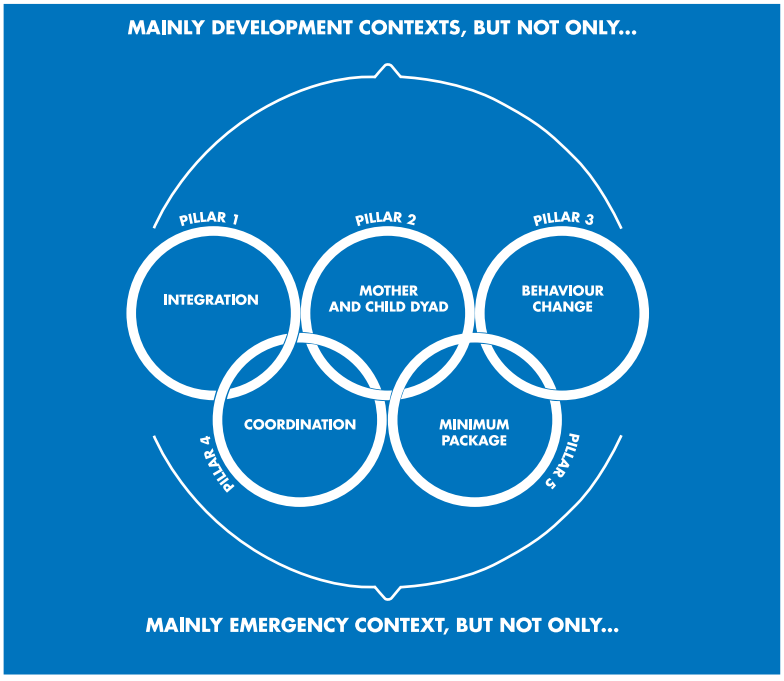


Figure 4. **The 5 pillars of the WASH'Nutrition strategy (16)**.
Source: WASH'NUTRITION- A practical guidebook on increasing nutritional impact through integration of WASH and nutrition programmes, Action Against Hunger 2017.

3.2. THE BABYWASH APPROACH IN THE MULTICAUSAL NUTRITION FRAMEWORK

Action Against Hunger bases its operations on the Conceptual Framework of Undernutrition developed by UNICEF in 1990 and adapted in numerous publications (see Annex C). The BabyWASH approach is particularly in line with the UNICEF maternal and child nutrition perspective, taking into account and giving importance to care practices and maternal resources.

Definitions for care and care practices for nutrition are in the chart below (17,18).

Care is defined as the provision of time, attention and support to meet the physical, mental and social needs of the growing child and other household members (ICN, 1992).

Care practices for nutrition are the practices at household level of those who give care to children, translating the available food and health care resources into the child's survival, growth and development (Engle et al., 1997).

CARE BEHAVIOURS	CAREGIVER'S RESOURCES FOR CARE
Child feeding practices	Education, knowledge and beliefs
Psychosocial stimulation/ interactions	Physical health and nutritional status
Care for pregnant/ lactating women	Mental health, self-confidence
Hygiene- related practices	Autonomy and control of resources
Health- seeking behaviours	Workload and time availability
	Social support

Recognising the importance of care for nutrition is essential, not only for ensuring good nutrition, but also to value caretakers unpaid care work. Recognising this will also ensure that design and implementation of nutrition-sensitive interventions is appropriate.

The BabyWASH approach seeks to create an enabling environment for the achievement of optimal care practices, being aware not to put additional workloads on mothers/caretakers, which will help them support and care for their children during the 1,000 days.

3.3. BABYWASH RESPONDS TO THE NUTRITIONAL SECURITY APPROACH

The BabyWASH approach seeks to have a nutritional impact, ending undernutrition and tackling its underlying causes, in a sustainable, multisector and multilevel way.

It is easily integrated in the Nutritional Security approach and facilitates the achievement of "an ongoing access to the basic elements of good nutrition for all people, and the knowledge needed to care for and ensure a healthy and active life for all household members" (19).

Nutrition Security goes beyond the traditional concept of food security and recognises that nutritional status is dependent on a wide and multi-sectoral array of factors, including access to food, sanitary environment, adequate health services, and knowledgeable care (20).

A BabyWASH package works at the household and individual level, promoting optimal practices and resources for care and improving environmental conditions (Figure 5).

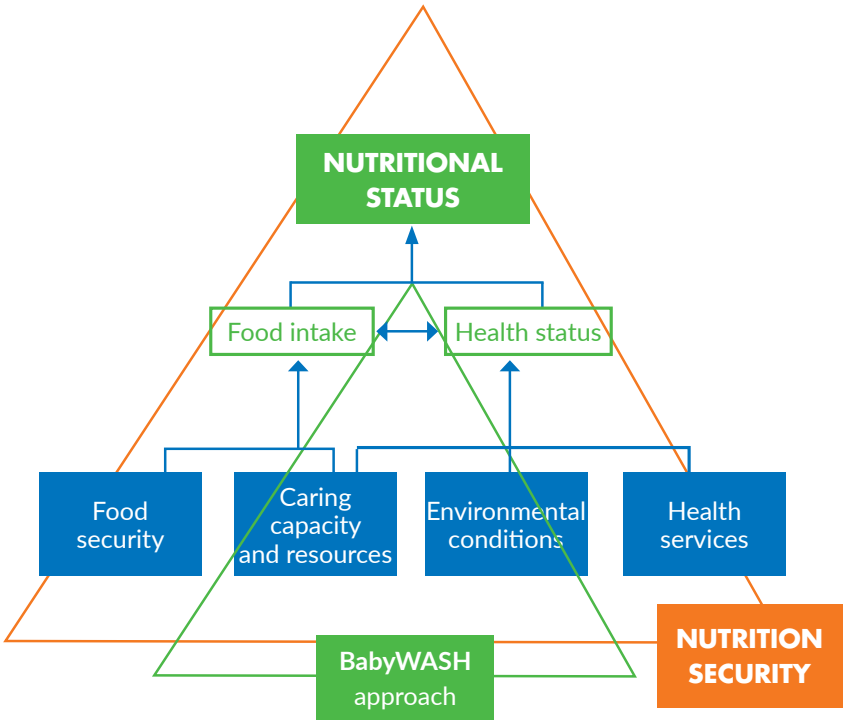


Figure 5. **BabyWASH approach framed under the Nutrition Security framework**
Adapted from Nordin et al. (21)

4. GLOBAL PLATFORMS FOR A BABYWASH APPROACH

4.1. THE BABYWASH COALITION

The **BabyWASH Coalition** is a multi-stakeholder platform initiated by World Vision and Water Aid in partnership with UN agencies, academic institutions, donors, NGOs and other international organisations. The BabyWASH Coalition was launched at the 71st UN General Assembly in September 2016 under the new commitment to the *Global Strategy on Women's, Children's and Adolescent's Health (2016-2030).*

The BabyWASH Coalition recognises the *lack of multisectorial engagement* and the importance of *improving collaboration among those who work to prevent malnutrition and keep children and their caretakers healthy in their first 1,000 days*. The aim of the Coalition is, therefore, to bring together experts in WASH, Nutrition, Maternal Newborn and Child Health (MNCH) and Early Childhood Development (ECD) to promote cross-sector collaboration to ensure better health for children, their mothers and caregivers.

The Coalition has identified vulnerability hotspots across the 1,000 days related to risk factors of poor WASH conditions. These high risk periods are: pregnancy, delivery and neonatal periods, early infancy, complementary feeding period and mobility and exploration periods. According to this identification, key points for intervention for each period are defined as seen in Figure 6.

Action Against Hunger is in the steering committee of the BabyWASH Coalition, the co-chair of the advocacy workstream and a core participant in the different workstreams.

It would be useful to identify successful pre-existing WASH and care practices, in order for the BabyWASH activities to be reinforced with them.

® Lys Arango

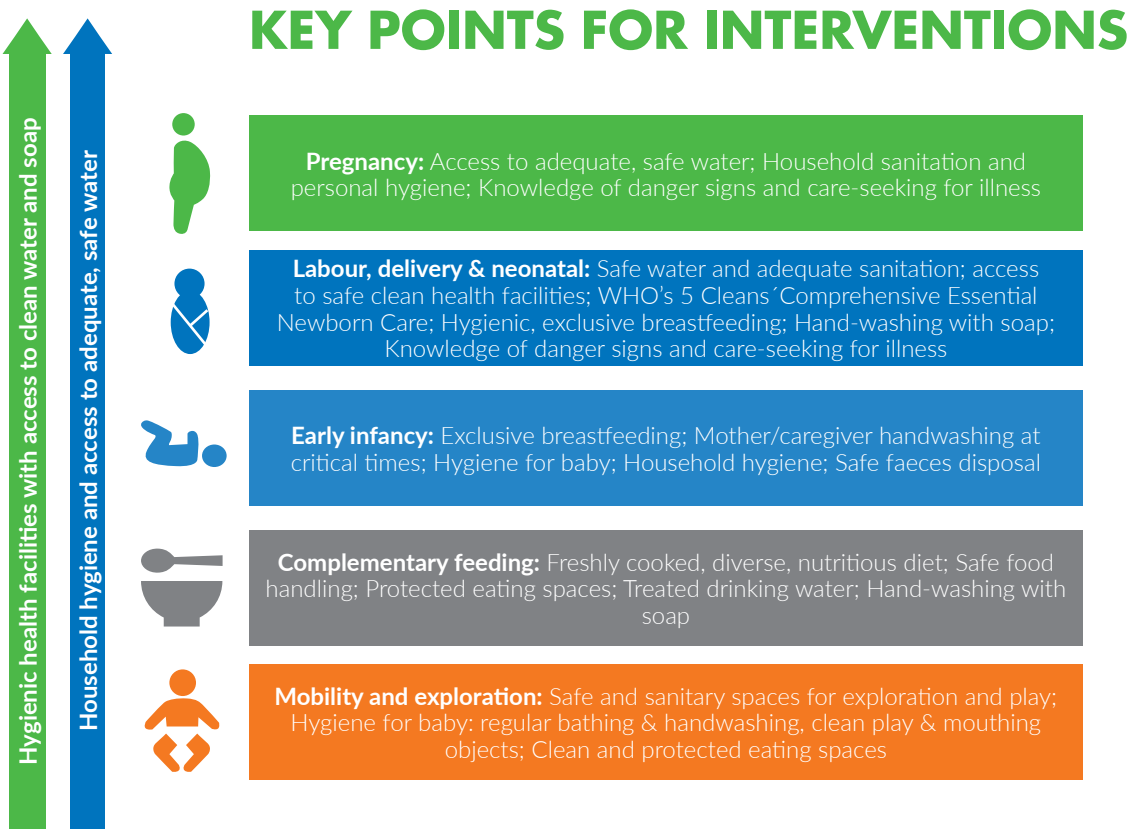


Figure 6. **Key points for intervention and vulnerability periods..**
Source: BabyWASH Coalition – World Vision International (13,22)

4.2. CORE GROUP

CORE Group emerged from a group of health professionals from NGOs who saw the value of sharing knowledge and ideas about how to best help children survive. Its mission is to *improve and expand community health practices for underserved populations, especially women and children, through collaborative action and learning*. In 1997, the **CORE Group** published a list of Essential Nutrition Actions (ENA) and Essential Hygiene Actions (EHA) that were updated in 2015 (23). They aim to have a **life-cycle approach,** to deliver **right messages** to the **right person** at the **right time** and be able to implement **small doable actions** in the context of daily routines.

The CORE group endorses the civil society statement on Scaling Up Nutrition (SUN) and is a programme partner of the 1,000 days organisation. Action Against Hunger specifically participates in the nutrition working group, as well as the Social and Behaviour Change working group.

ESSENTIAL NUTRITION AND HYGIENE ACTIONS: ENA - EHA

Essential nutrition actions

- Women's nutrition: adolescence, pregnancy, lactation.
- Breastfeeding
- Complementary feeding
- Nutritional care for sick and malnourished children
- Prevention and control of anaemia, vitamin A and iodine deficiencies in women and children

Essential hygiene actions

- Household water treatment and safe storage
- Handwashing at critical times
- Safe storage and handling of food
- Safe disposal of children's faeces
- Separate/create barriers between toddlers, soil and animal faeces

4.3. SUSTAINABLE DEVELOPMENT GOALS AND THE UN'S EVERY WOMEN EVERY CHILD INITIATIVE

The BabyWASH approach also responds to the Sustainable Development Goals. It is an integrated multidimensional action that seeks to leave no one behind. BabyWASH focuses on mothers and their children to break the stunting cycle, to ensure that the new generations can fulfil their potential in dignity and equality in a healthy environment, and enjoy a prosperous life (24).

Goals 2, 3, 4 or 6 are examples of SDGs supported by the BabyWASH approach.

Every Woman Every Child is a multi-stakeholder movement that puts into action the UN Global Strategy for Women's, Children's and Adolescent's Health (2016-2030). It presents a roadmap to ending all preventable deaths of women, children and adolescents within a generation, and ensuring their well-being. This initiative looks for sustainable, innovative and long-term commitments that seek to have clear impacts on well-being of women, children and adolescents.

SDGs addressed with the BabyWASH approach

GOAL 2
End hunger, achieve food security and improved nutrition and promote sustainable agriculture.

2.1- By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round.

2.2- By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons.

GOAL 3
Ensure healthy lives and promote well-being for all at all ages.

3.1- By 2030, reduce the global maternal mortality ratio to less than 70 per 100,000 live births.

3.2- By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under-5 mortality to at least as low as 25 per 1,000 live births.

GOAL 4
Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

4.2- By 2030, ensure that all girls and boys have access to quality early childhood development, care and pre-primary education so that they are ready for primary education.

GOAL 6
Ensure availability and sustainable management of water and sanitation for all.

6.1- By 2030, achieve universal and equitable access to safe and affordable drinking water for all.

6.2- By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations.

6.b- Support and strengthen the participation of local communities in improving water and sanitation management.

5. ONGOING BABYWASH TRIALS

Two randomised-controlled trials are currently being conducted to evaluate the effects of BabyWASH interventions on childhood stunting and anaemia in Zimbabwe, Kenya and Bangladesh.

5.1. THE SHINE TRIAL

The SHINE (Sanitation Hygiene Infant Nutrition Efficacy) **Trial** (14) has been designed by the Johns Hopkins Bloomberg School of Public Health and other academic and non-academic partners, and it is being implemented since November 2012 in Zimbabwe through the Ministry of Health. Its main goal is to determine the independent and combined effects of improved household WASH (protecting babies from faecal ingestion) and improved child feeding practices and haemoglobin concentration among children at 18 months of age who are born to HIV-negative women in rural settings.

Pregnant women and their babies are randomised in three intervention arms and one control arm, and followed until the baby reaches 18 months of age. The control arm receives a standard of care (SOC) programme (breastfeeding promotion, HIV mother-to-child transmission prevention, health workers and system strengthening). Intervention arms are receiving:

1) SOC + WASH intervention
2) SOC + Nutrition intervention
3) SOC + WASH + Nutrition interventions

The WASH intervention includes: provision of toilets, tippy-taps, point-of-use chlorination, a washable mat, a plastic play yard, and promotion of handwashing with soap, safe disposal of faeces and safe handling and preparation of complementary food. All these components are properly introduced during pregnancy and/ or key child stages. For example, the mat, that is also locally manufactured, is provided when the baby is 2 months old, and safe complementary food promotion starts when babies are 5 months old, just before weaning time at 6 months.

5.2. THE WASH BENEFITS TRIAL

The WASH Benefits Trial (15) is being implemented since 2012 in Kenya and Bangladesh by Emory University, University of California, Stanford University, the International Centre for Diarrheal Disease Research in Bangladesh and the Kenya Medical Research Institute. Its general aim is to measure the independent and combined effects of interventions that improve sanitation, water quality, handwashing, and nutrition on child health and development in the

first years of life. Groups of households with pregnant women have been randomised to one of the 6 intervention arms or control arm. The intervention arms consist of:

Group 1) water quality (point-of-use chlorination and promotion of household water treatment)
Group 2) sanitation
Group 3) handwashing
Group 4) nutrition
Group 5) water+ sanitation+ handwashing
Group 6) water+ sanitation+ handwashing+ nutrition

All intervention arms include both provision and promotion of appropriate hygiene practices. For example, households belonging to the sanitation arm have received free child potties, sani-scoop hoes and new or upgraded pit latrines. All of this is in addition to behaviour change strategies that focus on the use of latrines for defecation and the removal of human and animal faeces from the compound.

Both trials in these three very different settings are promising studies and they will hopefully add more evidence to the WASH and nutrition field, as they are looking at child growth and health from a wider perspective. They will also provide comparable results on WASH and nutrition interventions implemented alone or in an integrated way.

The household environment in which children develop and grow is highly related to their nutritional status.

6. CONCLUSIONS

Stunting reduction requires that nutrition-specific interventions are implemented along with nutrition-sensitive interventions in an integrated manner. Direct undernutrition interventions, even when scaled up to 90 percent coverage rates, have been estimated to address only 20 percent of the stunting burden. Tackling the underlying drivers of nutrition is key to addressing the other 80 percent (25).

Evidence around the BabyWASH approach is growing, and trials will soon bring to light the effect of these interventions on indicators for stunting reduction. It is essential to use the global momentum around this emerging body of evidence and the current international dialogue advocating for nutrition-sensitive WASH programming to develop operational guidance and practical examples for implementation.

This practical package represents a good opportunity to identify implementation challenges and refine the activities with communities, taking their input into account for the design and evaluation of programmes, and promoting their engagement for the long term. Although the package has been designed to be implemented at the household level, the proposal can be adapted to other levels, such as health centres or schools, where sectoral integration in the prevention of malnutrition has to be equally promoted and secured through adequate funding.

Based on the available evidence and the needs usually found in humanitarian environments, Action Against Hunger promotes the adoption of the BabyWASH concept and package by its operations and partners, and believes that it can be implemented on a large scale. For this, we advocate for governments to make water, sanitation and hygiene part of all strategies and plans to reduce child mortality and improve nutrition. Public health policies must equally increase their focus on environmental sanitation and integrate WASH minimum standards at all levels, from health centres to household levels. Finally, greater national and international investment in water, sanitation and hygiene, but also in nutrition, is necessary to effectively fight undernutrition.

Moreover, we aim to advocate for the integration and involvement of other sectors to make the BabyWASH impact larger and sustained. Joint cross-sector action is essential to achieve the Sustainable Development Goals, recognising that providing water and sanitation for all by 2030 (Goal 6) will be fundamental to ending malnutrition (Goal 2), preventing newborn and child deaths and achieving Universal Health Coverage (Goal 3). In addition, achieving lifelong learning opportunities for all (Goal 4) will be only possible if good nutrition in early life and, therefore, integral childhood physical and cognitive development is ensured.

We need to take this opportunity to get involved in these new ideas, working together with other humanitarian and academic actors in partnerships and coalitions, and fostering the generation of successful practices that can contribute to the fight against undernutrition.

Greater national and international investment
in water, sanitation and hygiene, but also in nutrition, is necessary
to effectively fight against undernutrition

ANNEXES: EVIDENCE REVIEW

A) CHRONIC UNDERNUTRITION AND STUNTED GROWTH

More than a third of child deaths and more than 10% of the global disease burden are attributed to maternal and child undernutrition. Linear growth failure in childhood is the most prevalent form of undernutrition globally (24).

Global improvements have been made since 2000, when the Millennium Development Goals were launched. However, according to the last United Nations International Children's Emergency Fund (UNICEF) report (27), and the very recent Global Nutrition Report 2016 (25), 159 million children under 5 are stunted or chronically malnourished worldwide. This represents a **23.8% global prevalence of stunting** among children under 5 years of age (2).

Regionally, Asia and Africa carry most of the burden. Asia has experienced a decline in the proportion of stunted children from 49% to 28% between 1990 and 2010, but nevertheless, it still contains the largest number: around 100 million children. In Africa, stunting prevalence has remained stagnant, around 40%, but the absolute number of stunted children is increasing due to population growth.

Stunting reveals a gradual, cumulative and chronic process of undernutrition from conception through the first two years of a child's life, and it has severe **short and long- term consequences, including for physical health and cognitive functioning** (1).

Causes of chronic undernutrition are multiple and will be addressed in following sections. Biologically, pregnant, lactating women and young children have substantially higher nutrient requirements relative to other age groups. Additionally, women and young children may hold lower social status which limits their access to nutrient-rich foods, increases their risk of infectious diseases, and reduces their access to adequate health care, which in turn, increases disease burden. This increased disease burden in these groups further increases nutrition requirements and creates a perpetuating **cycle of infection and undernutrition** (27).

Moreover, evidence shows that maternal undernutrition in pregnancy can initiate and perpetuate an **intergenerational cycle of malnutrition, infection and underdevelopment** (Figure 7) (29) . In fact, it is estimated that 20% of stunting has in utero origins (29), with effects continuing for at least the first 2 years of postnatal life. A mother who is undernourished is more likely to give birth to a small child with low birth-weight who, in consequence, will have greater risk of death in the neonatal period and increased chances of being stunted in his early infancy.

Stunted children are at higher risk of suffering from chronic diseases in later life. A chronically undernourished child who, in addition, experiences rapid weight gain after the age of 2 years has an increased risk of becoming overweight or obese later in life, and also a higher risk of coronary heart disease, stroke, hypertension and type 2 diabetes (31).

Moreover, stunting hinders developmental potential and human capital of entire societies due to its long-term impact on cognitive function and adult economic productivity, with significant educational and economic consequences at the individual, household and community levels (31). For example, studies from Brazil, Guatemala, India, the Philippines and South Africa have associated child stunting with a reduction in schooling: adults who were stunted at the age of 2 years completed nearly one year less of schooling than non-stunted individuals. (33, 34).

In addition, it is estimated that stunted children earn 20% less as adults compared to non-stunted individuals (34). For women, stunting in early life is associated with a lower age at first birth and a higher number of pregnancies and children (36).

Stunting is caused by factors that also contribute to wasting (acute undernutrition), underweight or anaemia. In fact, these different forms of malnutrition frequently co-exists and they have a compounded risk of morbidity, mortality (3) the long-term consequences.

B) THE 1,000 DAYS WINDOW OF OPPORTUNITY

The first **1,000 days** of life are defined as the period from conception to 2 years of age and nutrition along this period is crucial for child growth and development. Pregnancy and infancy are the most important periods for child's brain development and it is along those periods where the foundation for lifetime brain function is established.

For this reason, nutrient deficiency is more likely to impair growth development if the deficiency occurs during these first 1,000 days when the need for nutrients for neurodevelopment is higher (36). Additionally, damage done to child's physical growth, immune system and brain development during this period is usually irreversible (37).

Additionally, a well-nourished, healthy, active and responsive child is also better suited to interact with his or her caregiver and environment in a way that provides the experiences necessary for brain development (36). Similarly, well-nourished and healthy mothers provide more attention to infant caregiving and mother-infant interaction. Both positive factors also contribute to the optimal achievement of a child´s development and positive long-term effects.

The 1,000 days approach is additionally supported by the theory that height-for-age Z-score (HAZ), the stunting indicator, could decrease until 2 years of life but remained stable once the

child grew older. In support of this theory, the **window of opportunity of the 1,000 days** would prevent and stop stunted growth. Using a new indicator, the height-for-age difference (HAD), some authors have shown that children's growth faltering could continue until 5 years of age, thus creating further scope for the prevention period. However, 70% of this potential deficit is reached in that first 2 years (39), which again justifies the urgency of putting sufficient efforts during this period. This is an optimal window for interventions to prevent, reverse and improve both maternal, foetal, birth and infant outcomes, including risk reduction of infants developing chronic diseases in later life (39).

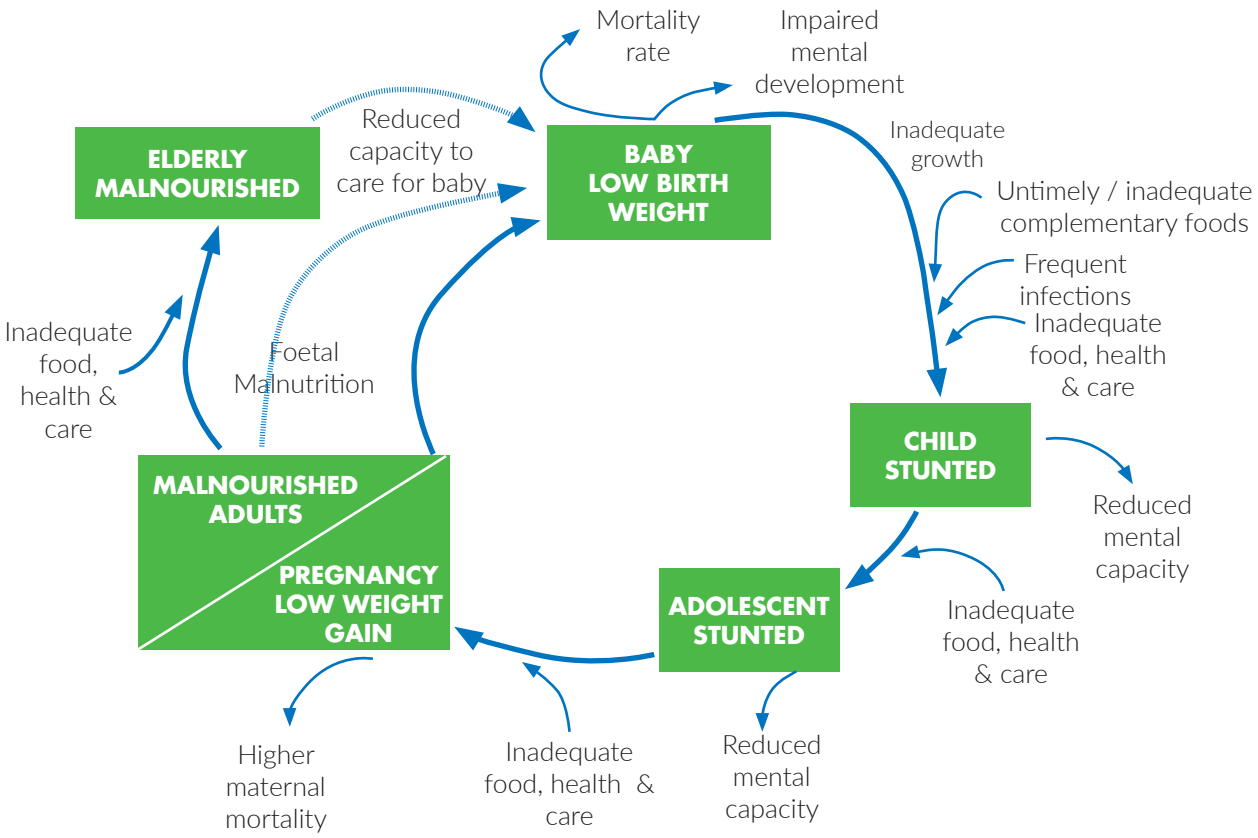


Figure 7. **The impact of undernutrition throughout the life cycle.**
Adapted by the LSHTM (2013) from ACC/SCN (2000) Fourth Report on the World Nutrition Situation. Geneva: ACC/SCN in collaboration with the International Food Policy Research Institute (IFPRI)

C) THE MULTICAUSAL FRAMEWORK OF MATERNAL AND CHILD UNDERNUTRITION

Factors and pathways leading to undernutrition are diverse, complex, and most often interconnected (20). An individual's nutritional status is the result of a complex set of inter-related factors that act synergistically, are dependent on the environment in which people live and the intra-household processes they are exposed to (41). For the same reason, maternal and child nutritional status cannot be looked at only in the sense of food intake.

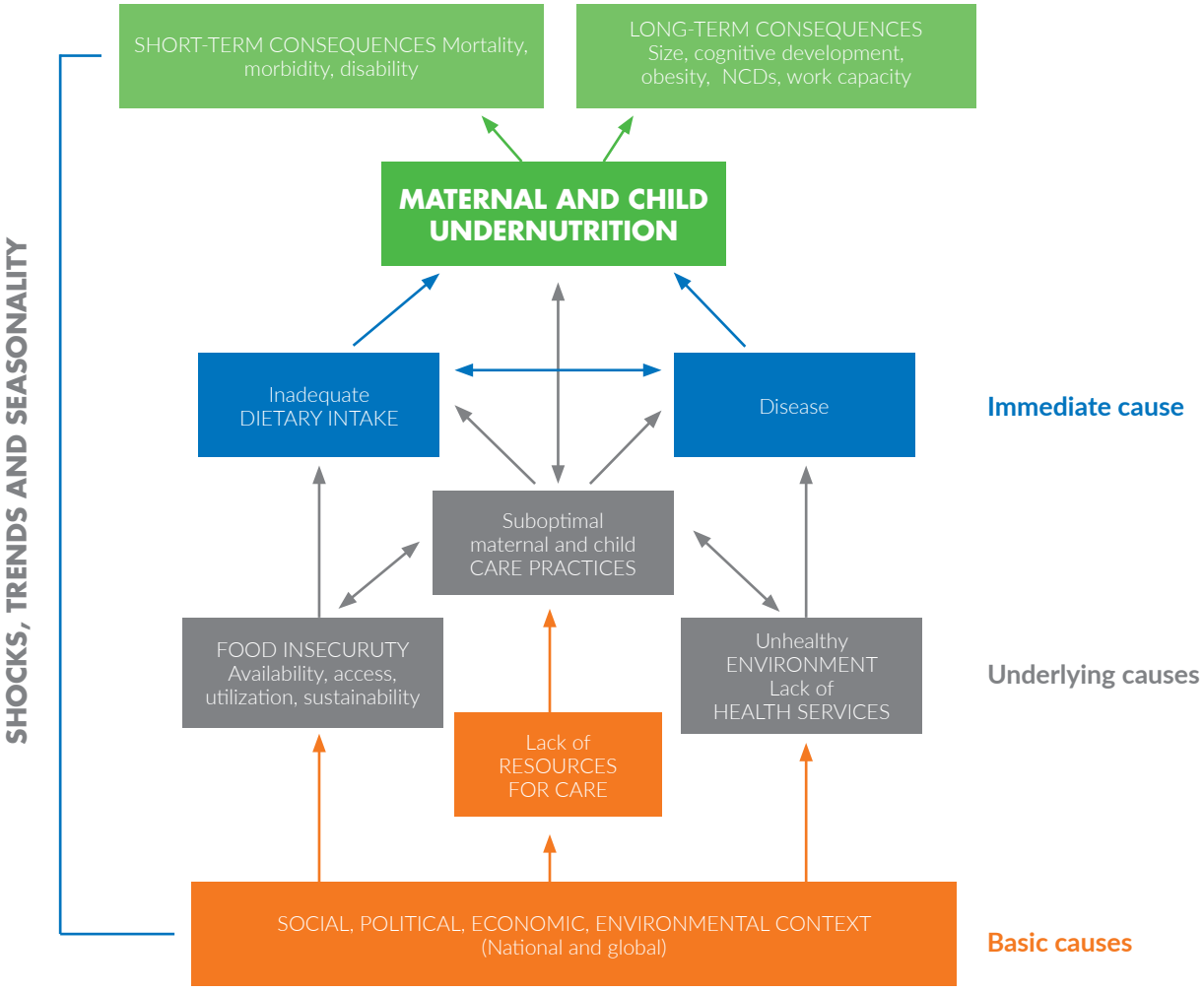


Figure 8. **Conceptual framework for maternal and child undernutrition**
Adapted from Black et al. 2008 (26) and UNICEF 1990 (44)

The stunting process along the 1,000 days is the result of multiple causes and factors. The conceptual framework of maternal and child undernutrition, initially developed by UNICEF in 1990, reflects these various factors and how they interact and affect nutritional status (Figure 8) (42). According to this framework, maternal and child undernutrition is directly caused by an inadequate food intake, a poor health status or disease as a consequence of a food insecurity situation at the household level, inadequate maternal and child health care practices and poor health and WASH conditions. These underlying causes are modelled by basic or structural determinants at the national and international level, which include social, political and economic contexts.

The novel aspect of this framework was the assumption of a **holistic and integrated approach** of undernutrition and its determinants, and it allowed us to understand why nutritional interventions alone couldn't solve the problem. In fact, the analysis from the 2008 and 2013 Maternal and Child Nutrition Lancet Series (43) showed a reduction of only a 30% of stunting prevalence among children under 5 years of age when nutritional interventions were implemented (44, 45), and added more evidence to the idea that **dietary adequacy is necessary but not sufficient** to ensure optimal linear growth of children.

In this 2013 Lancet Series (43), a new framework was designed (Figure 9) including potential interventions and programmes which highlighted the difference between the classical interventions, the specific nutritional interventions to achieve optimum foetal and child nutrition: **nutrition-sensitive interventions,** those addressing the underlying causes of undernutrition with nutrition specific goals.

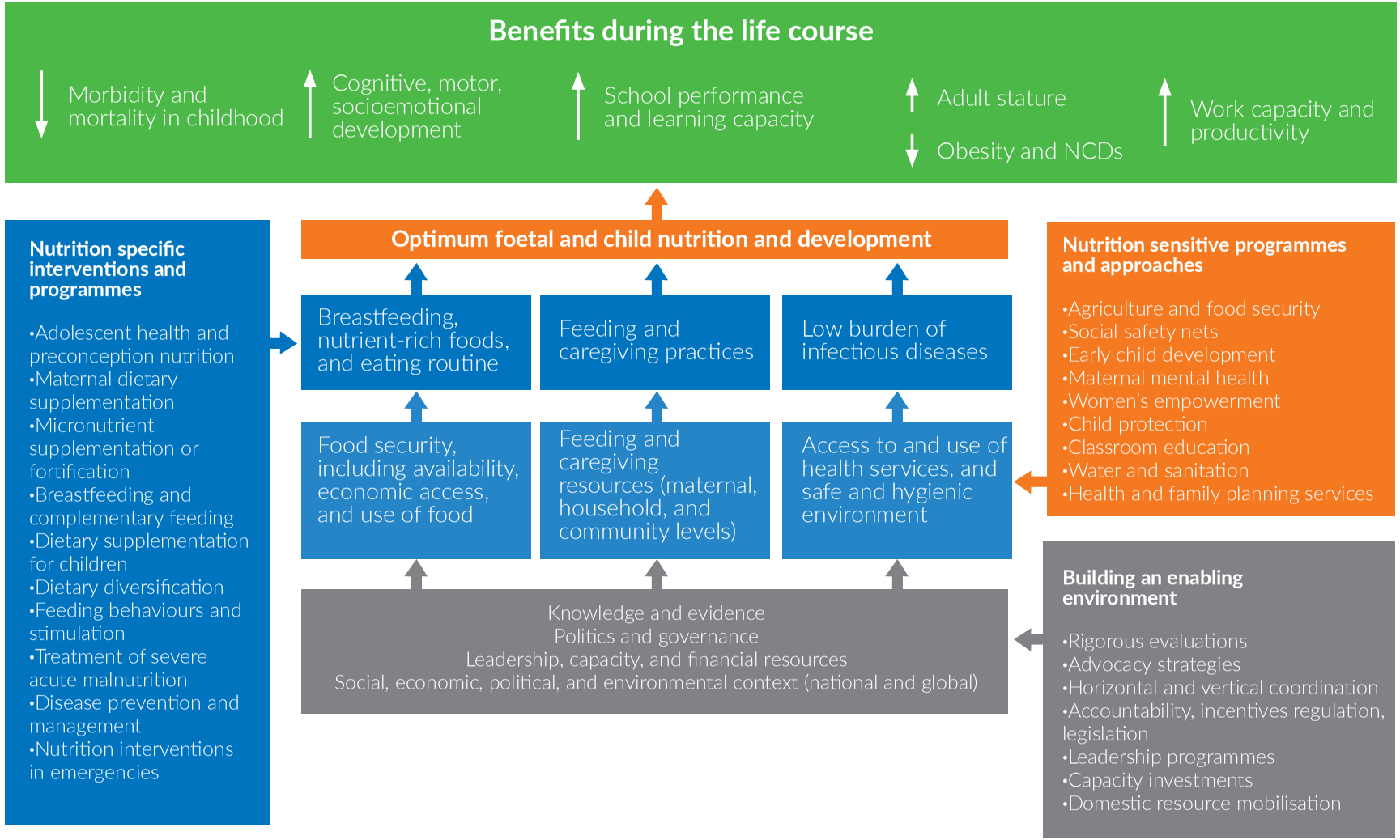


Figure 9. **Framework for actions to achieve optimum foetal and child nutrition and development.**
Source: The Lancet Maternal and Child Nutrition Group, 2013 (45)

D) WASH AND STUNTING: CAUSAL PATHWAYS

There are a wide variety of complex factors and pathways which lead to undernutrition; often interconnected (21). Nutritional status is a result of a set of complex and interrelated factors creating synergy and depends on the environment in which people live and the processes to which they are exposed at a household level (43). For the same reason, maternal and child nutritional status cannot be analysed only from a dietary intake approach.

1. DIARRHOEA

Diarrhoea remains a leading cause of mortality among children under five in the world, and one of the biggest killers of this age group in the sub-Saharan Africa (14). Diarrhoea is the passage of 3 or more loose or liquid stools per day, or more frequently than is normal for the individual. It is usually a symptom of gastrointestinal infection, which can be caused by a variety of bacterial, viral and parasitic organisms, although Rotavirus and E. coli infections are usually the etiological agents (46).

Most pathogens that cause diarrhoea follow a faecal-oral transmission pattern which is highly related to poor WASH conditions. Infection is spread through contaminated food or drinking-water, or from person to person as a result of poor hygiene (47).

The occurrence of repeated episodes of diarrhoea from early childhood, accounts for substantial amounts of chronic undernutrition and stunting observed worldwide. A 20-year multicenter analysis revealed that repeated diarrhoea episodes in the first two years of life significantly increase the risk of being stunted by the age of 2 years by a 25% (48).

As poor WASH conditions account for more than 80% of the diarrhoeal burden (49), it is expected that achieving improvements in access to safe water and adequate sanitation, along with the promotion of good hygiene practices can help prevent childhood diarrhoea (46).

2. SOIL- TRANSMITTED INFECTIONS (HELMINTHS)

Caused by different species of parasitic worms, the infection is transmitted by eggs present in human faeces, which in turn contaminate soil in areas where sanitation is poor. Infection can be caught easily from making contact with soil which has been contaminated or eating contaminated food.

Helminth infections interfere with nutrient uptake in children, which can lead to anaemia, undernutrition and impaired mental and physical development, posing a serious threat to children's health, education and productivity (16).

There are several mechanisms by which intestinal worms could affect the nutritional status of their host: by feeding on the contents of the host's gut or tissues, including blood and serum, which leads to a loss of iron and protein; by causing incorrect digestion or malabsorption

of nutrients; by stimulating inflammatory responses and affecting appetite or modifying the metabolism and storage of key nutrients (i.e. iron); and through contingent responses to infection, such as fever, leading to an increased metabolic rate and diversion of use of nutrients and energy.

Helminthiasis can be prevented with adequate sanitation (49) which in consequence, can lead to a reduction of faecal exposure and faecal-oral transmission. Access to improved sanitation should be prioritised alongside preventive chemotherapy and health education to achieve a durable reduction of the burden of helminthiases (50).

3. ENVIRONMENTAL ENTERIC DYSFUNCTION (EED)

Diarrhoea and soil transmitted infections have been the traditional explanations to the association between WASH and stunting.

However, recent evidence suggests that an important pathway between WASH and stunting is the EED, an enteric disease caused by a continued exposure to faecal microorganisms due to poor environmental conditions at the household level.

The ingestion of these microorganisms, not always pathogenic, has been suggested to be the main cause of EED in children under 2 years of age. In the context of poor diets and recurrent infections, EED would likely explain a significant portion of the unresolved stunting (52) and might be the causal pathway between diarrhoea, helminths and childhood stunting.

EED causes intestinal inflammation, villi damage and flattening of the gut wall. In consequence, it increases gut permeability and provokes a chronic immune stimulation (Figure 10). Several studies have suggested that this chronic immune response could be responsible for the observed oral vaccine failure in children (52,53) and the development of resistances to growth hormones, which, at the same time, would explain its relationship with growth faltering in early ages (55). In addition, it also causes inhibition and suppression of iron absorption and utlisation, causing anaemia of inflammation (9,14), the second leading cause of anaemia after iron-deficiency (56).

This condition seems to be the result of an appropriate immune reaction to a continued exposure to faecal microorganisms. The exposure may be more likely to happen in children under 2 during their frequent hands-to-mouth activity and crawling in contaminated household playing and feeding areas, where they can easily ingest soil or animal faeces. This contamination pathway seems to be more relevant in this age group rather than other pathways such as drinking unsafe water (9).

However, etiology of EED remains unclear. Nutritional deficiencies, especially zinc and vitamin A deficiencies, imbalances of gut microbiome, Helicobacter pilori presence and bacterial overgrowth, mycotoxins or HIV infection, seems to contribute to the multicausality of EED (9,14,52,55–57).

EED has been associated with linear growth faltering in several studies (58–60) and it is currently proposed as the primary causal pathway from poor sanitation and hygiene to stunting, rather than diarrhoea or soil-transmitted helminths, which had been considered the main pathways in this association (51,60,61).

If this hypothesis is correct, ameliorating environmental conditions in which children under 2 years old eat, grow and develop becomes an essential issue in the fight against child stunting. WASH interventions would need to adopt an age-targeted perspective and specifically address child environmental risk exposures.

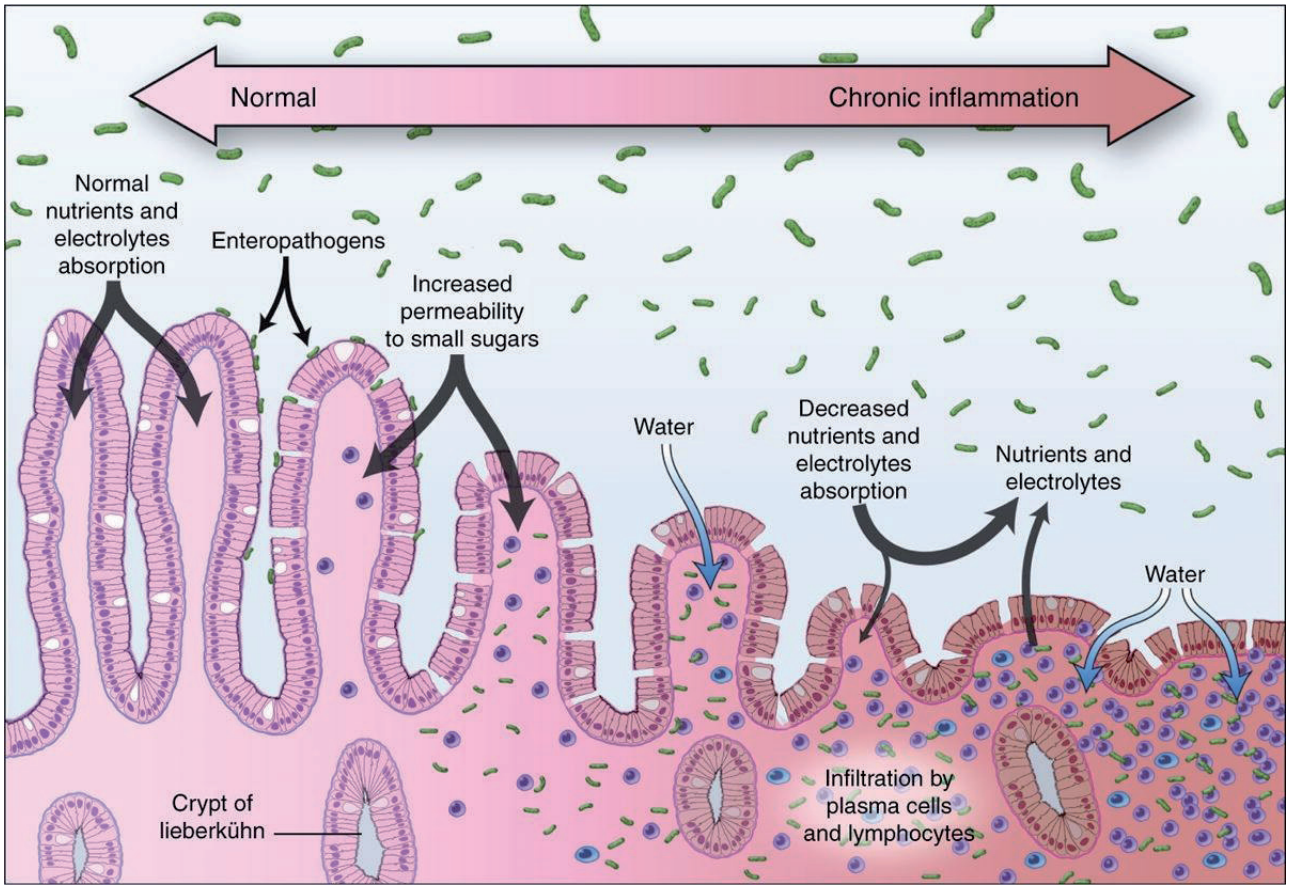


Figure 10. **Normal and EED gastrointestinal wall.**
Source: Syed et al. 2016

4. OTHER PATHWAYS

MALARIA AND OTHER INFECTIONS

Malaria and stunting present a potential reverse causality in their association. Some studies have shown a certain association between chronic undernutrition and malaria infection, in the sense that stunting could affect immunity, increasing the possibility of suffering from frequent and severe episodes of malaria (11,12). On the other hand, a study showed an increased risk of stunting for every malaria episode in an endemic area (13).

The Anopheles mosquito transmits malaria and is found breeding in stagnant waters near houses. Vector control measures associated to sanitation are required to limit transmissions, such as improved drainage, insecticide spraying, and sleeping under a mosquito net.

Other infections, such as acute respiratory infections (ARI), are also proven to be reduced by improved WASH conditions, and in particular, through regular handwashing with soap (63).

Nevertheless, more evidence is needed to link malaria and other infections to stunting (4).

NON-BIOLOGICAL PATHWAYS

Access to improved water sources is insufficient, especially in the rural Sub-Saharan region (64). Sanitation access is also a major concern, since this region experiences a high burden of undernutrition (65).

At the socioeconomic level, the link between poor WASH conditions and stunting may be explained by the time constraints caregivers (usually women) face in their everyday lives, due to the long time spent fetching water from the nearest safe source which makes less time available for childcare or income-generating activities. The time and cost of treating WASH-related diseases can also lead to catastrophic payments undermining their purchasing power for basic needs as nutrient-rich foods (4, 66). Water access and caregiver's time burdens for collecting water also affects the possibility that families engage in household gardening, and limit their capacities for household food production (67, 68).

An analysis of demographic and health surveys from 26 Sub-Saharan countries showed that time spent walking to a household's main water source was a significant determinant of under-five child health. In addition, these surveys reported that a 15 minutes decrease in one-way walk time to a water source was associated with a reduction in diarrhoea prevalence, improved anthropometric indicators of child nutritional status and a reduction in under-five child mortality (68).

However, some studies are already aware of WASH and nutrition interventions increasing caregiver`s time stress by adding more activities to their daily routines (68, 69), and therefore, negatively affecting caregiving practices.

Other circumstances affecting women living in poor WASH conditions can disturb their mental health and self-confidence. Unsafe access to toilets or the lack of privacy for menstrual hygiene may affect women and girls causing depression or stress syndromes, ultimately affecting mother-to-child caregiving behaviours (70-72) which may also impact mothers and behaviours children nutritional status.

REFERENCES

1. World Health Organization (WHO), United Nations Children's Fund (UNICEF). WHO child growth standards and the identification of severe acute malnutrition in infants and children [Internet]. Geneva: WHO; 2009 [cited 2016 Aug 11]. Available from: http://apps.who.int/iris/bitstream/10665/44129/1/9789241598163_eng.pdf?ua=1

2. World Bank (WB). World Bank Open Data [Internet]. 2014 [cited 2016 Aug 9]. Available from: http://data.worldbank.org

3. Prendergast AJ, Humphrey JH. The stunting syndrome in developing countries. Paediatr Int Child Health. 2014 Nov 1;34(4):250–65.

4. Chase C, Ngure F. Multisectoral Appro Acción contra el Hambre es to Improving Nutrition: Water, Sanitation, and Hygiene [Internet]. Washington: World Bank; 2016 [cited 2016 Aug 8]. Report No.: 102935. Available from: https://www.wsp.org/sites/wsp.org/files/publications/Multisectoral00itation00and0hygiene.pdf

5. WASH and nutrition. WASH Nutrition Forum; 2015; Bonn.

6. Merchant AT, Jones C, Kiure A, Kupka R, Fitzmaurice G, Herrera MG, et al. Water and sanitation associated with improved child growth. Eur J Clin Nutr. 2003 Dec;57(12):1562–8.

7. Checkley W, Gilman RH, Black RE, Epstein LD, Cabrera L, Sterling CR, et al. Effect of water and sanitation on childhood health in a poor Peruvian peri-urban community. The Lancet. 2004;363(9403):112–118.

8. Fenn B, Bulti AT, Nduna T, Duffield A, Watson F. An evaluation of an operations research project to reduce childhood stunting in a food-insecure area in Ethiopia. Public Health Nutr. 2012 Sep;15(09):1746–54.

9. Ngure FM, Reid BM, Humphrey JH, Mbuya MN, Pelto G, Stoltzfus RJ. Water, sanitation, and hygiene (WASH), environmental enteropathy, nutrition, and early child development: Making the links. Ann N Y Acad Sci. 2014;1308(1):118–28.

10. Rah JH, Cronin AA, Badgaiyan B, Aguayo VM, Coates S, Ahmed S. Household sanitation and personal hygiene practices are associated with child stunting in rural India: a cross-sectional analysis of surveys. BMJ Open. 2015 Feb 12;5(2):e005180–e005180.

11. Dangour AD, Watson L, Cumming O, Boisson S, Che Y, Velleman Y, et al. Interventions to improve water quality and supply, sanitation and hygiene practices, and their effects on the nutritional status of children. Cochrane Database of Systematic Reviews [Internet]. 2013 Aug 1 [cited 2016 Aug 2]; Available from: http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD009382.pub2/abstract

12. Ngure FM, Humphrey JH, Mbuya MNN, Majo F, Mutasa K, Govha M, et al. Formative Research on Hygiene Behaviors and Geophagy among Infants and Young Children and Implications of Exposure to Faecal Bacteria. Am J Trop Med Hyg. 2013 Oct 9;89(4):709–16.

13. World Vision International. About BabyWASH [Internet]. World Vision International. 2016 [cited 2016 Aug 31]. Available from: http://wvi.org/babywash/about-babywash

14. Humphrey JH, Jones AD, Manges A, Mangwadu G, Maluccio JA, Mbuya MNN, et al. The sanitation hygiene infant nutrition efficacy (SHINE) Trial: Rationale, design, and methods. Clin Infect Dis. 2015;61(Suppl 7):S685–702.

15. Arnold BF, Null C, Luby SP, Unicomb L, Stewart CP, Dewey KG, et al. Cluster-randomised controlled trials of individual and combined water, sanitation, hygiene and nutritional interventions in rural Bangladesh and Kenya: the WASH Benefits study design and rationale. BMJ Open. 2013 Jan 1;3(8):e003476.

16. Action Against Hunger. WASH' Nutrition- A practical guidebook on increasing nutritional impact through integration of WASH and Nutrition programmes. 2017.

17. Food and Agricultural Organization of the United Nations (FAO), World Health Organization (WHO). Nutrition and development: a global assessment. Rome; 1992. (International Conference on Nutrition).

18. Engle P, Lhotska, L, Armstrong, H. The Care Initiative: Assessment, analysis and action to improve care for nutrition. New York; 1997.

19. World Bank (WB). Improving nutrition through multi-sectoral appro Acción contra el Hambre es. Washington; 2013.

20. Action Contre le Faim (ACF) International. ACF Nutrition Security Policy [Internet]. Paris: ACF; 2014 [cited 2016 Aug 11]. Available from: http://www.actionagainsthunger.org/sites/default/files/publications/ACF_Nutrition_Security_Policy_Apr2014_EN.pdf

21. Nordin SM, Boyle M, Kemmer TM. Position of the Academy of Nutrition and Dietetics: Nutrition Security in Developing Nations: Sustainable Food, Water, and Health. J Acad Nutr Diet. 2013 Apr;113(4):581–95.

22. BabyWASH Coalition [Internet]. Available from: http://babywashcoalition.org/

23. CORE Group. Essential Nutrition Actions and Essential Hygiene Actions Framework [Internet]. 2015. Available from: http://www.coregroup.org/resources/488-essential-nutrition-actions-and-essential-hygiene-actions-framework

24. United Nations (UN). Transforming our World: The 2030 Agenda for Sustainable Development [Internet]. New York; 2015 [cited 2016 Aug 11] p. 41. Report No.: A/RES/70/1. Available from: https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf

25. International Food Policy and Research InstituteIFPRI. Global Nutrition Report - From Promise to Impact: Ending Maltrution by 2030 [Internet]. Washington; 2016 [cited 2016 Jul 29]. Available from: http://ebrary.ifpri.org/utils/getfile/collection/p15738coll2/id/130354/filename/130565.pdf

26. Black RE, Allen LH, Bhutta ZA, Caulfield LE, de Onis M, Ezzati M, et al. Maternal and child undernutrition: global and regional exposures and health consequences. The Lancet. 2008 Jan;371(9608):243–60.

27. United Nations Children's Fund (UNICEF), World Health Organization (WHO), World Bank (WB). Levels and trends in child malnutrition [Internet]. Nueva York, Ginebra, Washington; 2015 [cited 2016 Jul 29]. Available from: http://www.who.int/nutgrowthdb/jme_unicef_who_wb.pdf

28. Girard AW, Self JL, McAuliffe C, Olude O. The Effects of Household Food Production Strategies on the Health and Nutrition Outcomes of Women and Young Children: A Systematic Review. Paediatr Perinat Epidemiol. 2012 Jul 1;26:205–22.

29. Martorell R. Physical growth and development of the malnourished child: contributions from 50 years of research at INCAP. Food Nutr Bull. 2010 Mar;31(1):68–82.

30. Christian P, Lee SE, Donahue Angel M, Adair LS, Arifeen SE, Ashorn P, et al. Risk of childhood undernutrition related to small-for-gestational age and preterm birth in low- and middle-income countries. Int J Epidemiol. 2013 Oct;42(5):1340–55.

31. Black RE, Victora CG, Walker SP, Bhutta ZA, Christian P, de Onis M, et al. Maternal and child undernutrition and overweight in low-income and middle-income countries. The Lancet. 2013 Aug;382(9890):427–51.

32. World Health Organization (WHO). Global Nutrition Targets 2025: Stunting Policy Brief [Internet]. Geneva: WHO; 2014 [cited 2016 Aug 12]. Report No.: WHO/NMH/NHD/14.3. Available from: http://thousanddays.org/tdays-content/uploads/Stunting-Policy-Brief.pdf

33. Martorell R, Horta BL, Adair LS, Stein AD, Richter L, Fall CHD, et al. Weight Gain in the First Two Years of Life Is an Important Predictor of Schooling Outcomes in Pooled Analyses from Five Birth Cohorts from Low- and Middle-Income Countries. J Nutr. 2010 Feb 1;140(2):348–54.

34. Adair LS, Fall CH, Osmond C, Stein AD, Martorell R, Ramirez-Zea M, et al. Associations of linear growth and relative weight gain during early life with adult health and human capital in countries of low and middle income: findings from five birth cohort studies. The Lancet. 2013 Aug;382(9891):525–34.

35. Grantham-McGregor S, Cheung YB, Cueto S, Glewwe P, Richter L, Strupp B. Developmental potential in the first 5 years for children in developing countries. The Lancet. 2007 Jan;369(9555):60–70.

36. Hoddinott J, Maluccio JA, Behrman JR, Flores R, Martorell R. Effect of a nutrition intervention during early childhood on economic productivity in Guatemalan adults. The Lancet. 2008 Feb;371(9610):411–6.

37. Prado EL, Dewey KG. Nutrition and brain development in early life. Nutr Rev. 2014 Apr 1;72(4):267–84.

38. Why 1,000 days [Internet]. 1,000 Days. [cited 2016 Sep 4]. Available from: http://thousanddays.org/the-issue/why-1000-days/

39. Leroy JL, Ruel M, Habicht J-P, Frongillo EA. Using height-for-age differences (HAD) instead of height-for-age z-scores (HAZ) for the meaningful measurement of population-level catch-up in linear growth in children less than 5 years of age. BMC Pediatr. 2015;15:145.

40. Wrottesley SV, Lamper C, Pisa PT. Review of the importance of nutrition during the first 1,000 days: maternal nutritional status and its associations with fetal growth and birth, neonatal and infant outcomes among African women. J Dev Orig Health Dis. 2016 Apr;7(02):144–162.

41. The World Bank Agriculture and Rural Development Department. From Agriculture to Nutrition: Pathways, Synergies and Outcomes [Internet]. Washington: World Bank; 2007 [cited 2016 Jul 29]. Available from: http://siteresources.worldbank.org/INTARD/825826-1111134598204/21608903/January2008Final.pdf

42. United Nations Children's Fund (UNICEF). Strategy for improved nutrition of children and women in developing countries. In Nueva York: UNICEF; 1990. p. 38.

43. Maternal and Child Nutrition Study Group. Various authors. Executive Summary of The Lancet Maternal and Child Nutrition Series. Lancet. 2013;5(1):1–11.

44. Bhutta Z, Das. JK, Rizvi, A, Gaffey, MF, Walker, N, Horton, S. Evidence-based interventions for improvement of maternal and child nutrition: what can be done and at what cost? Lancet. 2013;382:452–77.

45. Bhutta Z, Ahmed T, Black RE, Cousens, Simon, Dewey, Kathryn, Giugliani, Elsa. What works? Interventions for maternal and child undernutrition and survival - The Lancet. Lancet. 2008;371:417–40.

46. UNICEF, World Health Organization. Diarrhoea: why children are still dying and what can be done. New York: United Nations Children's Fund; 2009.

47. WHO | Diarrhoea [Internet]. WHO. 2016 [cited 2017 Feb 1]. Available from: http://www.who.int/topics/diarrhoea/en/

48. Checkley W, Buckley G, Gilman RH, Assis AM, Guerrant RL, Morris SS, et al. Multi-country analysis of the effects of diarrhoea on childhood stunting. Int J Epidemiol. 2008 Aug 1;37(4):816–30.

49. Black RE, Morris SS, Bryce J. Where and why are 10 million children dying every year? The Lancet. 2003 Jun 28;361(9376):2226–34.

50. Strunz EC, Addiss DG, Stocks ME, Ogden S, Utzinger J, Freeman MC. Water, Sanitation, Hygiene, and Soil-Transmitted Helminth Infection: A Systematic Review and Meta-Analysis. PLOS Med. 2014 Mar 25;11(3):e1001620.

51. Ziegelbauer K, Speich B, Mäusezahl D, Bos R, Keiser J, Utzinger J. Effect of Sanitation on Soil-Transmitted Helminth Infection: Systematic Review and Meta-Analysis. Hales S, editor. PLoS Med. 2012 Jan 24;9(1):e1001162.

52. Mbuya MNN, Humphrey JH. Preventing environmental enteric dysfunction through improved water, sanitation and hygiene: An opportunity for stunting reduction in developing countries. Matern Child Nutr. 2016;12:106–20.

53. Korpe PS, Petri WA. Environmental enteropathy: critical implications of a poorly understood condition. Trends Mol Med. 2012 Jun;18(6):328–36.

54. Naylor C, Lu M, Haque R, Mondal D, Buonomo E, Nayak U, et al. Environmental Enteropathy, Oral Vaccine Failure and Growth Faltering in Infants in Bangladesh. EBioMedicine. 2015 Nov;2(11):1759–66.

55. Crane, Rosie, Jones, Kelsey DJ, Berkley, James A. Environmental enteric dysfunction: an overview. 2015. 36(10):S76–87.

56. Weiss G, Goodnough LT. Anemia of Chronic Disease. N Engl J Med. 2005 Mar 10;352(10):1011–23.

57. Ngure F. Mycotoxins, WASH and child stunting. (ongoing);

58. Lunn P, Northrop-Clewes C, Downes R. Intestinal permeability, mucosal injury, and growth faltering in Gambian infants. Lancet. 1991;338:907–10.

59. Campbell DI, Elia M, Lunn PG. Growth Faltering in Rural Gambian Infants Is Associated with Impaired Small Intestinal Barrier Function, Leading to Endotoxemia and Systemic Inflammation. J Nutr. 2003 May 1;133(5):1332–8.

60. Lin A, Arnold BF, Afreen S, Goto R, Huda TMN, Haque R, et al. Household Environmental Conditions Are Associated with Enteropathy and Impaired Growth in Rural Bangladesh. Am J Trop Med Hyg. 2013 Jul 10;89(1):130–7.

61. Esrey SA. Water, waste, and well-being: a multicountry study. Am J Epidemiol. 1996;143(6):608–623.

62. Humphrey JH. Child undernutrition, tropical enteropathy, toilets, and handwashing. The Lancet. 2009;374(9694):1032–1035.

63. Reinhardt K, Fanzo J. Addressing Chronic Malnutrition through Multi-Sectoral, Sustainable Appro Acción contra el Hambre es: A Review of the Causes and Consequences. Front Nutr [Internet]. 2014 Aug 15 [cited 2016 Jul 29];1. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4428483/

64. Improved water source, rural (% of rural population with access) | Data [Internet]. [cited 2017 Feb 2]. Available from: http://data.worldbank.org/indicator/SH.H2O.SAFE.RU.ZS?year_high_desc=false

65. Improved sanitation facilities (% of population with access) | Data [Internet]. [cited 2017 Feb 2]. Available from: http://data.worldbank.org/indicator/SH.STA.ACSN?year_high_desc=false

66. Pickering AJ, Davis J. Freshwater Availability and Water Fetching Distance Affect Child Health in Sub-Saharan Africa. Environ Sci Technol. 2012 Feb 21;46(4):2391–7.

67. Matare CR, Mbuya MNN, Pelto G, Dickin KL, Stoltzfus RJ. Assessing Maternal Capabilities in the SHINE Trial: Highlighting a Hidden Link in the Causal Pathway to Child Health. Clin Infect Dis. 2015 Dec 15;61(suppl 7):S745–51.

68. Budlender, Debbie. Why should we care about unpaid care work? [Internet]. Harare, Zimbabwe: UNIFEM; 2004 [cited 2017 Feb 2]. 65 p. Available from: http://trove.nla.gov.au/version/42337410

69. Iraizoz E. Systematic review of the impact of EFSVL interventions on care practices for maternal and child nutrition in Subsaharan Africa. [Barcelona]: Instituto de Salud Global/ Universidad de Barcelona; 2016.

70. Sarah House, Thérèse Mahon, Sue Cavill. Menstrual hygiene matters. A resource for improving menstrual hygiene around the world. 2012.

71. Engle P, Menon, P, Haddad, L. Care and Nutrition: Concepts and Measurement. Washington; 1996.

72. Cecile Bizouerne. Conceptual Models of Child Malnutrition. The ACF approach in mental health and care practices. 2013.

THE BABYWASH APPROACH TAKES INTO ACCOUNT THE MULTICAUSAL NATURE OF CHRONIC UNDERNUTRITION AND AIMS TO PREVENT IT THROUGH SUSTAINABLE MULTISECTORIAL MEANS.

CANADA
Action Contre la Faim
720 Bathurst St. - Suite 500
Toronto, ON - M5S 2R4
www.actioncontrelafaim.ca

FRANCE
Action Contre la Faim
14-16 boulevard de Douaumont
75017 Paris
www.actioncontrelafaim.org

SPAIN
Acción Contra el Hambre
C/ Duque de Sevilla, 3
28002 Madrid
www.accioncontraelhambre.org

UNITED KINGDOM
Action Against Hunger
First Floor, rear premises,
161-163 Greenwich High Road,
London, SE10 8JA
www.actionagainsthunger.org.uk

UNITED STATES
Action Action Against Hunger
One Whitehall Street 2F
New York, NY 10004
www.actionagainsthunger.org

ACTION AGAINST HUNGER