PAPER

ENUFF PROJECT LEARNING BRIEF NO. 4 | JUNE 2020

Water, Sanitation and Hygiene (WASH) related determinants of under-nutrition

Analysing WASH activities in the ENUFF project in two provinces of Northern Lao PDR.

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About SNV

SNV is a not-for-profit international development organisation that makes a lasting difference in the lives of people living in poverty by helping them raise incomes and access basic services. We focus on three sectors and have a long-term, local presence in over 25 countries in Asia, Africa and Latin America. Our team of more than 1,300 staff is the backbone of SNV. For more infomation: www.snv.org

About the ENUFF project

The ENUFF project is a programme of the Swiss Agency for Development and Cooperation (SDC), implemented by SNV with the assistance of Agrisud International in Lao PDR. The project is implemented together with government counterparts and other development partners with the aim of improving family nutrition in remote and ethnically diverse upland farming communities through nutrition-sensitive agricultural production, sustainable management of natural resources and good practices in health and hygiene. A core pillar of ENUFF is NSA, which is seen as a key way to improve food production and diversity at the household level. NSA is complemented by improvement of women's skills in nutrition and care practices, in particular women of reproductive age (WRA); physical and economic access to nutritious and diversified food through income generation activities, market and short value chain opportunities and a development of a conducive policy, strategic and institutional framework to address and prevent food and nutrition insecurity. The project is being implemented in Xiengkhor and Viengxay districts of Houaphanh province and Nga and Beng districts of Oudomxay province in collaboration with the Provincial Health Departments (PHD), Provincial Agriculture and Forestry Offices (PAFO) and Lao Women's Union (LWU) with their subordinate offices in the target districts. The project targets 4,000 farming families in 40 villages across the four districts of these two provinces. For more information: https://snv.org/project/enhancing-nutrition-upland-farming-families-enuff

Colophon

Citation: SNV, 2020. Water, Sanitation and Hygiene (WASH) related determinants of under-nutrition, ENUFF project learning brief no. 4, SNV Netherlands Development Organisation

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For more information

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Introduction

Although the burden of under-nutrition remains unacceptably high globally, significant steps are being made to achieve the World Health Assembly's nutrition targets to reduce stunting and wasting in children under 5 years of age (CU5). The Sustainable Development Goal 2 (SDG 2.2) commits to ending malnutrition in all its forms by the year 2030. The 61 countries participating in the Scaling up Nutrition (SUN) movement have established national targets (SUN, 2016). Lao PDR, a member of the SUN movement, has set itself a goal in its National Nutrition Strategy and Plan of Action (NNSPA, 2015) to reduce stunting from 44% in 2012 to 25% by 2025. To achieve this ambitious target, there is a critical need to understand how relevant sectors, including water, sanitation and hygiene (WASH), can accelerate progress towards the end goal.

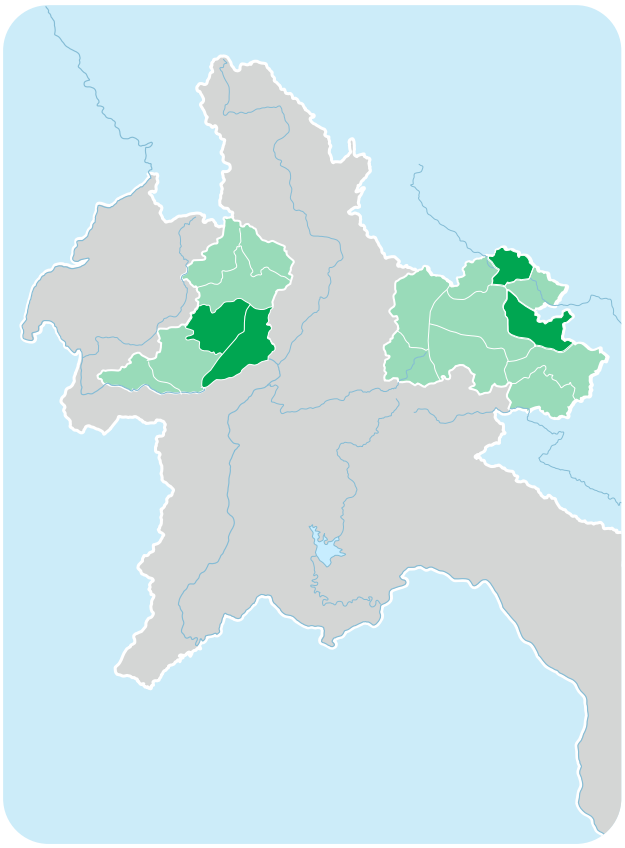

Figure 1 Location of ENUFF's target provinces and districts

The NNSPA recognises that improved WASH services are a critical contributing factor in meeting the country's stunting targets. Although Lao PDR has made progress in improving access to safe water (72%), the rate of open defecation remains high in poorer communities, reaching 23.9% nationally and 32.6% in rural areas (LSIS II, 2017). After Cambodia, Lao PDR has the second highest level of open defecation in the region (World Bank, 2016).

In line with the NNSPA, SNV has been implementing the multi-sectoral nutrition Enhancing Nutrition of Upland farming families (ENUFF) project since 2016, funded by the Swiss Agency for Development and Cooperation. The project recognises the importance of a multi-sectoral approach to nutrition, including the role of WASH. The project is implemented in two Northern provinces of Lao PDR, Beng and Nga districts in Oudomxay province, and Xiengkhor and Viengsay Districts in Houaphanh province. (figure 1).

This brief presents evidence found in the ENUFF project that poor WASH services and practices are associated with chronic under-nutrition.

How does the WASH environment impact children's nutritional status?

The causes of chronic under-nutrition are multidimensional. Stunting can be directly caused by inadequate dietary intake and disease and hence, is related to many underlying factors. The WASH environment can be critical in shaping children's nutritional outcomes (Spears et al., 2013, Cunningham et al., 2017). Poor sanitation and hygiene practices are essential determinants in the causal pathway and the cycle of infectious disease burden and under-nutrition (Dangour et al., 2013). See also figure 2. It has been estimated that environmental factors, including the lack of access to safe water, poor sanitation and hygiene practices, may account for half of all under-nutrition cases worldwide (Mills and Cumming, 2016).

WASH can potentially affect childhood nutrition via at least three direct pathways: soil transmitted helminth infections, environmental enteric dysfunction (EED, a condition of the small intestine) and repeated bouts of diarrhoea (see figure 3).

Note on COVID19

The findings presented in this survey are based on data collected before the COVID19 pandemic broke out. Undoubtedly, the COVID19 pandemic is a health and human crisis that threatens the food security and nutrition of millions of people globally. Considering the level of hunger and malnutrition before the pandemic, projects like ENUFF are taking immediate action to mitigate the immediate and long term impact.

The ENUFF project is currently undertaking rapid assessments to monitor potential increases in acute malnutrition, risk perceptions associated with food, its availability and price, labour and access to inputs. Some immediate findings, which are also reflected in the Laos WFP recent report[a] are:

- Nutrition Sensitive Agriculture & Markets: the restrictions in movement by traders and farmers had an impact on the sale of produce (cash crops and horticulture) and on the availability and prices of some food products;
- Food access: The primary constraint in food access is a result of interrelated factors of a lack of income, higher food prices and unemployment. Unemployment, particularly amongst daily labourers has increased, and income for farmer households has declined resulting in decreased purchasing power to purchase food.

To date, these rapid assessments have not indicated a rise in acute malnutrition, however this may not reflect an accurate picture as some mothers were not able to access the health centres for routine monitoring.

Moving forward the project will continue to promote nutritious diets to build immunity, prioritise hygiene and food safety messages. At the household level the project will continue to promote home gardens and small animal management, to ensure a supply of food in the immediate and long term.

a WFP, 2020. Rapid assessment of food security and agriculture in Lao PDR.

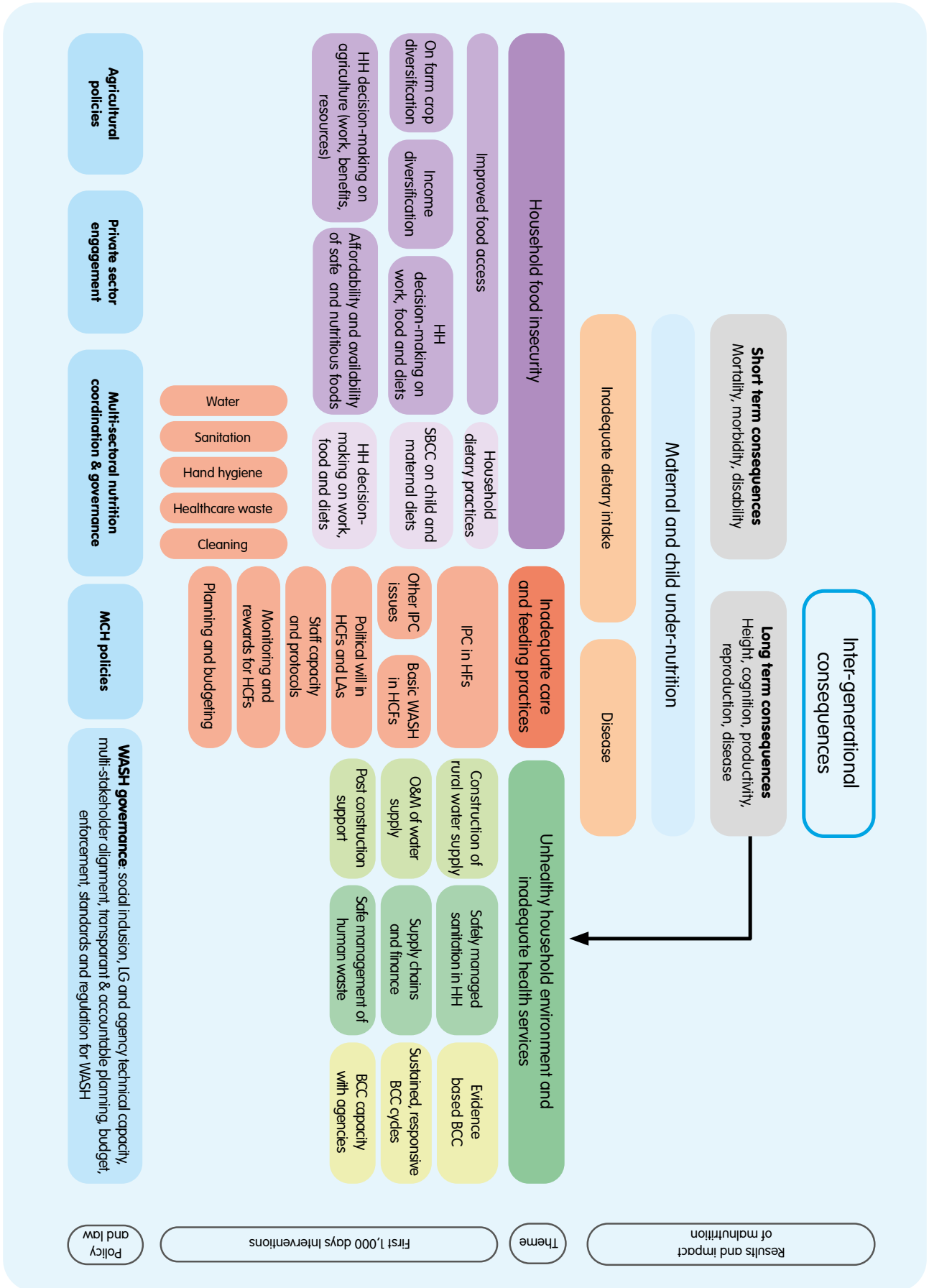

Figure 2 What interventions including WASH are needed to impact nutrition (adapted from UNICEF framework)

All three pathways are mediated by enteric pathogen exposure that affect the absorption and use of nutrients and that can be prevented with WASH interventions. The aim of safe sanitation services is to separate human excreta (faeces and urine) from human contact to interrupt pathogen transmission (see figure 4).

In order to impact nutrition outcomes, the agriculture, health, and environment sectors play a key role in ensuring quality food, proper health, and improved water and sanitation systems. The interventions needed from the three sectors are complex (see figure 2) and go beyond the scope of one project.

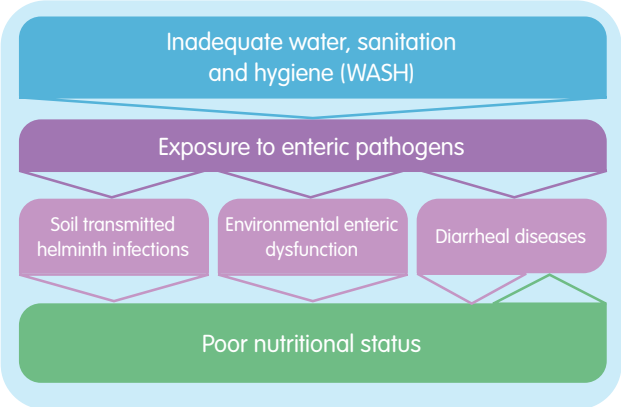

Figure 3 Poor WASH effects on children's nutritional status (adapted from Cumming et al., 2015)

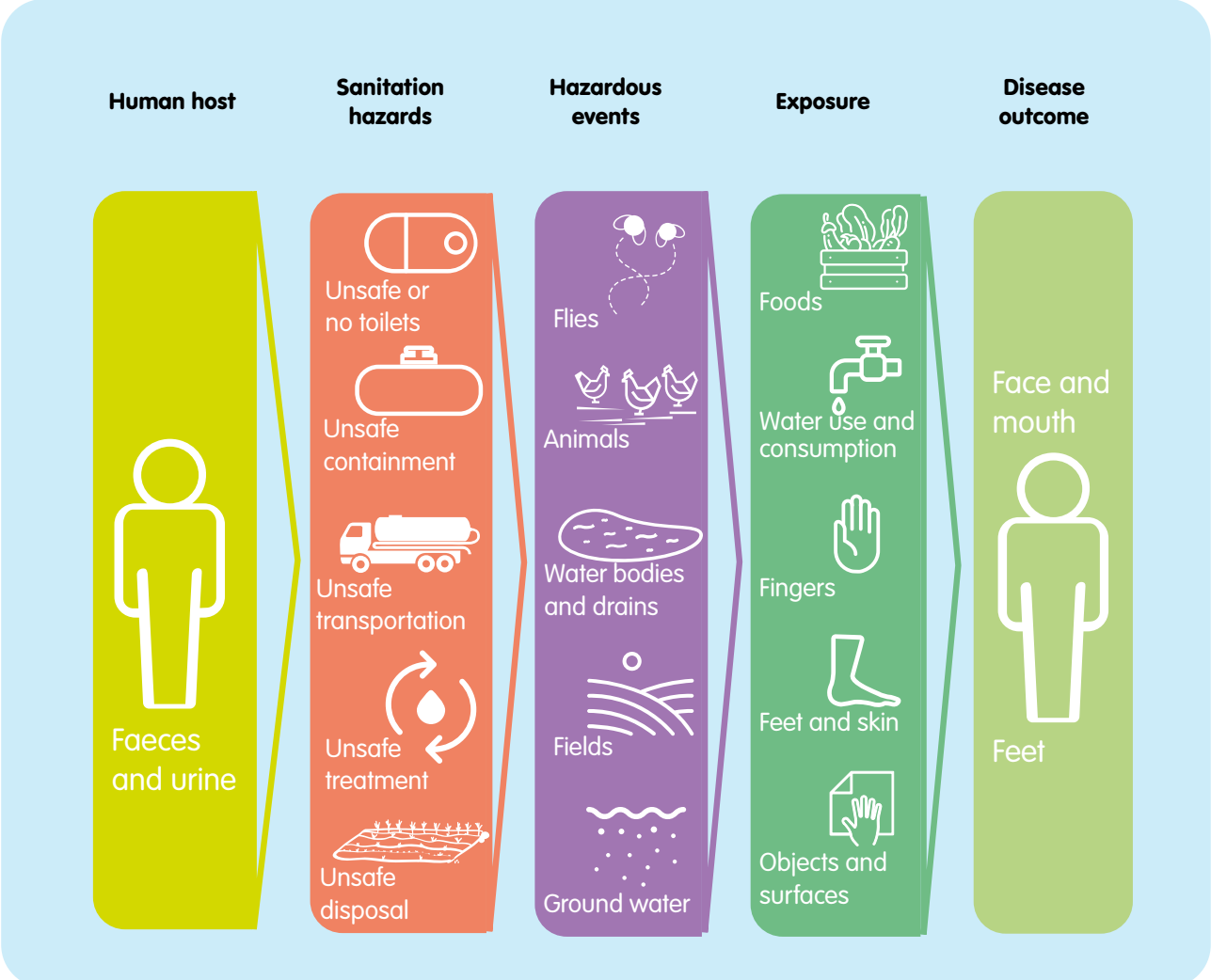

Figure 4 The health impact of unsafe sanitation (WHO, 2018)

Latest evidence on linkages between WASH and Nutrition

Although there is a consensus that the WASH environment can be critical in shaping children's nutritional outcomes, there are conflicting results on the benefits of integrating nutrition and WASH interventions.

There is evidence showing positive impacts of interventions on malnutrition and diarrhoea rates in open defecation free communities (Ayalew et al., 2018, Spears et al., 2013; Hammer & Spears, 2016). A systematic review of 27 studies linking animal exposure to diarrhoea symptoms or pathogens found that twenty studies showed significant positive linkages (Zambrano et. al., 2014). Another systematic review of 38 studies showed that improving the quality of drinking water resulted in a 31% reduction in diarrhoea frequency (Fewtrell, et al., 2005).

There are also studies that have shown that the WASH interventions currently used are not very effective in reducing diarrhoea and stunting. The WASH benefits and Sanitation, Hygiene, Infant Nutrition Efficacy Project (SHINE) randomised controlled trials that sought to understand if WASH interventions, either individually or in combination with nutrition interventions, could influence stunting and diarrhoea, found that they had no effect on child growth and only mixed effects on diarrhoea (Pickering et al., 2019). This went against a widely held belief amongst practitioners, researchers and funders, based on multiple studies from low-income and middle-income populations throughout the world over many years, that indicators of household-level WASH status are significant predictors of linear growth. Three randomised efficacy trials were conducted, testing improved household-level WASH with and without improved infant and young child feeding (IYCF) on stunting and diarrhoea in Bangladesh, Kenya, and Zimbabwe. The results from these studies put into question the widely accepted idea that the promotion of hand-washing and point-of-use water treatment with chlorine or flocculent disinfectant reduce diarrhoea over the long term, if the promotion of new behaviours is done through sporadic message delivery.

The implication of these studies is that changes in behaviour will only be achieved through sustained daily to fortnightly contact between promoters and participants. Their results suggest that point-of-use water treatment with chlorine or flocculent disinfectant and hand-washing promotion programmes implemented through sporadic message delivery by health workers, environmental technicians, or social marketing, might not reduce diarrhoea, at least amongst children younger than two years, who have the highest diarrhoea prevalence. The study found that despite substantial behavioural change and significant reduction in infection prevalence for some enteric pathogens, detection of entero-pathogens amongst children in the WASH groups of the trials was typically at ten times higher prevalence compared with high-income countries. This is regardless of high implementation fidelity and uptake of interventions. This indicates that environmental faecal contamination remained pervasive in the studied communities. The authors call for transformative WASH interventions that are able to overcome the limitations evidence by the trials.

A position paper to respond to the results presented by this paper speculates on the reasons for these findings (WHO and UNICEF, 2018). Amongst them, the authors suggest that the factors that could have contributed to such poor results include incomplete community coverage, lack of continuous water supply through household connections, continued exposure to animal and child faeces, and poor food hygiene. The WASH benefits and SHINE trials provide

evidence that elementary household-level WASH interventions are not enough to deliver substantial health improvements. The study also highlighted blind spots in typical WASH programming – particularly the role of animal waste and faecal contamination of food during irrigation and food preparation that are often overlooked in WASH programme design.

The position paper proposes an initial idea of what transformative WASH could mean. Transformative WASH must be context-specific and risk-based. This would require that programming uses local health data to identify the specific diarrhoeal diseases and other WASH-related infections common in the area where the implementation is taking place. Furthermore, interventions should then be tailored to focus on the main pathways through which specific pathogens spread.

A systematic analysis of over 1,000 studies between 2012 and 2017 conducted by WHO also suggests that greater impacts on infectious diseases and nutrition outcomes were seen when entire community coverage of sanitation is achieved (WHO, 2018). A recent study in Tunisia showed that WASH has a (statistically significant) positive link with improved child nutrition: more and better access to (improved) water and sanitation and non-shared toilets are likely to have significant beneficial effects on child nutrition (Cuesta & Maratou-Kolias, 2018). However, these correlations are neither uniform nor significant across WASH interventions, whether individual or as part of a combination of interventions. The authors highlight two key messages for policy purposes: i) progress toward satisfying a very strict level of adequacy in WASH or any single dimension of public service will not exhibit considerable correlation with child nutrition unless similar gains in other services are also attained ii) neither will a single intervention package bring uniform benefits across different types of households (poor–nonpoor, urban–rural, most–least vulnerable groups). Since correlations of interventions vary by group and area, on the one hand, and investments are limited on the other, interventions must be context specific and risk based. The implications for WASH and nutrition co-programming are that better planning and coordination is required between implementers.

WASH interventions in the ENUFF project

As previously mentioned in this paper, it is not possible to cover all the intervention areas as identified in figure 2 in an individual project, hence the ENUFF project focuses on key priority areas (see figure 5) and works closely with government partners in the coordination and convergence process (see also SNV, 2017 Technical Brief No. 1).

The ENUFF project uses the Community Led Total Sanitation (CLTS) approach through government structures (.e.g district staff and village volunteers) to mobilise communities and trigger collective behaviour change to completely eliminate open defecation (ODF) and to build and use latrines without the use of subsidies. Through the use of participatory methods community members analyse their own sanitation status including the extent of open defecation and the spread of faecal-oral contamination in their community. The project uses social behaviour change and communication (SBCC) tools to promote changes in knowledge, norms and behaviours. Inter-personal communication on nutrition and WASH behaviours is provided through household visits to the first 1,000 day[1] households. Community wide events such as WASH campaigns are also organised to promote safe sanitation and hygiene practices.

A survey was conducted from July to September 2019 in thirty ENUFF project target villages in the four districts (Beng,

1 The time spanning roughly between conception to the age of two years is known as the first 1000 days. This unique window is when the foundations of optimum health, growth, and neurodevelopment across the lifespan are established.

Nga, Xiengkhor & Viengxay) to examine the relationship between WASH factors and nutritional outcomes. Data on WASH practices, including hand-washing with soap[2], hand-washing knowledge, presence of pour flush latrine at the household, open defecation rates of the community, safe water[3], presence of rubbish around the house, presence of human faeces around the house, presence of animal faeces around the house[4] and incidence of diarrhoea was collected from 553 households with children under two years old. Anthropometric measurements were also taken of those children to determine their nutritional status. In the following sections, we provide an overview of the relationship between WASH and stunting; the ODF situation in the ENUFF target villages and highlight the relationship between WASH and diarrhoea.

Relationship of WASH factors and stunting in surveyed area

In Huaphanh the rate of stunting of children under two was 30% and in Oudomxay it was 32%. A multi-variate regression analysis was conducted to assess the relationships between Height for Age Z (HAZ) score and

2 Hand-washing with soap was defined as having a hand-washing station, running water and soap.
3 Water was defined as safe if the water was boiled, the water container was located inside the house, container was covered, the water looked clean and clear and if animals were not drinking the same water.
4 Environmental hygiene such as presence of trash, human faeces and animal faeces around the house was based on observations and serve as a rough proxy to exposure to unhygienic environment.

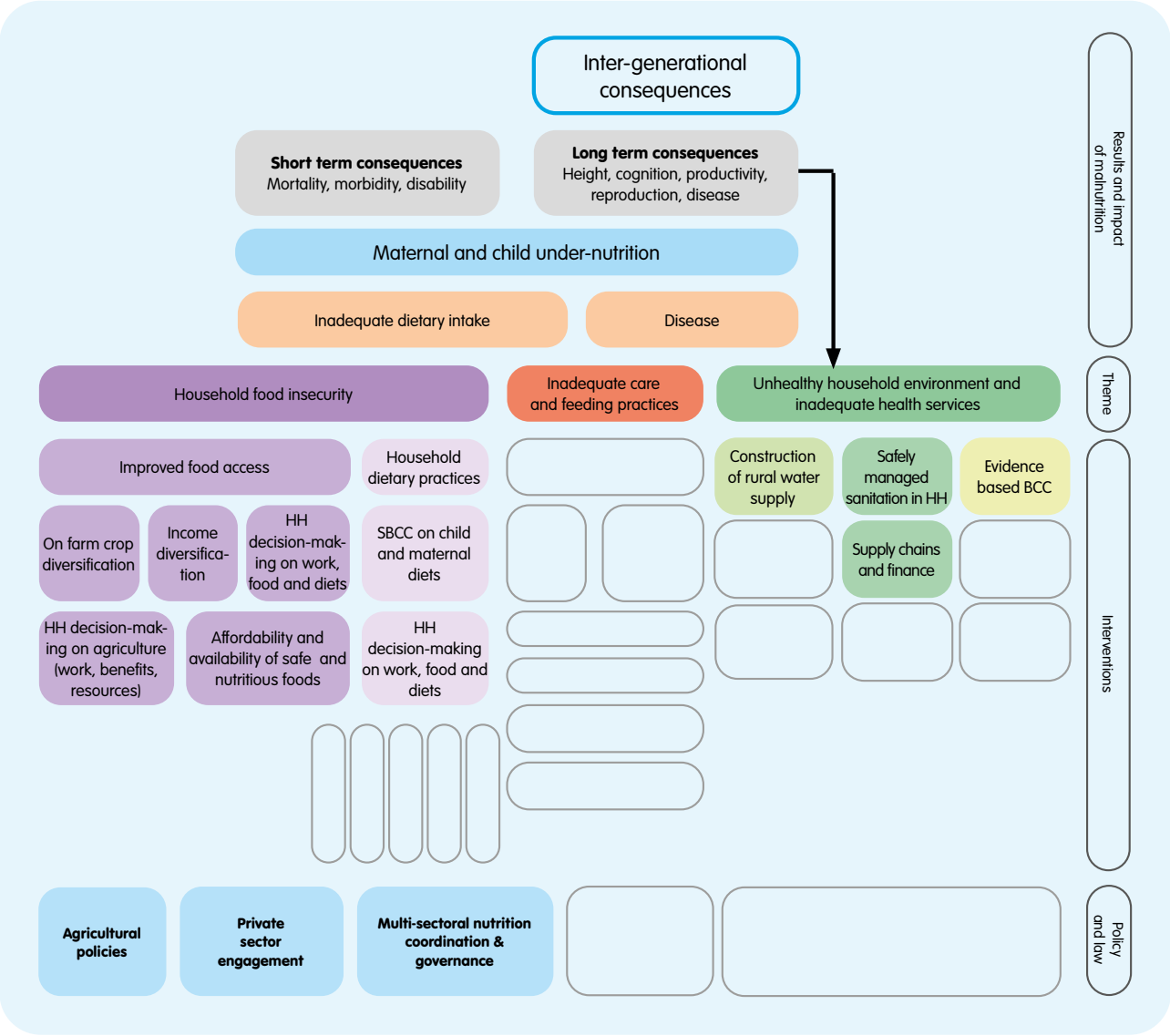

Figure 5 WASH Nutrition Integration in ENUFF

WASH variables. Regression results showed that HAZ scores were significantly associated with presence of animal faeces around the house. If the surrounding of the house was free from animal faeces there would be an increase of HAZ scores by 0.54 standard deviations which is substantial (Table 1). Animal faeces in the compound of the house was observed in 52% of the surveyed households.

Table 1 Regression results

Hazards	Coef.	P>t	[95%Conf. Interval]	
Diarhhoea	-.100	0.448	-.36	.16
Handwashing knowledge	.006	0.965	-.27	.28
Handwashing with soap	-.062	0.731	-.42	.29
Safe Water	.057	0.634	-.18	.28
No trash	-.290	0.019*	-.53	-.05
No human feces	-.087	0.754	-.63	.46
No animal feces	.367	0.004**	.12	.61
Latrine	-.125	0.500	-.49	.24
Open Defecation	.108	0.802	-.74	.96
N	532			
R squared	0.24			

Open Defecation in ENUFF target areas

As of September 2019, 24 villages have achieved ODF status out of 40 and 1,042 new pour flush latrines have been constructed with help from the project[5]. Remarkable achievements have been made in the first three years of the project in improving the ODF situation in the target villages. In 2016 before the project intervention only three target villages were open defecation free (ODF). See figure 6 and 7.

Relationship between WASH factors and diarrhoea in surveyed area

While pour flush latrine coverage is increasing and open defecation rates are decreasing, the rates of diarrhoea in the target areas are still high. In Houaphanh, 20% of the surveyed children reported having diarrhoea in the last two weeks while in Oudomxay, the rate of children under two having diarrhoea in the previous two weeks was 22%. Therefore, it is important to look at other factors that are causing diarrhoea.

A Logistic Regression analysis was conducted to test the dependent variable (i.e. diarrhoea)

5 The project assumes that having a latrine suggests that people are also using the latrine.

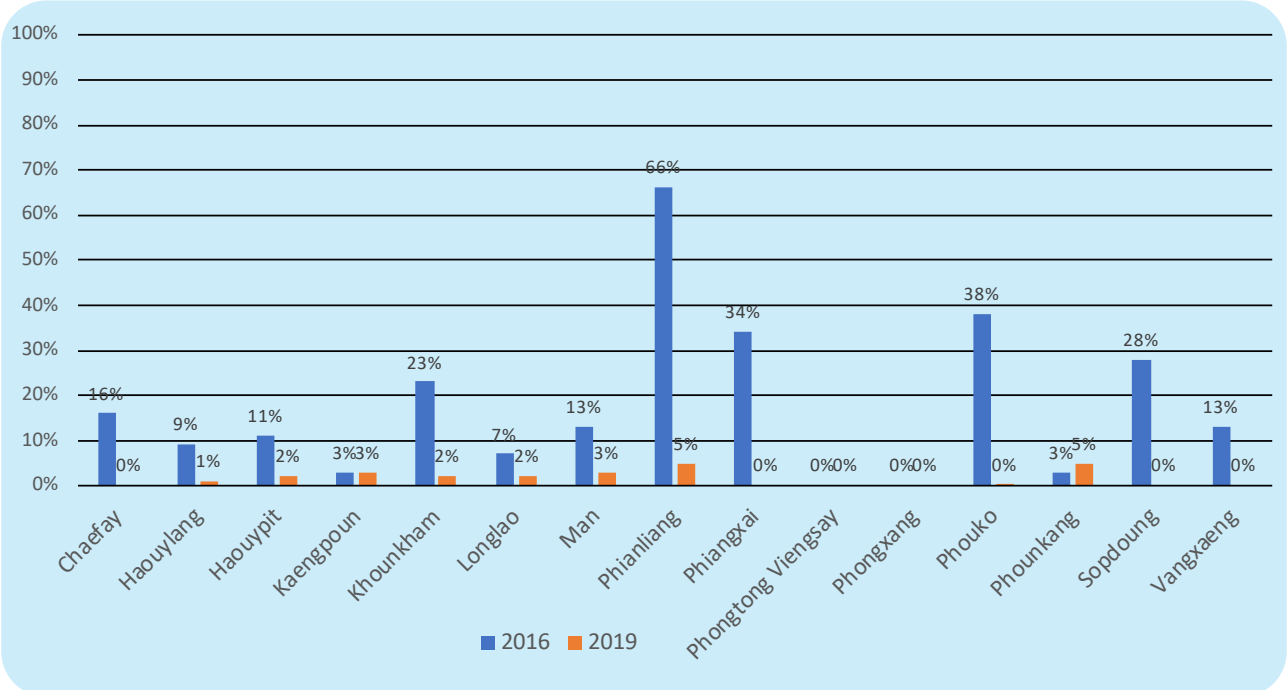

Figure 6 Open defecation rates in Houaphanh province from 2016-2019

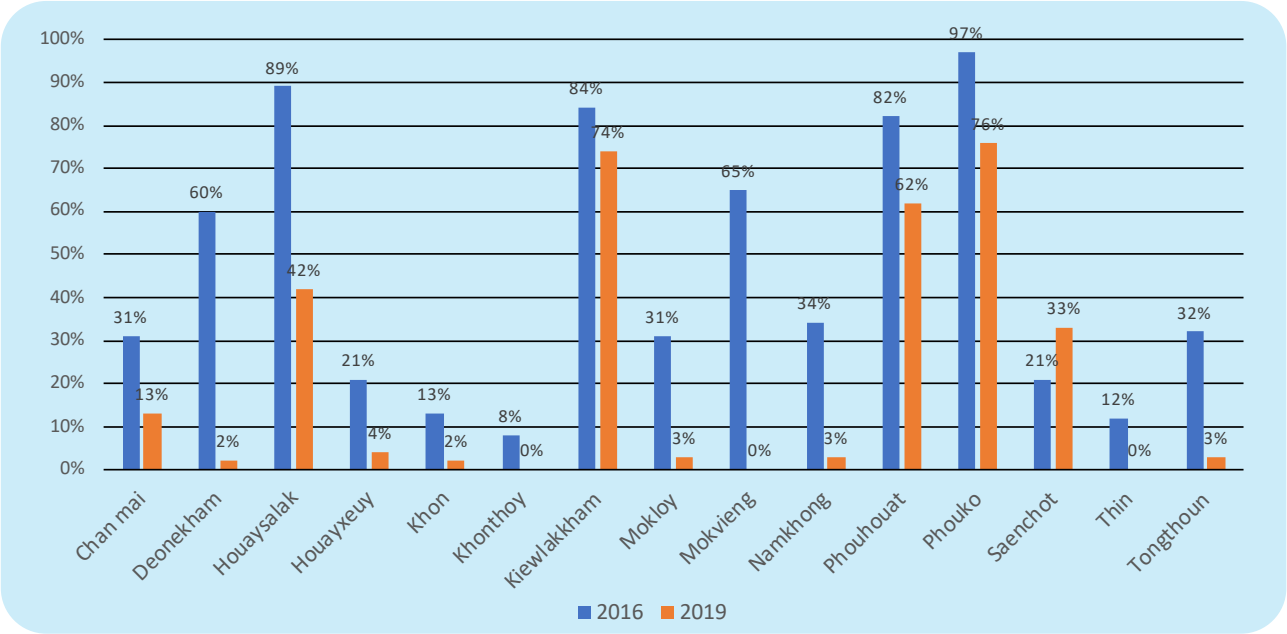

Figure 7 Open defecation rates in Oudomxay province from 2016-2019. There has been an increase in new households without latrines due to resettlement programmes resulting in an increase in open defecation rates in Saenchot.

with multiple binary independent variables: hand-washing with soap, hand-washing knowledge, safe water, presence of trash, presence of human faeces, presence of animal faeces, latrine presence and open defecation rate. Logistic Regression to estimate odds ratio showed that an increase in open defecation had significant association with diarrhoea (OR: 2.8; P-value 0.047).

Households that had safe water were significantly associated with less risk of getting diarrhoea (OR: 0.41; P-value 0.049). However, there was no significant association with hand-washing knowledge, hand-washing with soap, trash around the household, human or animal faeces around the household or presence of latrine (figure 8).

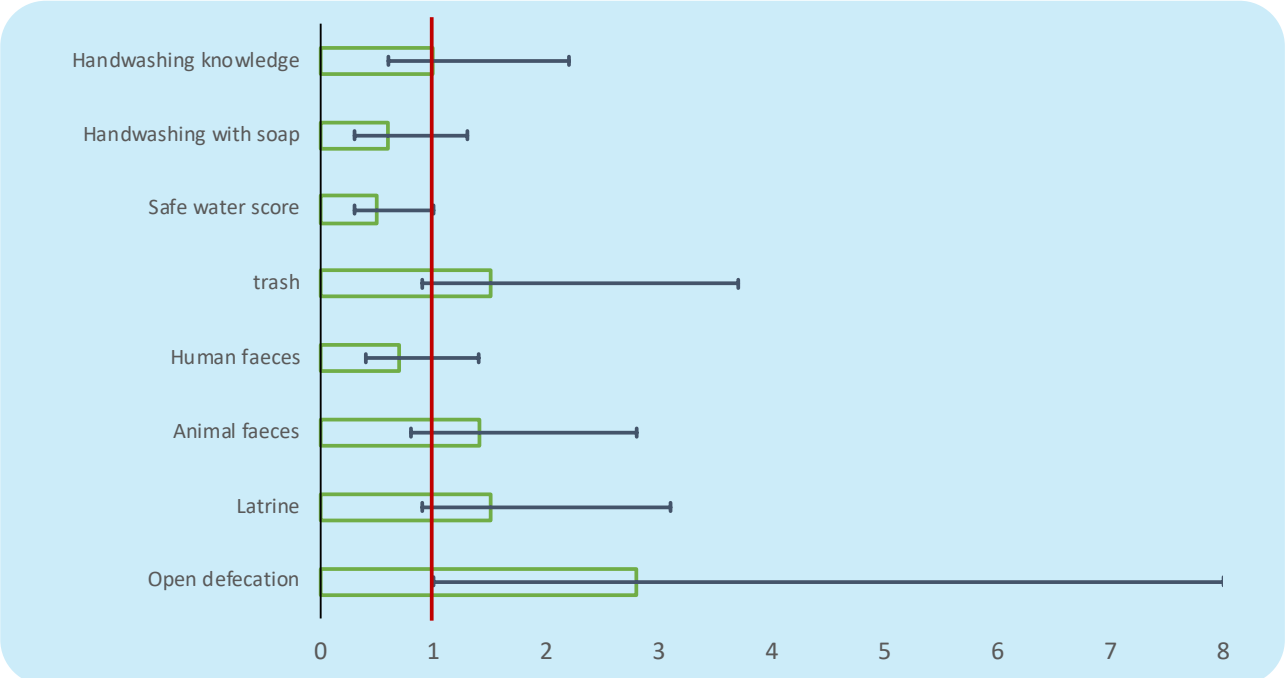

Figure 8 Odds ratio with 95% confidence intervals (1= no effect, <1=less risk of diarrhoea, >1= higher risk of diarrhoea)

Conclusion

Our findings contribute to a growing body of evidence suggesting that nutrition and health outcomes may be adversely affected by poor WASH conditions. In our study stunting was strongly associated with exposure to animal faeces; and diarrhoea had a significant association with open defecation and water quality which is aligned with previous studies (Zambrano et al., 2014, Ayalew et al., 2018, Fewtrell et al., 2005). However, knowledge of hand-washing and presence of hand-washing station with soap were not associated with diarrhoea or stunting. Our results on animal faeces supports other studies (Heady et al., 2017, Zambrano et al., 2014) and highlights that nutrition programmes aimed at diversifying diets through livestock ownership must also consider hygiene and sanitation. While livestock ownership is regarded as an important means of diversifying diets, exposure of children and their caregivers to animal faeces is a potential risk factor for EED and linear growth retardation. Similarly, our interventions on hand-washing knowledge and the promotion of hand-washing station and use of soap do not seem to be enough to see the large impacts on nutrition outcomes that we aspire for.

Our study found no association with open defecation and stunting which other studies have reported (Spears et al., 2013; Hammer & Spears, 2016). The Tunisia study highlights that the correlations vary depending on group and area hence we could be seeing inconsistent findings. The inconsistencies highlight the importance of investing in context specific and risk based interventions. A position paper to respond to the results presented by the WASH benefits and SHINE trials suggest that the factors that could have contributed to such poor nutrition results include incomplete community coverage, lack of continuous water through household connections, continued exposure to animal and child faeces, and poor food hygiene (WHO & UNICEF, 2018). Interestingly, these are all issues that have been identified in the SNV project discussed in this paper.

While as a project ENUFF can adapt its WASH approach to go beyond the typical interventions, in a project cycle it is not possible to do the complete package depicted in figure 2. This will require sustained oversight from the government and collaboration with other stakeholders. The importance of investing in WASH is even more pressing in light of the COVID-19 pandemic. A "transformative WASH" approach is needed to have substantial health impacts.

Limitations to the study

Although the findings in this study are strongly suggestive of an important link between child nutrition outcomes and WASH, there are several limitations to this study. Observations of animal faeces in the outside surrounding serve only as a rough proxy of exposure to animal faeces. We did not record whether faeces are regularly present in the compound, what types of animal faeces are prevalent in the compound, whether children were left outside unattended, and whether children had ever been observed to handle, mouth, or ingest livestock faeces.

Similarly, the consumption of safe water by households was also based on observations. Ideally a water quality test would give more robust data on presence of bacteria and water quality. While the water was boiled, stored in a covered container and looked clean it is only a proxy for safe water. Furthermore, it was assumed that if a household had a hand-washing station with running water and soap that they were washing their hands with soap. There were no observations made of the respondent actually using soap while hand-washing.

The sample size for this study was also very small compared to other studies, resulting in low R squared values[6]. Similarly there are other variables in play that have not been included in the analysis such as access to health centres, dietary diversity score, access to markets, which can also explain the low R squared value.

6 R squared is a statistical measure of the degree in which the independent variables explain the dependent one.

Recommendations

The integration of WASH into nutrition programmes will continue to grow in Lao PDR in the coming years. Having a national nutrition policy, such as the NNSPA, that recognises the importance of WASH for nutrition outcomes, paves the way for the development of integrated programming at all levels. However, further investments are needed in resources and monitoring and evaluation to determine what implementation modalities are most likely to lead to strong and sustained impact.

Based on our analysis and survey outcomes, the SNV team recommends that practitioners:

At the national level

- Adapt the traditional WASH approach: WASH interventions such as CLTS have traditionally focused on reducing exposure to human excrement. However, future nutrition related strategies need to consider the transmission of disease from animal faeces, particularly to infants and young children;
- In areas where there is high malnutrition prevalence, co-locate WASH and nutrition services that can ensure effective impact at scale. Aligned sector action plans and strong stakeholder coordination can take place through district nutrition coordination committees, such as those being established in Lao PDR;
- Invest in a robust monitoring and evaluation frameworks with corresponding WASH and nutrition indicators. The use of local health data to identify the specific diarrhoeal diseases and other recurring illness common in a target area can help tailor interventions to focus on the pathways most relevant to interrupt transmission of specific pathogens. An integrated M&E framework will inform the nutrition situation and measure progress in reducing chronic malnutrition and stunting.

From development agencies and organisations

- Incorporate selected WASH approaches and activities in Nutrition Sensitive Agriculture and livestock programmes. While livestock ownership is regarded as an important means of diversifying diets and improving incomes, exposure of children and their caregivers to animal faeces is a potential risk and can worsen nutrition outcomes. Livestock programmes should include interventions such as penning animals, distancing livestock away from the house and practicing proper hygiene;
- Invest in and support the robust monitoring and evaluation framework with corresponding WASH and nutrition indicators;
- Increase investment in Social Behaviour Change Communication strategies that promote key relevant positive sanitation and hygiene practices. Complement and reinforce the WASH package both in health and nutrition centres, at the community as well as household level. This will play a key role in keeping families, in particular infants, healthy and reduce exposure to WASH related disease;
- Invest in WASH service delivery and infrastructure, including the year round safe supply of clean water, and facilities that encourage, for examples safe disposal of child's faeces and hand-washing;
- Invest in research to define "transformative WASH" that would more comprehensively block disease transmission and build the evidence base for effective delivery models that can be co-programmed.

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