World

Thematic Evaluation FY2020: "Nutrition Improvement through a Multifaceted Approach" Final Report

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Japan International Cooperation Agency (JICA)

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List of Abbreviations

Abbreviation	Description
ANC	Antenatal Consultation
ANSA	Association for Food and Nutrition Security
BCC	behavior change communication
BINP	Bangladesh Integrated National Plan
BMI	Body Mass Index
BNNC	Bangladesh National Nutrition Council
CBO	Community Based Organization
CHPS	Community-based Health Planning and Services
CI4N	Collective Impact for Nutrition
CLTS	Community-led Total Sanitation
CNCS	Conselho Nacional de Combate ao SIDA
CODSAN	Conselho Distrital de Segurança Alimentar e Nutricional
CONSAN	Conselho Nacional de Segurança Alimentar e Nutricional
COPSAN	Conselho Provincial de Segurança Alimentar e Nutricional
CSG	Community Support Group
DHS	Demographic and Health Survey
DNCC	District Nutrition Coordination Committee
DP	Development Partners
DPCU	District Planning and Coordination Unit
DPHE	Department of Public Health and Engineering
ECD	Early Childhood Development
EMBRAPA	Empresa Brasileira de Pesquisa Agropecuária
ESAN	Estratégia de Segurança Alimentar e Nutritional
FAO	Food and Agriculture Organization
FASDEP	Food and Agriculture Sector Development Policy
FCFN	National Committee on Food and Nutrition
FY	fiscal year
GAIN	Global Alliance for Improved Nutrition
GAS	Grupo de Água e Saneamento
GDP	Gross Domestic Product
GES	Ghana Education Service
GHS	Ghana Health Service
GSFP	Ghana School Feeding Programme
GT-PAMRDC	Grupo Técnico - Plano de Acção Multissectorial para a Redução da Desnutrição Crónica
HFS Project	Household Food Security Project
HNPSP	Health, Nutrition and Population Sector Programme
IEC	information, education and communication
IFAD	International Fund for Agricultural Development
INAS	Instituto Nacional da Acção Social
INGD	Instituto Nacional de Gestão e Redução do Risco de Desastres
IYCF	Infant and Young Child Feeding
JICA	Japan International Cooperation Agency
LEAP	Livelihood Empowerment Against Poverty
LGCFN	Local Government Committee on Food and Nutrition
MAD	Minimum Acceptable Diet

MADER	Ministério da Agricultura e Desenvolvimento Rural
MB&NP	Ministry of Budget and National Planning
MCH	Maternal and Child Health
MCH-RB	Maternal and Child Health Record Book
MDD	Minimum Dietary Diversity
MDGs	Millennium Development Goals
METASIP	Medium-term Agricultural Sector Investment Plan
MGCAS	Ministério do Género, Criança e Acção Social
MIC	Ministério da Indústria e Comércio
MICS	Multi Indicator Cluster Survey
MIMAIP	Ministério do Mar, Águas Interiores e Pescas
MINEDH	Ministério da Educação e Desenvolvimento Humano
MISAU	Ministério da Saúde
MMF	Minimum Meal Frequency
MNI	Mainstreaming Nutrition Initiative
MNPFAN	National Multi-sectoral Plan of Action for Food and Nutrition
MoHFW	Ministry of Health and Family Welfare
MOPHRH	Ministério das Obras Públicas, Habitação e Recursos Hídricos
MSA	Multisectoral Approach
NCD	Non-communicable Diseases
NCFN	National Committee on Food and Nutrition
NCN	National Council on Nutrition
NDPC	National Development Planning Commission
NFNP	National Food and Nutrition policy
NGO	Non-governmental Organization
NNP	National Nutrition Project
NNP	National Nutrition Policy
NNS	National Nutrition Services
NPAN	National Plan of Action on Food and Nutrition
NPAN	Bangladesh National Plan of Action for Nutrition
NPAN-2	Second National Plan of Action for Nutrition
NSPAN	National Strategic Plan of Action for Nutrition
OfSP	Orange-fleshed Sweet Potato
PAMRDC	Plano de Acção Multissectorial para Redução da Desnutrição Cronica
PESS	Plano Estratégico do Sector Sáude
PHC	Primary Health Care
PIA	Project Implementation Agency
POSAN	Política Nacional de Segurança Alimentar e Nutritional
PPP	Purchasing Power Parity
PRONAE	Programa Nacional de Alimentação Escolar
ProPESCA	Artisanal Fisheries Promotion Project
REACH	Renewed Efforts Against Child Hunger and Under-nutrition
RHNP	Regenerative Health and Nutrition Programme
RMNCAH&N Strategic Plan	Ghana Reproductive, Maternal, Newborn, Child and Adolescent Health and Nutrition
RPCU	Regional Planning and Coordination Unit
SBCC	Social behavior change communication strategy
SCFN	State Committee on Food and Nutrition

SDG	Sustainable Development Goal
SEJE	Secretaria de Estado da Juventude e Emprego
SETSAN	Secretariado Técnico de Segurança Alimentar e Nutritional
SHEP	School Health Education Programme
STC	Standing Technical Committee
SUN	Scaling-Up Nutrition
SUN CSA	Civil Society Alliance for Scaling Up Nutrition
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WASH	Water, Sanitation and Hygiene
WFP	World Food Programme
WHO	World Health Organization
WIAD	Women in Agricultural Development

Chapter 1. Outline of the Study

1.1. Background

JICA has supported multi-sectoral approaches (food, maternal and child health, and water and sanitation, etc.) to improve nutrition by utilizing Japan's development experience through the Initiative for Food and Nutrition Security in Africa (IFNA) and promote Universal Health Coverage, whereas the Sustainable Development Goals (SDGs) aim to eradicate hunger and improve food security and nutrition[1]. The basic policy of JICA has also been the improvement of nutrition and communication on nutrition improvement, leveraging the "Tokyo Nutrition Growth Summit" held on December 7 and 8, 2021. This basic policy currently remains in effect.

On the other hand, JICA has rarely conducted comprehensive analyses and evaluations of multi-sectoral interventions to improve nutrition, and too few studies have been conducted previously to quantitatively analyze the results of each activity in nutrition-related projects. Furthermore, there is no widely agreed-upon quantitative indicator for multi-sectorality in nutrition improvement, which is a barrier preventing comparison with other projects and evaluation of the results of these projects.

Lastly, the recent spread of COVID-19 infections has resulted in increasing attention being drawn to the role of nutritional improvement in preventing infectious diseases.

1.2. Objectives

In this thematic evaluation, a cross-sectional analysis of multi-sectoral approaches for the improvement of nutrition by JICA and other development partners will be examined. We also analyze the effectiveness of standardized indicators for target countries that may cooperate in the future. These analyses will provide highly versatile results for future cooperation in nutritional improvement, thereby contributing to future project formulation, monitoring and evaluation, and visualization of results in nutrition related projects.

1.3. Workflow

The workflow is shown in the figure below. As shown in the figure, the two main tasks in this study are A and B as follows:

A: Reviews of the multi-sectoral approaches of JICA and other development partners on nutrition

B: Quantitative analysis of the determinants contributing to the effectiveness of multi-sectoral approaches in nutritional improvement

[1] A multisectoral approach refers to interventions or programs implemented by multiple government departments/ministries or across multiple sectors.

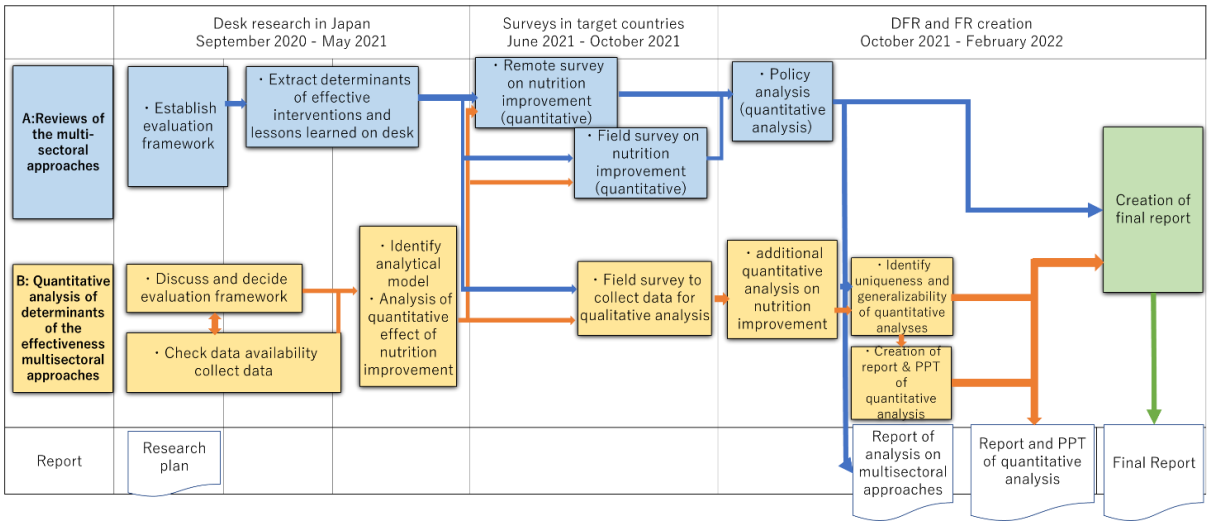

Figure 1-1: Workflow of the study

1.4. Contents

A: Reviews of the multi-sectoral approaches of JICA and other development partners to nutrition

The present study provides an overview of the trends and current status of multisectoral approaches to nutrition policies in Bangladesh, Ghana, Nigeria, and Mozambique, and identifies challenges and lessons learned using multisectoral approaches to assess the situation in each country.

Information on each country was collected using remote surveys (Bangladesh, Nigeria, and Mozambique), a field survey (Ghana), and desk research. To identify challenges and lessons learned, the information collected from the surveys was organized into categories such as implementation structure, the organization's capacity, and resources for multisectoral approaches in the nutrition policy of each country to evaluate each of their activities.

B: Quantitative analysis of determinants contributing to the effectiveness of multi-sectoral approaches in nutrition improvement

Based on World Bank (2018), which estimated the determinants of stunting for 33 countries in Sub-Saharan Africa, we quantitively analyzed the effects of multisectoral interventions (e.g., agriculture, water and sanitation, and health) on improving nutrition. The following analyses are added to obtain more general policy implications:

- The regional scope of the analysis is expanded to include Asia in addition to Africa.
- Assessment of the determinants of child wasting, female anemia, and child overnutrition in addition to analysis of stunting in children.
- The conditions under which multisectoral approaches become effective are identified, and the effects of multisectoral approaches and interventions in bottleneck sectors are compared.

1.5. Survey members

The survey members are as follows (Table 1-1):

Table 1-1: Names, positions, and companies of each member

Name	Position	Company
Yukio Ikeda	Team leader / Nutrition and Health	Kaihatsu Management Consulting, Inc.
Hiroki Kajifusa	Evaluation Analysis 1 (Agriculture / Rural development)	Kaihatsu Management Consulting, Inc.
Naoki Take	Evaluation analysis 2 (Statistics)	Kaihatsu Management Consulting, Inc.
Yo Oishi	Evaluation analysis 3 (Statistics)	Kaihatsu Management Consulting, Inc.

Chapter 2. Review of Multi-sectoral Initiatives

Section 2 provides an overview of the transition and current status of multi-sectoral initiatives in nutrition policies in Bangladesh, Ghana, Nigeria, and Mozambique, and identifies challenges and lessons learned during multi-sectoral initiatives by organizing and comparing the general situation in each country[2].

Section 2.1 provides a comparative analysis of the structure, capacity, and resources of the multi-sectoral initiatives in each country's nutrition policy based on the results of the survey in each country. Common challenges and lessons learned in multi-sectoral efforts will be identified based on the results of the analysis.

Sections 2.2 - 2.5 detail the transition, current status, and challenges of multi-sectoral efforts in the nutrition policy of each country that was surveyed.

2.1. Comparison of multi-sectoral initiatives in the countries surveyed

The current status of multi-sectoral initiatives in the nutrition policies in the four countries being studied is compared in Table 2-1, divided into criteria such as policy, organization, and budget.

[2] The four countries surveyed were selected as candidates for support from JICA with distinctive activities in improving nutrition, giving them priority.

Table 2-1: Comparison of the current status of multi-sectoral initiatives in the nutrition policies of the four countries that were surveyed

Item	*Criteria*	*Bangladesh*	*Nigeria*	*Mozambique*	*Ghana*
Policy and strategy	**National policies and strategies for multi-sectoral initiatives exist.**	The National Nutrition Policy (NNP) was formulated in 2015.	The National Food and Nutrition Policy was formulated in 2016.	The Food and Nutrition Security Strategy (ESAN III) is submitted to the Council of Ministers in July 2021. (Prior to this, ESAN II covered the period 2008-2015)	There are no multi-sectoral policies. The following health sector-centered policies and strategies exist: - National Nutrition Policy -Ghana Reproductive, Maternal, Newborn, Child and Adolescent Health and Nutrition Strategic Plan 2020-2025 (RMNCAH&N Strategic Plan) In 2021, the National Development Planning Commission (NDPC) released the Ghana Multi-Sector Food and Nutrition Security Guidelines to fully promote a multi-sectoral approach to improve nutrition.
	Framework of national policy and strategic framework for multi-sectoral initiatives is appropriate[3].	Appropriate. It emphasizes the need for a coordinated effort that combines multi-sectoral nutrition-specific and nutrition-sensitive interventions, and incorporates the general concepts of today's nutritional improvement, including the adoption of a life-cycle approach. Overnutrition and strengthening the capacity of the public sector are included among the key issues.	Appropriate. It covers key sectors and incorporates important concepts such as nutrition-sensitive interventions and the first 1,000 days.	Appropriate. It adheres to SDG Goal 2, which emphasizes not only the quantity of food, but also its quality, including nutrition. In addition to the food targets, child and women's nutrition indicators are added for under- and over-nutrition. Strengthened financial, informative, and administrative efforts are also being exerted.	The above health policies and strategies are partially appropriate. While it is a health sector strategy, it clearly states that it will address inter-sectoral cooperation, and is based on the WHO's Maternal and Child Health Strategy to 2030. It also covers the issues that need to be covered: under-nutrition, over-nutrition, and anemia.

[3] The importance of multi-sectoral efforts is recognized, key sectors are covered, and key concepts, such as nutrition-sensitive interventions and the first 1,000 days, are incorporated.

Item	*Criteria*	*Bangladesh*	*Nigeria*	*Mozambique*	*Ghana*
Organization	**There are nutrition-related coordinating bodies at the national level.**	The Bangladesh National Nutrition Council (BNNC) of the Prime Minister's Office is the coordinating body.	The Ministry of Budget and National Planning (MB&NP) is the coordinating body.	The Technical Secretariat for Food and Nutrition Security (SETSAN) is the coordinating body under the Ministry of Agriculture, Food, and Nutrition Security (now the Ministry of Agriculture and Rural Development).	The NDPC exists as a coordinating body. However, it is not responsible for inter-ministerial coordination, and the NDPC is expected to take the lead in implementing multi-sectoral initiatives based on the Ghana Multi-Sector Food and Nutrition Security Guidelines.
	Adequate resources in nutrition-related coordinating bodies exists[4].	Not adequate. The Executive Committee, Technical Committee, and Secretariat are under the BNNC. However, it does not provide financial incentives to ministries to implement nutrition improvement activities, and the main function of the BNNC is awareness-raising and advocacy to relevant ministries.	Not adequate. The National Committee on Food and Nutrition (NCFN) provides technical support to MB&NP. MB&NP does not provide financial incentives for ministries to implement nutrition improvement activities, and the primary function of MB&NP is awareness raising and advocacy to relevant ministries.	Not adequate. More than half of SETSAN's staff are in the administrative sector, and the technical workforce is very thin and the technical level is insufficient. Nutrition-related activities are coordinated through the National Technical Working Group (GT-PAMRDC), but it is difficult to secure a budget to organize GT-PAMRDC meetings and monitor interventions.	*(Not applicable, as NDPC is not responsible for coordination among other departments)*
Plan	**An operation plan for improving nutrition is in place.**	The second National Plan of Action for Nutrition 2016-2025 (NPAN-2) is under implementation.	The National Multi-sectoral Plan of Action for Food and Nutrition 2021-2025 (MNPFAN) is being formulated.	The Multi-sectoral Action Plan for the Reduction of Chronic Malnutrition in Mozambique (PAMRDC) (2011-2020) is under implementation.	RMNCAH&N Strategic Plan, a health sector-centric strategy, is under implementation.
	There is a budget plan for improving nutrition	There is no budget plan in NPAN-2.	A budget plan is being developed (to be included in the MNPFAN).	The nutrition-related activities defined in the PAMRDC will be monitored and coordinated by SETSAN and implemented by the relevant sector based on the business plans and programs of each sector (i.e., the budget for nutrition improvement activities belongs to each sector ministry).	There is no budget plan.

[4] The existence of a technical committee, a sufficient number of technical staff, the authority to convene regular high-level multi-ministerial meetings, possession of budgetary measures, etc.

Item	*Criteria*	*Bangladesh*	*Nigeria*	*Mozambique*	*Ghana*
Baseline survey	**A comprehensive study on the causes of malnutrition is implemented.**	Not implemented.	Not implemented.	Not implemented. (Strengthening the food and nutrition surveillance system is one of the strategic goals of PAMRDC and is expected to be implemented)	Not implemented.
Targets (indicators) of policies, strategies, and plans	**There are national goals for nutritional outcomes (e.g., stunting, wasting, and anemia).**	NPAN-2 has targets for stunting, wasting, anemia, and overweightness.	The National Food and Nutrition Policy has targets for stunting, wasting, anemia, and obesity.	Specific targets of ESAN III include malnutrition (acute and chronic) in children, anemia in women, and overweight in children.	Monitoring indicators of the RMNCAH&N Strategic Plan include targets for stunting in children under 5 years old, anemia in women, and obesity (men and women).
	Targets related to the causes of malnutrition exist (e.g., agriculture, maternal and child health, health, and sanitation).	NPAN-2 has goals related to agriculture, health, sanitation, etc.	The National Food and Nutrition Policy has goals related to agriculture, health, and sanitation.	There are indicators in ESAN III for each sector (agriculture, health, water and sanitation, infrastructure, social welfare, fisheries, education, economy, etc.) on the causes of malnutrition, but the targets are unclear.	Only health-related indicators are included in the RMNCAH&N Strategic Plan.
	The structure of the target is appropriate[5].	Some problems exist. In the health- and care-related indicators (Theme 1), the percentage of children with stunting or wasting syndrome, an indicator of low nutrition, and the causes of these conditions, such as full breast feeding and minimum dietary standards, are set in parallel. The relationship between the themes and indicators is also unclear, and there are problems with the structure.	There are some problems. Nutritional outcome measures (e.g., stunting and anemia) and their contributing factors (e.g., full breastfeeding, complementary foods) are described in parallel.	Appropriate: In ESAN III, the current state of food and nutrition security was analyzed to identify the overall causes of the problem, after which the multi-sectoral indicator setting was based on the analysis.	*(Not applicable as there is no multi-sectoral nutrition strategy in place.)*
Budget	**Budgetary provision for nutrition improvement activities exists.**	Does not exist.	Does not exist.	Does not exist.	Does not exist.

[5] Covers key relevant areas, relationships between targets (consequences and root causes) are clear, etc.

Item	*Criteria*	*Bangladesh*	*Nigeria*	*Mozambique*	*Ghana*
	Single budget allocation for all major departments exists.	Does not exist.	Does not exist.	Does not exist.	Does not exist.
Target	**Key target populations for improved nutrition have been identified.**	Identified. The primary target of NPAN-2 is the vulnerable groups in social protection programs.	Identified. The National Food and Nutrition Policy states that vulnerable groups will be the main target.	Identified. ESAN III states that all people have access to sufficient food at all stages of life within acceptable food and nutrition standards sustainably and in perpetuity, targeting children and women in particular.	Identified. The main target groups of the RMNCAH&N Strategic Plan are children under 5 years old and women aged 15-50 years old, but the obesity measures include adults as well, and the plan also addresses nutrition for the elderly.
	A joint (multi-ministerial) targeting mechanism exists.	Does not exist.	Does not exist.	Unknown. (It is presumed that targeting will be performed during the PAMRDC coordination process to supplement and package the programs in each sector.)	Does not exist.
Multi-sectoral coordination at the regional level	**Nutrition-related coordinating bodies exist at the state and regional levels.**	Exists. The NPP requires each that district and sub-district establish a coordinating committee for other sectors, and 53 such committees have been established thus far.	Exists. Coordinating bodies have been established at the state and district levels.	Exists. Provincial SETSAN focal points will be placed under the provincial Department of Agriculture and Food Security to coordinate, plan and monitor activities through the provincial GT-PAMRDC. Only two states have taken the initiative to establish provincial SETSAN focal points; in the others, the provincial SETSAN focal points will facilitate and coordinate activities at the provincial level.	Does not exist at this time. Planning and coordinating committees at the state and county levels are expected to be established in the future to take on this role. The RCC (Regional Coordinating Council) for the state and council for the county will also participate in the coordination.
	The coordinating body has sufficient ownership and resources.	Not sufficient. There are few functioning county and prefecture coordinating committees.	The commitment of state governments to nutrition policy is not sufficient.	Not sufficient. The GT-PAMRDC mechanism is active in some states but needs to be more activated.	*(Not applicable, as there is no regional coordinating body)*
Vertical coordination	**There is a mechanism for guidance, coordination, or communication between the national-**	The BNNC has the role of guiding the coordinating committees of the provinces and counties, but this is not being done effectively.	Not practically done.	A mechanism for SETSAN exists at the national and state levels to monitor and coordinate through the GT-PAMRDC.	None at this time. The NDPC is expected to collaborate with the planning and coordinating committees at the state and county levels that will be established in the

Item	*Criteria*	*Bangladesh*	*Nigeria*	*Mozambique*	*Ghana*
	and regional-level coordinating bodies.				future.
Incentives	**Incentive mechanisms (e.g., results-based funding) exist to implement nutrition activities.**	Does not exist.	Does not exist.	Does not exist.	Does not exist.
	Incentives exist for staff responsible for nutrition-sensitive activities at the field level (e.g., agriculture, education, water, and sanitation).	Unknown.	Unknown.	Unknown.	Unknown.
Monitoring	**Nutritional targets are monitored periodically and evaluated every few years.**	NPAN-2 for 2018-2019 has has been monitored and evaluated and the report has been published.	The National Food and Nutrition Policy states that the NCFN and MB&NP will monitor and evaluate the policy, but this has not yet been done.	A mid-term review of the PAMRDC was conducted in 2015 and an end-of-life assessment was conducted in 2021.	The Ghana Multisector Food and Nutrition Security Guidelines (FNS Guidelines) are expected to come into effect in 2022 and monitoring will be conducted based on these guidelines.
	Every few years, joint monitoring or evaluations are conducted for nutrition targeting.	NPAN-2 for 2018-2019 was monitored and evaluated jointly by the relevant ministries.	It is unclear whether the above monitoring and evaluation will be conducted jointly.	The assessment was conducted by GT-PAMRDC and not by the joint ministry. Some provinces have conducted sectoral joint field monitoring.	It is unclear whether this will be done jointly.
Multisectoral collaboration at the field level	**Joint creation of training materials.**	Unknown.	Unknown.	It is unclear whether they jointly prepare teaching materials, but joint training is conducted.	Although not a teaching material, there are some achievements at the central level, such as the joint preparation of a handbook on improving nutrition for agricultural extension workers by the Ministry of Agriculture and Ghana Health Service.
	Joint implementation of the project.	There are cases where inter-sectoral cooperation on nutrition improvement has been implemented, such as dispatching health professionals to agricultural extension workshops for	JICA's project for nutrition improvement in the Federal Capital District is working to establish a mechanism for collaboration among different ministry officials.	Some states have conducted joint sector field monitoring through GT-PAMRDC.	Most projects in Ghana are single sector (mostly health). Within that, there are projects that have nutrition education as a major component.

Item	*Criteria*	*Bangladesh*	*Nigeria*	*Mozambique*	*Ghana*
		farmers.			
	Common messages[6]	Partially confirmed. For example, during the National Nutrition Week in April, there joint rallies, fairs, and awareness raising activities have been hosted by related sectors such as health and agriculture at county and group levels. Whether any activities with a common message were conducted at the field level of government agencies could not be confirmed.	Unknown.	Unknown.	Unknown.

[6] Different sectors are working on activities to improve nutrition with a common message at field level. For example, the health and agriculture sectors are working on "food diversification" as a key message.

The following points from Table 2-1 regarding the current status and challenges of multi-sectoral initiatives in the four countries surveyed were identified.

- Status of organization for multi-sectoral initiatives

Ghana is moving towards a multi-sectoral approach in nutrition, but does not yet have the necessary systems in place to implement the approach, including policies and organizations.

In Bangladesh, Mozambique, and Nigeria, however, basic structures and frameworks that promote multi-sectoral efforts in nutrition are in place. Specifically, they are as follows:

- ✓ A comprehensive nutrition policy or strategy and operation plan covering relevant sectors have been developed (see the "Policy and strategy" and "Plan" items in the table above). Targets for these strategies and plans have also been set (see "Targets (Indicators) for policies, strategies, and plans" in the table above), and the plans have been monitored (see "Monitoring" in the table above).
- ✓ Some policies and strategies emphasize the need for coordinated efforts combining multi-sectoral nutrition-specific and nutrition-sensitive interventions, whereas others adopt a life-cycle approach and incorporate today's general nutrition improvement concepts (see "Policies and strategies" in the table above).
- ✓ Institutions that coordinate relevant ministries and sectors at the central and local government levels are in place (see the "Organizations for Multi-sectoral Initiatives" and "Multi-sectoral Coordination at the local level" sections in the table above).

Bangladesh, Mozambique, and Nigeria have engaged in multi-sectoral efforts to improve nutrition for the past 20 years, and the above system and framework are based on their experiences. In addition, all three countries have participated in the Scaling Up Nutrition (SUN) movement, and the donors' awareness-raising activities are a result of the progress made in building the system.

The table also shows that multi-sectoral efforts face several challenges. Specifically, the following issues are present:

- Budget and financial issues

- ✓ Despite the fact that multi-sectoral nutrition improvement plans have been developed, budgetary provision for implementation is lacking in all countries. Basically, the budget for implementing these activities is obtained from the respective sectoral ministries (see "Budget" in the table above).
- ✓ There is a lack of financial incentives for nutrition improvement activities (see "Incentives" in the table above).

- There are issues in policy implementation design

- ✓ Lack of clear targets (e.g., regions and classes) and targeting mechanisms for multi-sectoral

activities to achieve effective and efficient nutrition improvement (see "Targets" in the table above).

- ✓ The indicators in strategies and action plans may be structured inappropriately. For example, nutrition outcome indicators (e.g., stunting and anemia) and their related factors (e.g., full breastfeeding and complementary foods) are listed in parallel, and the relationship between each theme and indicator is unclear (see the above table, "Targets (indicators) for policies, strategies, and plans").

- Implementation issues

- ✓ Overall, the coordinating organizations do not have sufficient capacity and resources to implement the relevant policies and plans (see table above, "Organization for Multi-sectoral initiatives").
- ✓ There is little track record of multisectoral coordination and collaboration at the field level (see table above, "Multisectoral Collaboration at the field level").

2.2. Bangladesh

2.2.1. Trends in key nutrition-related indicators in Bangladesh

(1) Nutritional status

Figure 2-1 shows the trends in the key indicators of under- and over nutrition in Bangladesh. The stunting rate among under-five year-olds was very high at approximately 50% in 2008, but improved to about 30% in 2018. The wasting rate remained almost unchanged from 2000 (12%) to 2014 (14%), but has improved since 2014, decreasing to about 8% in 2018. Overweightness, which indicates overnutrition, is still low at about 2% in 2018, but exhibited an upward trend between 2000 and 2018.

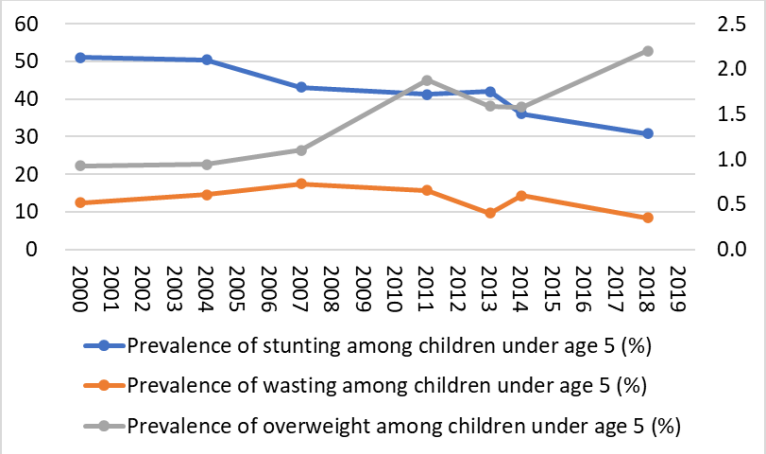

Figure 2-1: Trends in key nutrition-related indicators in Bangladesh (Children <5 years of age)

Source: Global Nutrition Report[7]

[7] https://globalnutritionreport.org/

Figure 2-2 shows trends in the key indicators of nutritional status among adults (18 years and older). The percentage of underweight (BMI <18.5) men and women has decreased consistently from 2000 to 2016. In contrast, the percentage of the population that is overweight (BMI >25) has shown a continuous increase over the same period.

The anemia rate among women aged 15-49 years has improved from approximately 48% in 2000 to 40% in 2016 (Figure 2-3).

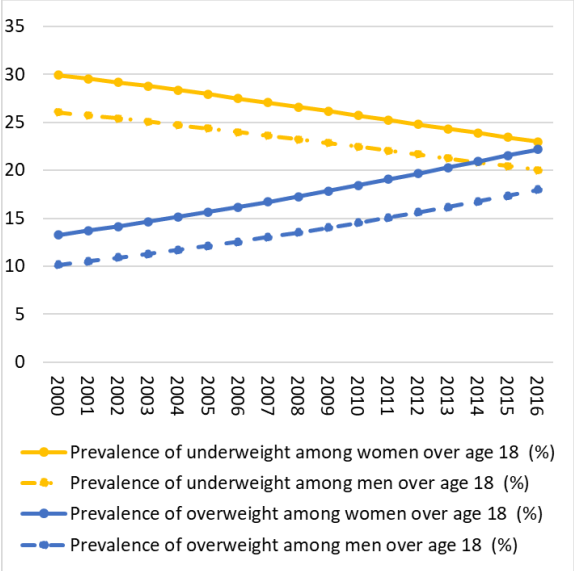

Figure 2-2: Trends in key nutrition-related indicators in Bangladesh (Adults 18 years and older)

Source: Global Nutrition Report

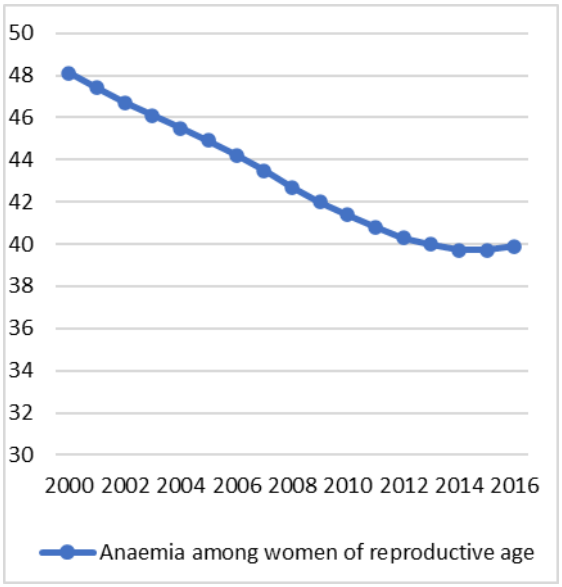

Figure 2-3: Anemia among women of reproductive age in Bangladesh

Source: Global Nutrition Report

(2) Feeding and care

This section reviews the trends in the factors that affect nutritional status. Figure 2-4 shows the trends in key indicators related to feeding at <2 years of age. The minimum meal frequency has remained high, at about 62% and 75% in 2011 and 2018, respectively. On the other hand, minimum dietary diversity has remained extremely low, at 21% and 26% in 2011 and 2014, respectively.

Figure 2-5 shows trends in indicators related to childcare. The incidence of early initiation of breastfeeding and exclusive breastfeeding have both increased since 2004.

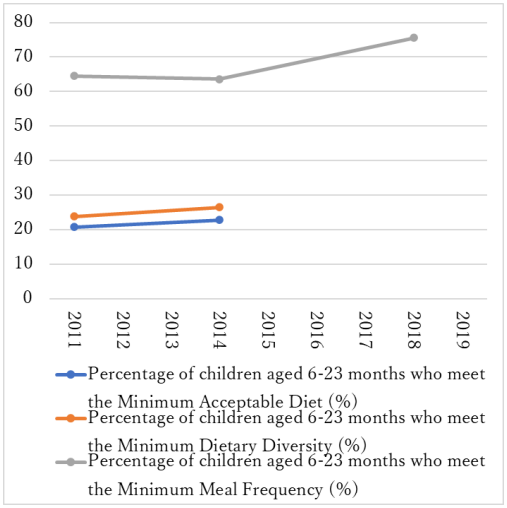

Figure 2-4: Trends in key feeding indicators in Bangladesh (Children under 2 years of age)

Source: Global Nutrition Report

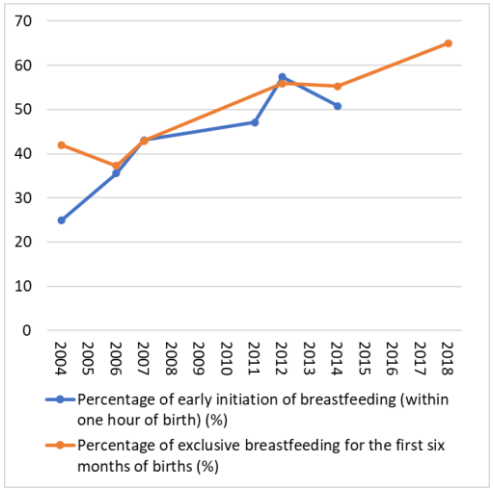

Figure 2-5: Trends in key care indicators in Bangladesh

Source: Global Nutrition Report

(3) Health, water and sanitation, and education

Figure 2-6 shows the percentage of pregnant women who received at least one prenatal checkup as an indicator for the health sector, which exhibited an upward trend between 1997 and 2011.

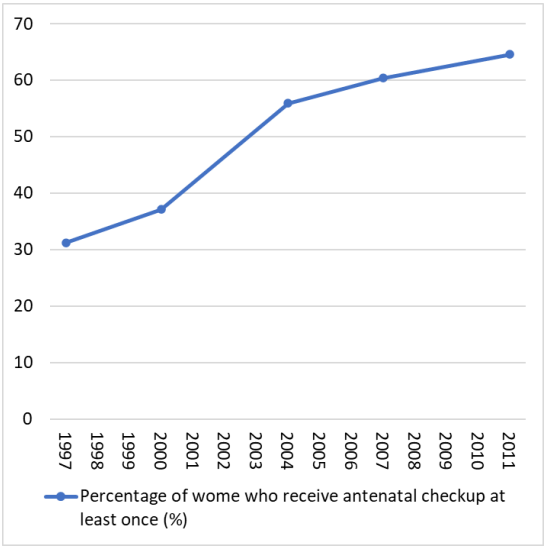

Figure 2-6: Antenatal visits for pregnancy in Bangladesh (%)

Source: USAID DHS Database

Figure 2-7 shows the trend in the percentage of households by source of drinking water: in 2000, over 50% of households had access to a safely managed water source, and the same level was observed in 2017. Figure 2-8 shows the trend in the percentage of households by the type of sanitation facility: the percentage of households with access to safely managed sanitation increased from 17.7% in 2000 to 38.7% in 2020.

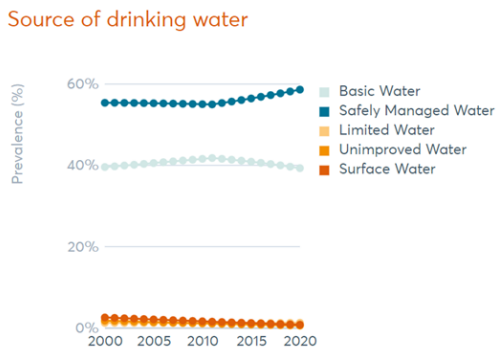

Figure 2-7: Ratio of households by source of drinking water in Bangladesh
Source: Global Nutrition Report

Figure 2-8: Ratio of households by type of sanitation facility in Bangladesh
Source: Global Nutrition Report

Figure 2-9 shows the trend in the net enrolment rate of women in secondary education as an indicator related to education, and this indicator has been exhibiting visible positive trends consistently since 2005.

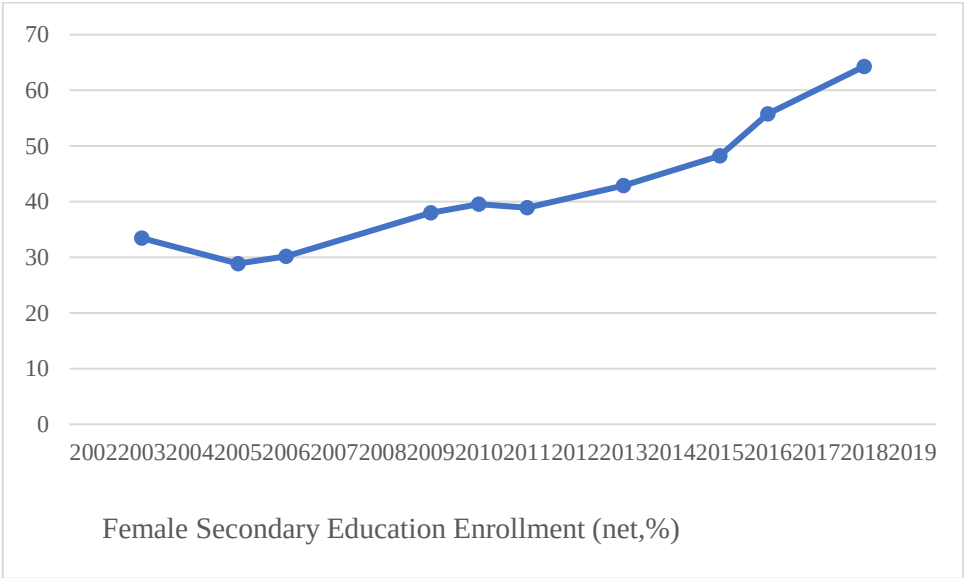

Figure 2-9: Net enrollment rate in secondary school among women in Bangladesh (%)

Source: Global Nutrition Report

(4) Income level

As shown in Figure 2-10, Bangladesh's real GDP per capita (in 2017 prices, in PPP$) has grown significantly, especially between 2000 and 2020.

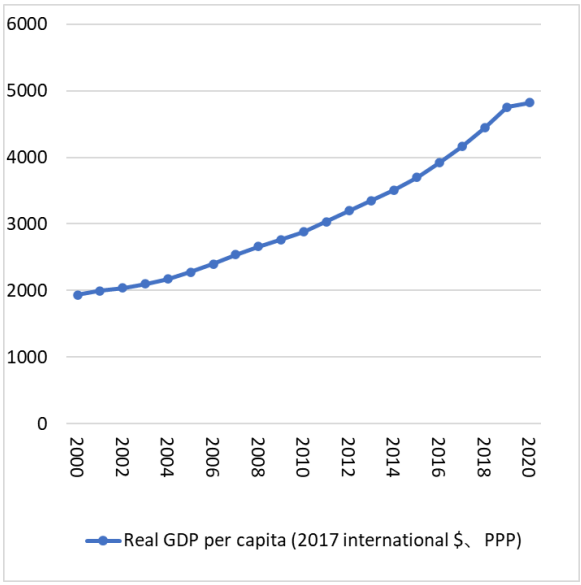

Figure 2-10: Real GDP per capita in Bangladesh (PPP, constant 2017 international US$)

Source: World Bank, World Development Indicators

2.2.2. Evolution of multi-sectoral nutrition-related policies and programs in Bangladesh

The following section describes the transition and current status of multi-sectoral nutrition-related policies and programs in Bangladesh before and after the National Nutrition Policy was formulated in 2015.

（1） Evolution of the nutrition policy before the formulation of the National Nutrition Policy (2015) [8]

In the mid-1990s, several policy interventions were launched to improve nutrition, including the Bangladesh Integrated National Plan (1996) and the formulation of the National Food and Nutrition policy (1997). Improving nutrition has become one of the government's priorities. The following two points can be cited as the background to the increased priority given to improving nutrition during this period. First, the numerous malnourished children in Bangladesh became known as the "Asian Enigma" and attracted international attention, forcing the government to address the issue. Another important factor was that the Bangladesh government officials participated in several international conferences, such as the First International Nutrition Conference in 1992 and World Food Summit in 1996, thus raising awareness among domestic officials of the importance of nutrition issues in development.

1） National Food and Nutrition policy (NFNP) and Bangladesh National Plan of Action for Nutrition (NPAN)

The National Food and Nutrition policy (NFNP) was formulated in 1997 and was the first

[8] The contents of this section are largely based on A Shahan and F Jahan, Opening the policy space: the dynamics of nutrition policy making in Bangladesh, National Information Platform for Nutrition, 2017.

policy of the Government of Bangladesh regarding the improvement of nutrition. It formulated strategies for improving nutrition in a wide range of areas, including agricultural production, health, social security, and community development. The Bangladesh National Plan of Action for Nutrition (NPAN-1) was based on the NFNP and formulated in the same year, with 11 policy objectives and 10 strategies to achieve the objectives. Twelve relevant ministries and agencies were identified as the implementing agencies for the strategies.

The NFNP emphasizes that nutrition improvement is a multi-sectoral issue and various sectors should work together in a coordinated manner. However, the policy document only focused on coordinating three sectors, namely agriculture for food production, food policies to ensure access to food, and health to ensure that malnourished people receive treatment. It concentrated on food security policies based on food production while considering the multisectoral nature of nutrition[9].

In addition, the NFNP and NPAN-1 specified strategies to improve nutritional status, mainly through the role of the health sector in providing health care, improving care methods, and combating diseases, but did not explain the interaction with improving nutrition by ensuring the availability and accessibility of food mentioned above. Thus, health sector activities in NPAN-1 were not widely recognized as nutrition improvement activities.

Additionally, the NFNP did not emphasize the specific roles to be played by each ministry, and inter-ministerial coordination was not mentioned. NPAN-1 also noted the importance of multi-sectoralism in nutrition, but no activities were undertaken to ensure inter-ministerial coordination or policy coherence.

Lack of political stability, including military rule and the return to civilian rule in the early 2000s, was also a factor and NPAN-1 ended without any significant achievements[10].

2） **Other policies**

i) Bangladesh Integrated National Plan (BINP）

The Bangladesh Integrated National Plan (BINP) was an integrated project with a community-based nutrition component that was adopted by the Government of Bangladesh in 1996. It made active use of community nutrition promoters and NGOs to conduct regular growth monitoring, intensive nutrition counseling, micronutrient supplementation, and feeding of at-risk infants and pregnant women, and also included an agriculture and livestock development component. The BINP was implemented using a multi-sectoral approach overseen by the Ministry of Health and Family Welfare (MoHFW) and inter-ministerial coordination by the BNNC until 2002.

However, one challenge in implementing BINP was the lack of commitment from the relevant

[9] In fact, the NFNP describes nutrition as "a critical component of an individual's development and ability to function in society. Food, nutrition, and health promote an economically productive and socially active citizenry," and on the other hand, "The people must have sufficient economic status to be able to purchase food and sufficient socio-cultural awareness to be able to recognize the food they need, store it, prepare it well, and distribute it in accordance with the biological needs of the members of their families. In other words, people must have access to food. In other words, it concludes that nutritional status can be improved by ensuring people's access to food (Source: National Food and Nutrition policy, policy document.)

[10] According to the interview with BNNC.

ministries, such as the Department of Agricultural Extension and Department of Livestock and Fisheries. Additionally, even though funds were allocated from the project office based at the Ministry of Health and Family Welfare, only a small amount of the budget was executed. In addition, the complex flow of funds made project execution difficult[11]. Due to these challenges in implementation, Headey et al. (2014) concluded that BINP achieved little in reducing child malnutrition, nor did it achieve its objectives[12].

ii) National Nutrition Project and Health, Nutrition and Population Sector Program

The Government of Bangladesh launched the National Nutrition Project (NNP) in 2002, which was integrated into the HNPSP in 2006. HNPSP was implemented under two Operational Programs from 2006 to 2011, the NNP and Micronutrient Supplementation. However, implementing the NNP and Health, Nutrition and Population Sector Program (HNPSP) during 2002-2011 posed several problems.

- The two components of the HNPSP were meant to play different roles to achieve a common objective, but there was a lack of coordination and activities were duplicated between these two operational programs.
- The government lacked the sufficient capacity to implement these programs and many of the community-based interventions were outsourced to NGOs, but the health facilities were only able to treat 20% of severely malnourished children.
- Several other ministries implemented nutrition-related projects, but there was no effective mechanism to coordinate these projects and monitor their activities; the BNNC was barely functioning and only met once between 2008 and 2011.
- Regarding the implementation of the NNS project, the line directors within the NNS did not ensure effective coordination with other line directors, making coordination between the components difficult.[13]

In addition, the Household Food Security (HFS) project by NNP has identified the following key challenges in the project setting[14]:

- Target groups for nutritional improvement activities through agricultural development

  The HFS activities targeted poor households, whose criteria were to own up to 80 decimal of land to set up a vegetable garden and 50 decimal [15]of land to raise chickens. The poorest households did not have enough land for vegetable gardens and poultry farming, and HFS could not target the poorest of the poor.
- Local needs

  The "Kallikapur model" of horticulture and poultry promotion that was applied in the HFS project worked well in high-altitude areas, but less so in the lowlands that make up most of

[11] MDGIF. Addressing Malnutrition Multisectorally, 2013
[12] Headey D, Hoddinott J, Ali D, Tesfaye R, Dereje M. The Other Asian Enigma: Explaining the Rapid Reduction of Undernutrition in Bangladesh. World Dev. 2015 Feb 1;66(Supplement C):749–61.
[13] World Bank, Bangladesh National Nutrition Services, 2015.
[14] World Bank, Multisectoral approaches to addressing malnutrition in Bangladesh, 2008.
[15] 1 decimal = 40.5057 m^2

Bangladesh. Therefore, HFS case formulation should have been tailored to the local needs rather than imposing a particular model.

iii) HNPSP and National Nutrition Services (NNS)

Due to the abovementioned issues related to the implementation of nutrition policies and programs, the National Nutrition Program was dissolved in 2011 and the Health, Population and Nutrition Sector Development Program (2011-2016) was launched in the same year. The main goal of this program was to scale up nutrition interventions in the health sector and make them more mainstream (Directorate General of Health Services, Directorate General of Family Planning Services, and Directorate General of Family Planning). The government's decision to mainstream nutrition was based on the work of the Mainstreaming Nutrition Initiative (MNI), a three-year World Bank-funded initiative that ran from 2006 to 2009. MNI's main objective was to "mainstream nutrition into national policies and programs, especially in the health sector," and its main activities were to build partnerships between government officials (especially those in the Ministry of Health and Family Welfare), international organizations, and nutrition-related NGOs, along with promoting media coverage and advocacy[16].

Based on the lessons learned from the MNI activities and discussions, the HNPSP set the following specific objectives:

- Developing and strengthening coordination mechanisms with key relevant sectors (particularly the Ministry of Food and Disaster Management, Ministry of Agriculture, Ministry of Women and Child Affairs, Ministry of Information, Ministry of Education, Ministry of Livestock and Fisheries, and Ministry of Local Government, Rural Development and Cooperatives) to ensure a multi-sectoral response to malnutrition.
- Building the capacity of those working at different levels of health and family planning services to manage, supervise, and deliver nutrition services effectively and efficiently.
- Strengthening the nutrition management information system.

This program led to the NNS being established as the implementing agency for nutrition improvement policies, and many services are still provided through it[17]. In addition, a line director and three program managers were sent from the Ministry of Health and Family Welfare (MoHFW) for coordination among the various organizations providing services at field level[18].Most services were delivered through various platforms (community clinics, health assistants, family welfare volunteers,

[16] Pelletier DL, Frongillo EA, Gervais S, Hoey L, Menon P, Ngo T, et al. Nutrition agenda setting, policy formulation and implementation: lessons from the Mainstreaming Nutrition Initiative. Health Policy Plan. 2012 Jan;27(1):19–31.

[17] The prioritized activities of the NNS will include the following: Mainstreaming and program management of national nutrition services, growth monitoring and promotion, communication regarding behavioral changes, micronutrient supplementation, management of iodine deficiency, management of severe acute malnutrition, community management of acute malnutrition, training and capacity building, and nutrition monitoring.

[18] The main role of the Ministry of Health and Family Welfare (MoHFW) dispatch managers is supervision and coordination, with the majority of service delivery being provided at the community level through health workers (community health care providers, health assistants, and family welfare assistants).

etc.) with the main roles of the MoHFW dispatch manager being supervision and coordination. These platforms have their own challenges related to geographic coverage and quality, and many of them worked poorly in several areas. For example, the NNS program's area of intervention was too large for service providers to effectively respond within the required timeframe because it exceeded their capacity and workload. It has been suggested that the use of other platforms, including NGOs, should have been considered to expand the outreach and achieve greater coverage[19].

In implementing the NNS program, the importance of multisectoral coordination in improving nutrition was recognized, and the Multi-sectoral Steering Committee on Nutrition Initiative, headed by the Secretary of the Ministry of Health and Family Welfare and involving the relevant ministry secretariats, was charged with "developing and strengthening coordination mechanisms with key relevant sectors to ensure a multi-sectoral response to malnutrition." However, a different inter-ministerial coordination mechanism for nutrition policies is the Food Planning and Monitoring Committee, which is led by the Ministry of Food and "represents the ministers and secretaries of ministries concerned with food security and monitors the implementation of food policy and action plans." In addition, the Bangladesh National Nutrition Council (BNNC), which was established as a coordinating body for nutrition under the control of the Prime Minister, also existed giving the appearance of a proliferation of coordinating bodies.

iv) Problems of nutrition policies prior to 2015

The problems of nutrition policies established prior to 2015 in Bangladesh can be summarized as follows.

- Improper conceptual framework for nutritional improvement

  Based on the NFNP developed in 1997, Bangladesh's nutrition policy was a unique system in which nutrition was improved through economic development and improved access to food, complemented by the provision of health and care services to vulnerable groups. The relationship between the efforts of each sector, such as the conceptual framework on child nutrition proposed by UNICEF in 1990[20], was not clearly stated, and establishing a monitoring system to measure the impact of each sector's efforts on improving nutrition was not possible.

- Disorganization of coordinating bodies

  As mentioned earlier, the Multi-sectoral Steering Committee on Nutrition Initiative, headed by the Secretary of the Ministry of Health and Family Welfare, and the Food Planning and Monitoring Committee, led by the Ministry of Food, stand side by side as the coordinating bodies for nutrition policies in Bangladesh. This juxtaposition has led to duplication of activities and interagency competition for the same goal of improving nutrition. Additionally, neither committee could attract a consistently high level of participation from other ministries related to nutrition effectively[21].

[19] World Bank, Bangladesh National Nutrition Services, 2015.
[20] UNICEF, 1990. Strategy for Improved Nutrition of Women and Children in Developing Countries. A UNICEF Policy Review. New York: UNICEF.
[21] Save the Children. Nutrition Governance in Bangladesh. A National and Upzila Level Assessment [Internet]. Dhaka, Bangladesh: Save the Children; 2014.

On the other hand, the BNNC was established as a coordinating body on nutrition under the Prime Minister's jurisdiction, but lacked the capacity and authority to convene participants from relevant ministries. As a result, it could not host regular meetings and coordinate policies[22].

- Limitations of the universal approach

The BINP, NNP, and NNS programs took a universal approach, targeting all regions of the country, but could not achieve their initial goals due to a lack of resources. On the other hand, the MDG-F and SHOUHARDO projects (discussed below), which took a convergent approach that combined nutrition-specific and nutrition-sensitive interventions in a limited number of regions and segments, have shown clear results in improving nutrition[23].

As shown in Figure 2-1, the rate of stunting in Bangladesh has decreased significantly between 2000 and the early 2010s. Although the government of Bangladesh has suggested that this is the result of effective nutrition policies during this period, severalstudies suggest that the impact of government nutrition policies during this period on improving child nutrition was limited, and that the major drivers of improvement were improved access to education for women, enhanced community-based health service delivery, improved access to sanitation (particularly through NGO 'right to water and sanitation' campaigns), agricultural growth, and improved women's status. to water and sanitation' campaign), agricultural growth, and women's empowerment[24]. These studies also argue that while uncoordinated efforts by various sectors such as agriculture, education, water and sanitation, and health have led to improved nutrition outcomes, these activities are generally indirect interventions in the improvement of nutrition and there is a lot of overlap; thus, they will not yield positive results in the future without inter-sectoral coordination.

（2） Evolution of nutrition policies after the formulation of National Nutrition Policy (2015)

1） Formulation of National Nutrition Policy[25]

The National Nutrition Policy (NNP) was formulated in 2015 to replace the previous National Food and Nutrition policy (NFNP). Compared to the NFNP, which viewed poverty and hunger reduction as the primary strategies for improving human nutrition, the NNP emphasizes the need for a coordinated, multi-sectoral approach to improving nutrition that combines nutrition-specific and nutrition-sensitive interventions. It also incorporates general concepts of current nutrition improvement, such as the adoption of a life-cycle approach. Key issues that have emerged since the formulation of the NFNP, such as over-nutrition and strengthening the capacity of the public sector, are also included (see Table 2-2).

[22] Taylor, L. The nutrition agenda in Bangladesh: 'Too massive to handle'? [Internet]. Sussex, UK: Institute of Development Studies; 2012 [cited 2017 Sep 19].
[23] MDGIF Addressing Malnutrition Multisectorally,2013
[24] Headey DD. Developmental Drivers of Nutritional Change: A Cross-Country Analysis. World Dev. 2013 Feb;42:76–88.、Chowdhury AMR, Bhuiya A, Chowdhury ME, Rasheed S, Hussain Z, Chen LC. The Bangladesh paradox: exceptional health achievement despite economic poverty. Lancet Lond Engl. 2013 Nov 23;382(9906):1734–45.
[25] The contents of this section is largely based on A Shahan and F Jahan, Opening the policy space: the dynamics of nutrition policy making in Bangladesh, National Information Platform for Nutrition, 2017.

Table 2-2: Comparison of Food and Nutrition Policy (1997) and National Nutrition Policy (2015)

	Food and Nutrition Policy (1997)	National Nutrition Policy (2015)
Strategies to achieve nutrition improvement goals	Reducing poverty and hunger is a key strategy for improving human nutrition.	Improving nutrition requires a coordinated, multi-sectoral approach that combines nutrition-specific and nutrition-sensitive interventions.
Details of intervention	Focuses on providing primary health care to vulnerable groups and increasing food production and income-generating activities. The following four priority areas are proposed. ● Increases in agricultural production, adequate distribution, and food security in the food, agriculture, fisheries, livestock, and forestry sectors ● Promotion of primary health care, nursing care, care of the elderly, disease control, and sanitation in the health, family welfare, and environment sectors ● Promotion of nutritional awareness through nutrition education and communication policies. ● Community development and social welfare to alleviate poverty and promote income generation and economic growth. There is no mention of over-nutrition.	Proposes more comprehensive and specific strategic interventions aimed at improving the nutritional status of all citizens, particularly that of children, pregnant women, and lactating mothers. For example: ● Proposing a life-cycle approach to ensure improved nutrition services at every stage of life, ensuring adequate nutrition for pregnant and lactating mothers, promoting breastfeeding, and preventing non-communicable diseases and premature marriage and childbirth ● To promote food diversity, nutrition-sensitive agricultural practices, adoption of communication regarding behavioral changes, and promotion of food fortification are needed ● Emphasize the need to strengthen food security, women's education and empowerment, livelihood generation, improved social protection and safety nets, sanitation, and promotion of nutrition-sensitive agricultural practices to scale up nutrition-sensitive interventions It also considers over-nutrition as a nutrition challenge.
Enhancement of public sector capacity	Not mentioned.	Emphasis on the need to assess and develop the capacity of staff working in health facilities and communities, recognizing that successfully improving nutrition depends on the capacity of staff to implement interventions.
Collaboration with stakeholders outside the government	Not mentioned.	It notes that to promote an effective multi-sectoral approach to improve nutrition security, safety net building, sanitation and hygiene, and livelihood generation, the Ministry of Health and Family Welfare will strengthen collaboration and coordination with stakeholders, including international organizations, development partners, academic and research institutions, and NGOs.

Source: A Shahan and F Jahan, Opening the policy space: the dynamics of nutrition policy making in Bangladesh, National Information Platform for Nutrition, 2017.

Twelve ministries and two departments[26] were involved in preparing the goals and strategies of the NNP. During preparation, great efforts were made to ensure that the goals of the NNP aligned with the policies and activities of the ministries and departments, and that some of these policies were actively incorporated into the NNP. Such considerations were not taken into account when the NFNP was formulated.

2） Revival of the BNNC (2015）

The NNP included the following article, an expression of commitment to strengthen the coordination of ministries involved in improving nutrition through the BNNC.

"The Bangladesh National Nutrition Council will be established in the Prime Minister's Office, chaired by the Prime Minister, which will review the nutritional status annually and give necessary directions to improve the nutritional status of the people."[27]

In September 2015, the government of Bangladesh revived the previously dormant BNNC, a 37-member body chaired by the Prime Minister and vice-chaired by the MoHFW. The Council is to be chaired by the Prime Minister and vice-chaired by the MoHFW and is to meet at least once every six months. It was also established that it will play the following roles, making it the most powerful coordinating body for improving nutrition in Bangladesh[28]:

- Provision of overall direction on national food and nutrition policy
- Provision of guidance to ministries, departments, and boards on the role of ministries in implementing nutrition improvement interventions
- Coordination of the activities of ministries, departments, and boards aimed at improving the nutritional status of the population
- Monitoring and evaluation of the performance of each government agency involved in improving nutrition and holding them accountable for the results

Thus, Bangladesh's nutrition policy was re-launched with a new structure in 2015. The following points have been identified as important factors in this change[29]:

- As many government officials participated in international workshops on nutrition and discussed with international organizations and NGOs, they understood the need for awareness of the

[26] Ministries of Health & Family Welfare, Agriculture, Food, Fisheries &Livestock, Environment & Forest, Women & Children's Affairs, Social Welfare, Disaster Management & Relief, Local Government, Rural Development & Cooperatives, Education, Information, Planning and Finance Departments of Primary & Mass Education Division and NGO Affairs Bureau.
[27] National Nutrition Policy of Bangladesh, 2015
[28] ENN, Multi-sector programs at the sub-national level, 2017.
[29] A Shahan and F Jahan, Opening the policy space: the dynamics of nutrition policy making in Bangladesh, National Information Platform for Nutrition, 2017.

nutritional challenges in their countries and to accept internationally recognized findings and recommendations. In particular, they understood that if the ruling party does not adopt new policies to address this issue, it may face criticism from the opposition.

- The Prime Minister's strong political commitment to nutrition and his desire to show leadership in the world made the issue politically relevant and served to push policymakers to seek policy changes[30].
- Previous activities by international organizations, research institutions, and NGOs to improve nutrition in Bangladesh (e.g., the SHOUHARD and MDGIF projects described below) and research activities have improved government officials' understanding of the effectiveness of comprehensive activities that incorporate both nutrition-specific and nutrition-sensitive interventions.

International organizations, NGOs, and other development partners conducted institutional design activities in the field of nutrition to pressure the government to make policy changes. In particular, "Undernutrition in Bangladesh: A Common Narrative," jointly prepared by UNICEF, WFP, FAO, WHO, World Bank, DFID, USAID, CIDA, and the European Union[31], not only identifies the current problems but also proposes concrete solutions, which significantly affected policy changes[32].

3） Second National Plan of Action for Nutrition 2016-2025

Around the same time as the NNP was being developed, the Second National Plan of Action for Nutrition (NPAN-2) was launched, which is not a specific program but rather a set of Operation Plans involving 22 ministries and agencies that define the ideal method of achieving the NNP’s objectives.

The BNNC, with the support of international organizations and NGOs, is preparing NPAN-2 after conducting four workshops that involved 22 ministries and agencies.

i) Implementation structure of NPAN-2

Figure 2-11 shows an overview of the implementation structure of NPAN-2. The BNNC, chaired by the Prime Minister, is responsible for overall policy guidance. Under the BNNC, there is an Executive Committee chaired by the Minister of Health and Family Welfare (MOH&FW), which is in charge of coordination among the sectors for policy implementation. The Executive Committee consists of the following four sectoral committees with top-level representatives from relevant ministries and agencies.

[30] Some experts pointed out that the 2008 elections triggered the change in policy, because when the Awami League came to power, it made a strong election promise to improve the nutritional status of the people.
[31] UNICEF, WFP, WHO, USAID, CIDA, World Bank, et al. Undernutrition in Bangladesh. A common narrative. 2014.
[32] In fact, many of the document's suggestions have been adopted by the NNP.

- Health, Urban Health and WASH
- Food, agriculture, fisheries, and livestock
- Women's empowerment, education, social safety nets, and information
- NPAN-2 institutionalization: finance, planning, and budgeting

The next level is the Standing Technical Committee (STC), chaired by the Additional Secretary of the Ministry of Health and Family Welfare, which is responsible for technical oversight of nutrition policies and programs and is composed of expert members from government agencies, academia, and civil society. The STC is responsible for technical oversight of nutrition policies and programs and is composed of expert members from government agencies, academia, and civil society.

In addition, the Secretariat of the BNNC has the following five working-level platforms with members from the relevant ministries and development partners.

- Nutrition-specific interventions
- Nutrition-sensitive interventions
- Monitoring, evaluation, and research
- Training and capacity building
- Advocacy, communication

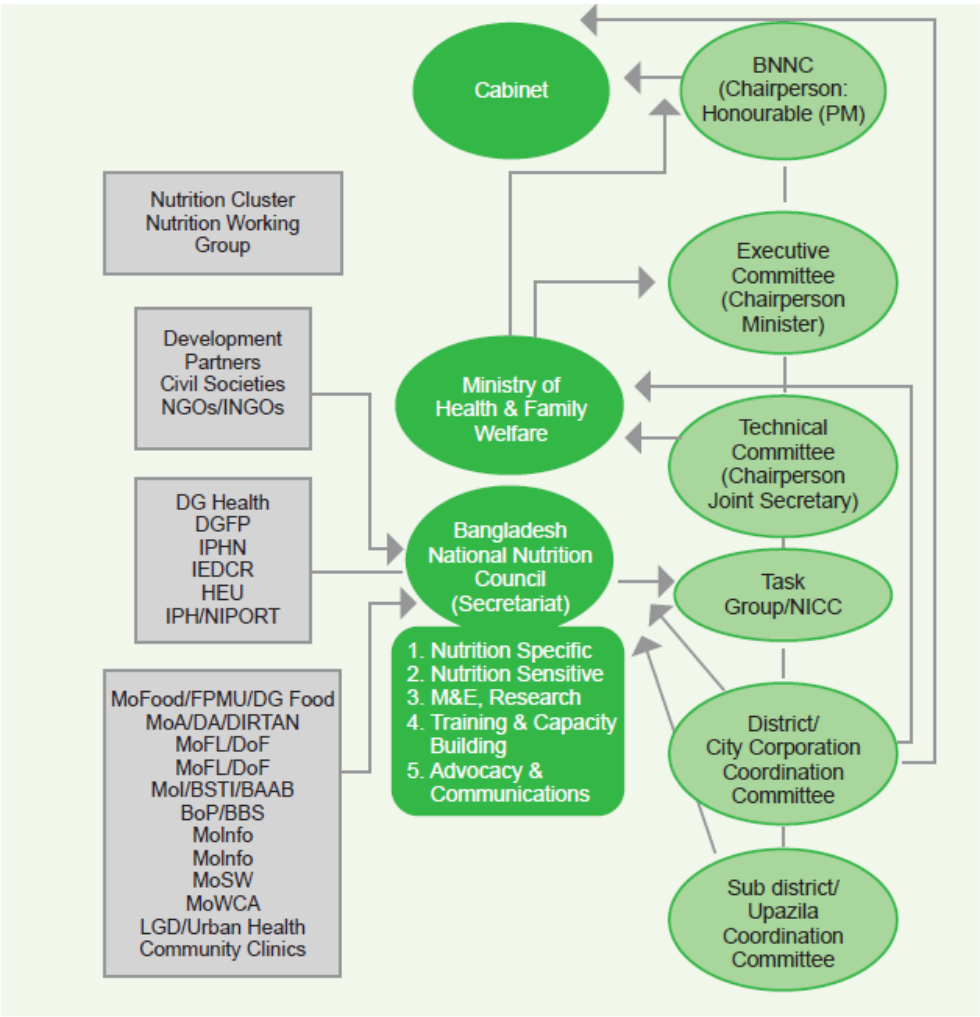

Figure 2-11: Implementation structure of NPN-2

Source: BNNC, Monitoring Report 2018-2019, Second National Plan of Action for Nutrition

In Bangladesh, the BNNC facilitates communication and collaboration among development partners, civil society organizations, and the business community through the SUN Network[33]. For example, at the national level, members of the SUN Network participate in all five working level platforms, and the BNNC actively participates in relevant SUN Network activities (SUN Multi-Sectoral Platform, SUN Academia and Research SUN Multi-Sectoral Platform, and SUN Academia and Research Network). At the local level, the Civil Society Alliance for Scaling Up Nutrition (SUN CSA) represents SUN in the District Nutrition Coordination Committee (DNCC) established under the BNNC (see below), which is also represented by NPAN.

In addition, the BNNC received active support from members of the SUN network in the areas of sectoral coordination for the implementation and operationalization of NPAN-2, nutrition governance and advocacy, development and updating of nutrition policies and guidelines, preparation of monitoring

[33] Multi-sectoral Platform (MSP)、SUN Academia and Research Network Academia and Research、SUN Business Network, Civil Society Alliance for Scaling Up Nutrition (SUN CSA).

reports, financial accounts, and promotion of advocacy throughout National Nutrition Week celebrations[34].

ii) Activities, monitoring, and evaluation of NPAN-2

The NPAN-2 activities are broadly categorized into the following six themes:

- Theme 1: Nutrition for all based on a life cycle approach
- Theme 2: Diversification of agriculture and food, as well as community-based diets
- Theme 3: Social security
- Theme 4: Implementation of an integrated and comprehensive social behavior change communication (SBCC) strategy
- Theme 5: Monitoring, evaluation, and research
- Theme 6: strengthening the capacity of public institutions

In total, 25 process- and impact indicators each were established as indicators for the monitoring and evaluation of these activities[35].

Updated data on the above indicators will be collected by the BNNC Secretariat every few years as part of the monitoring process for NPAN-2 activities, and progress will be assessed by the Monitoring and Evaluation Working Group (with members from relevant ministries and development partners). In 2021, the first interim progress report of NPAN-2 will be published[36].

4) **Multi-sectoral coordination at district and sub-district (Upazila) levels**

NPAN-2 mandates the establishment of other sectoral coordination committees for nutrition in each District and Sub-District (Upazila) with the participation of the Secretary and relevant departments. The coordinating committees at the district and county levels are called the District Nutrition Coordination Committee (DNCC) and Upazila Nutrition Coordination Committee (UNCC), respectively, and their functions include planning, budgeting, overseeing implementation, and monitoring multisectoral nutrition activities within the district and sub-district.

The Collective Impact for Nutrition (CI4N) was implemented from 2018-2020 as a project to support the establishment of DNCC and UNCC by CARE Bangladesh. The main activities of the CI4N are as follows[37]:

- Worked with the BNNC and MOH&FW to develop membership structure and terms of reference (TOR) for DNCC and UNCC.
- Provided technical support for the development of operational guidelines for DNCCs and

[34] BNNC, Monitoring Report 2018-2019, Second National Plan of Action for Nutrition 2020 and interview with BNNC.
[35] No target indicators have been set for theme 6, capacity building.
[36] BNNC, Monitoring Report 2018-2019, Second National Plan of Action for Nutrition, 2021.
[37] CARE Bangladesh, CI4NInitiative., BNNC, Monitoring Report 2018-2019, Second National Plan of Action for Nutrition 2019.

UNCCs. The guidelines were developed by the BNNC.

- In the Sunamganj district, the district nutrition action plan and 11 county nutrition action plans were developed through a participatory approach.
- Development of a web-based system for monitoring and evaluating BNNC and UNCC (currently being prepared for operation).

Thus far, the orientation for the establishment of DNCCs and UNCCs has been held by the BNNC in 53 districts and counties and a coordinating committee has been established under the above terms of reference.

The DNCC will be chaired by the District Administrator with the Civil Surgeon as Member Secretary, and members of the DNCC will be drawn from all relevant key sectors and convene every two months. The DNCC will also be attended by the press, teachers, two representatives of the SUN CSA, nominated representatives of research institutes and organizations specializing in nutrition, and the Chairman of the District Council as an advisor.

The UNCC will be chaired by the Upazila Nirbahi Officer and the Health and Family Planning Officer, who is also a member of the DNCC, will be the Member Secretary and serve as a link between the DNCC and the NNCC. Members include representatives of relevant key sectors, as well as the press, NGO representatives, and the Union Parishad Chairman (elected representative of the Union Municipality) in the county. The Upazila Council Chairman will serve as an advisor.

The web-based system for monitoring and evaluation, currently under development, is expected to be regularly updated with the status of DNCC and UNCC operations, nutrition activities in each sector, annual plans, budgets, and district-level nutrition advocacy implementation plans, and is expected to serve as a support, monitoring, and reporting tool for the DNCC and UNCC.

5) Characteristics and challenges of multi-sectoral coordination in nutrition in Bangladesh

The characteristics and challenges of the multi-sectoral coordination of nutrition policy in Bangladesh as of 2021 include the following.

- Limitations of the functions and authority of Bangladesh National Nutrition Council (BNNC):

As the coordinating body for nutrition policy in Bangladesh, the BNNC is responsible for aligning and avoiding duplication of nutrition-related activities of various ministries and agencies and monitoring and evaluating the nutrition-related goals and activities of each ministry and agency, but it does not have decision-making authority over the budget. Therefore, there are no financial incentives for each ministry to implement nutrition improvement activities[38].

In the absence of budgetary authority, the BNNC's primary function is to educate and advocate for the relevant ministries. The inter-ministerial workshops, along with the monitoring and evaluation activities conducted by BNNC are designed to educate ministries and agencies on multi-sectoral

[38] According to the interview with the BNNC and Ministry of Agriculture.

approaches in nutrition and the importance of each sector in improving nutrition. For example, the Ministry of Agriculture, became aware of the role of nutrition improvement in agriculture during the development of the NNP and NPAN-2, and as a result, strengthened its activities on horticultural crops and livestock products in its agricultural sector action plan[39].

However, the above-mentioned awareness-raising activities are difficult, especially when ministries and agencies change their staff due to personnel changes, meaning that the previously accumulated awareness-raising activities up to that point return to a blank slate. It has also been pointed out that the BNNC currently has about 50 staff members, making its available resources insufficient when compared to its role as a coordinating body for 22 relevant ministries and agencies[40].

- Lack of a targeting mechanism

NPAN-2 mentions targeting interventions for economically disadvantaged groups in social protection programs where appropriate, but there are no other targeting mechanisms to focus resources on nutrition improvement activities[41]. In other words, NPAN-2 does not take a convergence approach to concentrate limited resources in a particular stratum or region.

- Lack of effectiveness of nutrition-related coordinating committees at the local level

So far, DNNCs and UNNCs have been established in 53 districts and sub-districts, but all the committees have been in existence for less than two years and their effectiveness is unknown. According to a staff member of CARE Bangladesh, who supported the establishment of DNNC and UNNC in Sunamganj district in the CI4N project mentioned above, the importance of nutrition improvement and multi-sectoral efforts was stressed to the heads of the relevant departments. According to a CARE Bangladesh staff member who supported the establishment of DNNC and UNNC in the Sunamganj district, it took patience and a long time to convince the relevant department heads of the importance of nutrition improvement and multi-sectoral efforts, as well as the need for local coordination committees. Additionally, personnel changes have rendered previous awareness-raising activities irrelevant in many cases, and even in Sunamganj district where CARE Bangladesh provided support, there are few functioning UNNCs in the counties. However, in one county, the budget for nutrition improvement was significantly increased as a result of awareness-raising activities. There are also cases of inter-departmental cooperation on nutrition improvement, such as sending health experts to agricultural extension workshops for farmers.

- Issues with the structure of monitoring and evaluating indicators

The NPAN-2 impact indicators have the following structural issues, which may need to be revised to a more systematic structure that clarifies the results and causes of nutrition improvement.

  - ✓ Theme 1 juxtaposes the percentage of children with stunting and wasting, which are

[39] According to the interview with the Ministry of Agriculture.
[40] According to the interview with BNNC.
[41] ENN, Multi-sector programs at the sub-national level, 2017.

indicators of undernutrition, with full breastfeeding and minimum-acceptance diet requirements, which are widely recognized as causes of undernutrition

- ✓ The relationships between the themes and indicators are unclear.

2.2.3. Major nutrition improvement projects in Bangladesh[42]

- Strengthening Household Ability to Respond to Development Opportunities (SHOUHARDO) project

(Implementing agencies: USAID/CARE, Integrated Type: Health + Water and Sanitation + Gender + Agriculture + Disaster Prevention)

Phase I (2006-2010)

The project took a multisectoral approach to improving food security and maternal and child nutrition, aiming to address the direct determinants of malnutrition as well as its underlying structural causes. The project targets approximately 2 million poor households in the northern and coastal regions of the country, and activities include maternal and child health, water and sanitation, female child and women's empowerment, poverty and food insecurity alleviation, and disaster mitigation and response.

According to the project evaluation report[43], the percentage of stunted children in the target area decreased from 56% before- to 28% after the project. In addition, the following characteristics were observed.

- ✓ Interventions aimed at empowering women reduced stunting more effectively than other interventions, such as those aimed at improving sanitation and family agricultural production.
- ✓ Women who participated in both empowerment activities and direct interventions on maternal and child nutrition experienced greater reductions in child stunting than women who only participated in one of the interventions, and there was greater synergy between the two interventions.

Phase II (2010-2015):

The project was implemented by applying SHOUHARDO's activity framework to women from poor households in 172 sub-districts in Bangladesh. According to the project's evaluation report, the percentage of stunted children in the target area decreased significantly from 45% to 21% during the project. The endline survey revealed that the reduction in stunting was caused by several factors, including household food[44].

[42] In the list of nutrition-related projects, four categories (devised by the study team) were applied based on the form of the intervention: 1) "integrated type," in which multi-sectoral activities are implemented in a single project; 2) "combined type (1)," in which nutrition-specific and nutrition-sensitive interventions are combined and implemented in the same target area; 3) "combined type (2)" in which only nutrition-sensitive interventions are combined and implemented in the same area; and 4) "single type" of intervention by a single sector only (in practice, this does not qualify as multi-sectoral).

[43] CARE Bangladesh, Reaching new heights, 2010.

[44] USAID, SHOUHARDO: A Holistic Approach: Ensuring Food Security through Women‘s Empowerment, 2016.

Phase III (2015-2020):

The project covers 115 sub-districts in the north of the country. The activities of the agriculture and income generation components of the project take an inclusive value chain approach.

- Linking Fisheries and Nutrition: Promoting Innovative Fish Production Technologies in Ponds and Wetlands with Nutrient-Rich Small Fish Species in Bangladesh (2010-2013)

(Implementing agencies: IFAD/WorldFish; Combined Type (2): Fisheries + Natural Resource Management + Agriculture + Nutrition Education)

The project was implemented by WorldFish in collaboration with the Department of Fisheries and Extension, targeting small-scale farmers and fishermen with small-scale aquaculture ponds in the implementation areas of two IFAD-supported loans (Sunamganj Community Resource Management Project and National Agricultural Technology Project). The project was implemented by WorldFish with the cooperation of the Department of Fisheries and Extension.

The project activities include training on the production of carp and nutritious small mola fish in aquaculture ponds, technical training on increasing small fish production in wetlands, promoting vegetables (e.g. vitamin A-fortified sweet potatoes) being grown on pond banks and in home gardens, and awareness raising activities aimed at increasing dietary diversity. This includes cooking demonstrations, and the formation of women's promoter groups that will be responsible for spreading the idea of improved dietary habits in each village. As a result of the project, the consumption and frequency of consumption of nutritious small fish increased, especially among pregnant and lactating women and children, who were given supplementary food from the age of six months onwards. The increase in production also led to more fish being consumed. The increase in production also led to an increase in household income, which was used primarily for food purchases, school fees, and health-related expenses. Training women as promoters of improved dietary habits in villages proved effective in promoting the production and consumption of nutritious food. Households not participating in the project also started pond aquaculture and production of fortified sweet potatoes[45].

- MDG-F Program (Protecting and Promoting Food Security and Nutrition for Families and Children in Bangladesh) (2010-2013)

(Implementing Agencies: WFP, UNICEF, and FAO; Combined Type (1): agriculture + health care + education)

A joint program by the MDG Achievement Fund. To reduce underweight and malnutrition among children aged 6-59 months and acute malnutrition among pregnant and lactating women in the Barisal district, one of the poorest areas in Bangladesh, the program strengthened food production in mansion fields, food distribution, community-based management of acute malnutrition, school feeding and

[45] IFAD, The Fisheries and Aquaculture Advantage, 2019

vegetable gardens, food security, and nutrition information systems[46].

The project evaluation report concludes that the project contributed significantly to improving nutrition in the project area and demonstrates the effectiveness of a multi-sectoral approach based on a convergence approach by achieving the following results[47].

- ✓ Severe acute malnutrition was almost eliminated in the project area, and moderate acute malnutrition was reduced by one-tenth.
- ✓ Among the target households, vulnerable households with vegetable gardens experienced significant increases in income from vegetable and poultry gardens, egg and meat consumption, and food consumption scores.
- ✓ The school feeding- and home garden program led to increased school enrollment and attendance.
- ✓ The role of women in household decision making increased greatly and the food consumption of pregnant women in the project area doubled.

In addition, the following project implementation lessons were learned.

- ✓ Households with improved household food security are more likely to follow nutrition counseling.
- ✓ Children in households with improved water sanitation had a reduced prevalence of diarrheal infections and improved nutritional status.
- ✓ When nutrition education classes and school gardens are offered in schools, they often lead to increased school enrollment and attendance, improved nutrition intake at home, and more home gardens.
- ✓ Stakeholders agreed that the benefits of collaboration between the three UN agencies and their government counterparts far outweighed the coordination costs of doing so.

- Alive & Thrive (A&T) project (2011-2014)

(Implementing agencies: Bill & Melinda Gates Foundation/FHI 360, Combined Type (1): Health Care + Water and Sanitation)

The project aimed to reduce the incidence of child stunting and anemia in 8.5 million households with children under two years of age through intensive community-based interventions and a national media campaign that combined improved infant feeding and hygiene. Project activities included health workers training community volunteers in IYCF, awareness-raising activities on breastfeeding for community groups, and performance-based cash incentives linked to breastfeeding practices.

The project process evaluation conducted in 2013 showed that the percentage increase in full breastfeeding practices in the project areas was about 25% higher than that in the comparison areas. The percentage of children on a minimum diet almost doubled from about one-third to two-thirds

[46] http://www.mdgfund.org/node/999
[47] MDGIF Bangladesh Final Evaluation, 2013.

in the program areas, whereas no change was observed in the comparison areas[48].

- Food and Nutrition Technical Assistance III Project (FANTA) (2012-2018)

(Implementing agencies: USAID/FHI 360, Integrated Type: Health care + Agriculture + Multisector Planning)

In line with USAID's multi-sectoral nutrition strategy, nutrition advocacy, development of multi-sectoral policies, action plans and guidelines, cost and resource mobilization for nutrition interventions, analysis and use of nutrient deficit data to strengthen linkages with agriculture, capacity building, multi-sectoral nutrition research, M&E for integrated planning, and technical assistance for the sharing of knowledge implemented in multiple countries (9 countries). The main activities of the FANTA project in Bangladesh were as follows.

- ✓ Conducted training on infant feeding and hygiene practices for over 2,900 service providers in USAID's health programs.
- ✓ Distributed iron and folic acid tablets to postpartum mothers, developed a basic nutrition training curriculum, and mapping nutrition interventions and projects.
- ✓ Provided technical assistance to the USAID/Bangladesh NGO Health Service Delivery Project (NHSDP) to improve coverage and quality of nutrition services by building the capacity of service providers and clinics.

- JICA Project for Strengthening Health Systems through Organizing Communities (2017-2022)

(Implementing agency: JICA, Single Type Health Care)

The project aims to promote early detection and prevention of non-communicable diseases (NCDs) in Bangladesh by linking NCD services with maternal protection services. The project areas are Dhaka City, Norshindi District, and Cox's Bazar District, and the main target groups are healthcare workers in primary and secondary level health care facilities[49] and residents of the target areas. The number of maternal deaths due to NCDs is set as one of the project's target indicators.

JICA has implemented the " Safe Motherhood Promotion Project" (Phase I from 2006 to 2011, Phase II from 2011 to 2016) in the country and supported maternal and child health activities at the community level through community support groups (CSGs), which are community-based organizations. In the community-based health promotion project, we have been supporting maternal and child health activities at the community level through CSGs. The community-based health promotion project aims to comprehensively improve the health of the population by incorporating NCD prevention activities, which have not been tackled in the country to date, into the activities of the CSGs, which have been made into policies through the above project.

The main activities include: early detection and treatment of hypertension and diabetes at the primary health care level; establishment and support for the introduction of public health care

[48] BRAC, Scaling Up and Sustaining Support for Improved Infant and Young Child Feeding, 2014.
[49] Primary medical facilities: community clinics, county hospitals, city clinics, and secondary medical facilities: district hospitals

services (NCDs management model) to prevent serious diseases; strengthening of hospital operation and management to improve the quality of health care services; and strengthening of NCD measures at the community level using CSG[50]. Health workers and CSG members have limited experience in counseling, and developing their capacity takes time.

The counterpart agency for this project, the Directorate General of Health Services, NCDC Division of the Ministry of Health and Family Welfare, has little collaboration with BNNC and there is no link between activities related to the control of NCDs, including this project, and NPAN-2. In addition, a multisectoral action plan for the control of NCDs, Multisectoral Action Plan for the Noncommunicable Disease Control and Prevention (2016-2021), has been developed, but no meeting has been held in the past three years and there is barely any multi-sectoral coordination of NCD control[51].

2.2.4. Lessons learned from implementing the nutrition policy and nutrition improvement project in Bangladesh

The lessons learned from implementing nutrition policies and projects in Bangladesh to date are presented in Table 2-3 and Table 2-4 below and compared with typical lessons and challenges in implementing nutrition improvement activities. In Table 2-3, lessons related to the enabling environment are organized in accordance with the framework of Black et. al (2013). Table 2-4 shows the lessons learned in project design and implementations excluded from the enabling environment.

[50] This project mainly focuses on NCD control and not on overnutrition alone. As part of the preventive management of NCDs, nutrition education (balanced diet, including attention to overnutrition) and exercise are promoted.

[51] However, some of the activities listed in the action plan, such as anti-smoking, school health, Healthy City, and activities involving religious leaders, are being conducted in collaboration with relevant sectors.

Table 2-2: Lessons learned on enabling environment in Bangladesh

Major entries	Sub-entries	Typical lessons learned and challenges associated with nutrition-related projects	Current situation and experiences in Bangladesh	Corresponding projects
Overall		Multisectoral Approach (MSA) is the most effective approach to addressing malnutrition. However, inter-ministerial collaboration is not always an efficient mechanism.	Bangladesh prior to the formulation of the 2015 National Nutrition Plan is a prime example of the proposition that interagency collaboration is not always an efficient mechanism. For example, the following three projects failed to achieve their initial goals due to the following factors. BINP: Complex flow of funds, lack of commitment from each sector implementing agency NNP: Project design not suited to local needs NNS: Lack of resources at the implementation site	BINP NNP NNS
Overall		The principle of effective MSA is "Plan multisectorally, implement sectorally, review multisectorally."	NPAN-2 is planned, implemented, and monitored based on the principles described on the left.	NPAN-2
Overall		A realistic organization for MSA is for the coordinating body for nutrition to have overall policy and resource allocation authority, and to give each sector the freedom and resources it needs to implement its own programs. The role of the coordinating body would be to ensure appropriate incentives to motivate sector agencies to prioritize nutrition and to ensure accountability.	The BNNC, the coordinating body for nutrition policy in Bangladesh since 2015, does not have any budgetary authority and does not hold any financial incentives for the concerned agencies; the main function held by the BNNC can be said to be awareness and advocacy to the concerned ministries.	
Overall		Experience has shown that a convergent approach combining nutrition-specific and nutrition-sensitive interventions is more effective than a universal approach for a limited number of regions and segments.	Examples of universal approaches in Bangladesh are BINP, NNP, and NNS; examples of convergent approaches are MDG-F and SHOUHARDO; MDG-F and SHOUHARDO have shown clear results in improving nutrition.	
Leadership		Direct involvement at a high level of the executive branch (presidential or prime ministerial level) is important.	The Prime Minister's strong political commitment to nutrition and his desire to show leadership in the world led to the development of the National Nutrition Plan.	

Major entries	Sub-entries	Typical lessons learned and challenges associated with nutrition-related projects	Current situation and experiences in Bangladesh	Corresponding projects
Policy	**Setting policy issues**	Creating a single narrative about the severity of malnutrition can help to set clear policy goals.	International organizations, NGOs, and other development partners conducted institutional design activities in the field of nutrition and pressured the government to make policy changes, which played a role in formulating the NNP. In particular, "Undernutrition in Bangladesh: A Common Narrative," jointly prepared by UNICEF, WFP, FAO, WHO, World Bank, DFID, USAID, CIDA, and the European Union, not only identified the current problems but also proposed concrete solutions, which significantly impacted policy changes.	
Horizontal coordination	**Effective coordination mechanism**		Prior to 2015, two parallel agencies implemented nutrition-related policies: the Ministry of Health and the Food Planning Monitoring Unit (FPMU), leading to the duplication of activities.	
Horizontal coordination	**Budget execution mechanism**	Adequate budgets are insufficient to generate multi-sectoral sectoral commitments.	In the BINP, funds from the project office based in the health ministry were allocated to the Department of Agricultural Extension and Department of Livestock and Fisheries, but little of the budget was executed, clearly demonstrating the lack of commitment from these sectors. In addition, the complex flow of funds made execution difficult.	BINP
Vertical coordination	**Local ownership**	Local ownership of nutrition programs and their outcomes is needed. If local politicians believe that they can promote the results of nutrition improvement projects to the public, they may make efforts to promote policies and obtain funding.	The DNNC and UNNC have been established as multi-sectoral coordinating committees on nutrition at the regional level. However, the committees have only existed for less than two years and their effectiveness is unknown.	
Vertical coordination	**Ownership of local implementing agencies**	The ownership of the local implementing agency must be sufficient to facilitate effective project implementation.	One reason for the failure of the HFS component is that the Community Nutrition Promoter, the implementing agency for the HFS component of the NNP project, felt that it was not the owner of the deal.	HFS under NNP
Domestic resources		If there are insufficient resources to implement the plan, the use of other organizations (NGOs, etc.) to supplement the missing resources should be considered.	The NNS intervention area was too large and exceeded the capacity and workload of the healthcare providers to effectively respond within the required time frame. The use of other platforms, including non-governmental organizations (NGOs), to achieve greater coverage should be considered.	NNS

Major entries	Sub-entries	Typical lessons learned and challenges associated with nutrition-related projects	Current situation and experiences in Bangladesh	Corresponding projects
Domestic resources			NNS support service delivery was implemented through various platforms (community clinics, health assistance, family welfare volunteers, etc.). These platforms had their own challenges related to coverage, reach, and quality, and NNS services did not perform well due to these challenges. There was also no ongoing learning or review process to assess implementation challenges.	NNS
Advocacy	**Support of civil society**	If civil society groups have the capacity to produce, analyze and disseminate reliable data, they can make the problem of malnutrition visible and improve the scope and quality of service delivery.	An important development in nutrition in Bangladesh is the establishment of two nutrition-related civil society organizations, namely the Civil Society Alliance for Scaling Up Nutrition (SUN CSA) and the Bangladesh-Bangladesh Civil Society Network for Promoting Nutrition. The SUN CSA represents SUN in the DNCC.	
Monitoring and evaluation		Nutrition-related data collected in an accurate and timely manner is very important when developing nutrition strategies.	In NPAN-2, comprehensive impact and process indicators have been established, and multi-sectoral monitoring and evaluation are being conducted based on these indicators. However, the impact indicators are not structured in a way that facilitates systemic clarification of the results and causes of nutrition improvement.	
Monitoring and evaluation		Appropriate monitoring and evaluation is necessary for effective project implementation.	In the NNS program, few systems existed to technically monitor the quality of services provided by professionals. It also overburdened field staff to record data.	NNS

Table 2-3: Lessons learned on project design and implementation in Bangladesh

Major entries	Sub-entries	Typical lessons learned and challenges associated with nutrition-related projects	Current situation and experiences in Bangladesh	Corresponding projects
Project design	**Targeting**	Although the main target group for improved nutrition is often vulnerable groups, the target group for activities aimed at increasing agricultural production tends to be farmers with a certain level of production ability, which may make them inappropriate targets.	There was a major flaw in the design of HFS project in NNP: HFS activities targeted poor households, whose criteria were that they owned up to 80 decimal of land to set up a vegetable garden and 50 decimal of land to raise chickens. Poor households did not have enough land for vegetable gardens or poultry farming, and the beneficiaries of HFS were not the poorest of the poor.	HFS under NNP
Project design	**Local needs**		The "Kallikapur model" of horticulture and poultry promotion applied in the HFS project worked well in high-altitude areas, but less so in the lowland areas that make up most of Bangladesh. The HFS case formulation should have been tailored to local needs rather than imposing a particular model.	HFS under NNP
Combination of activities at the field level	**WASH**	The WASH program does not require much coordination with other sectors. The WASH activities needed to improve nutrition are clean well water, sanitary latrines, and hygiene counseling.	The Department of Public Health and Engineering (DPHE), the lead agency in the WASH sector, focuses on infrastructure development and lacks the capacity to implement behavior change communication (BCC) activities on sanitation.	
Combination of activities at the field level	**WASH**		The results of the Alive & Thrive (A&T) project showed that handwashing before meals was associated with a lack of knowledge of the benefits of handwashing on health, lack of social pressure and norms regarding handwashing, and the burden and hassle of household chores. In the absence of social pressures and norms regarding hand washing, involving influential individuals, especially men, is necessary to establish the practice of hand washing.	A&T project
Combination of activities at the field level	**Agriculture and education**	Nutrition improvement can be strengthened by including nutrition education, life skills training, and weekly iron supplementation for adolescent girls (including those not attending school) in school lunches and school gardens.	When nutrition education classes and school gardens are offered in schools, they often lead to increased school enrollment and attendance, as well as improved nutrition intake at home and more home gardens being planted.	MDG-F
Combination of activities at the	**Agriculture and gender**	Home gardens combined with nutrition education and gender-sensitive approaches strongly impact nutrition outcomes.	Interventions aimed at empowering women reduced stunting more effectively than other interventions, such as	SHOUHARD

Major entries	Sub-entries	Typical lessons learned and challenges associated with nutrition-related projects	Current situation and experiences in Bangladesh	Corresponding projects
field level			those aimed at improving sanitation and family agricultural production. Women who participated in both empowerment activities and direct interventions on maternal and child nutrition experienced greater reductions in child stunting than women who participated in only one of the interventions, and there was greater synergy between the two interventions.	
Combination of activities at the field level	**Agriculture and gender**	Activities to improve nutrition will be more effective if women are the primary target group.	As a result of the Linking Fisheries and Nutrition project's promotion of small-scale aquaculture targeting women, increased production of small nutritious fish has led to increased consumption of nutritious fish by pregnant and lactating women and their children. Complementary intake of nutritious fish is now available from the age of six months onward.	Linking Fisheries and Nutrition
Combination of activities at the field level	**Agriculture and gender**		Women trained during the Linking Fisheries and Nutrition project encouraged women who were not involved in the project to farm and produce vitamin A-fortified sweet potatoes, leading to improved women's empowerment, social status, and mobility.	Linking Fisheries and Nutrition
Combination of activities at the field level	**Social protection**	By including nutrition interventions in social security programs, improved incomes can be linked to improved nutrition and food security.	Four social protection programs in Bangladesh substantially increased household food expenditures through cash transfers, but did not the increase caloric intake among children under five years of age.	

2.3. Ghana

2.3.1. Trends in key nutrition-related indicators in Ghana

（1） State of Nutrition

First, Ghana has realized tremendous improvement of undernutrition indicators of children under five years of age (Figure 2-12). In 2017, 17.5% of children under 5 years of age were stunted, which was greatly improved from 35.5% in 2013. The percentage of wasting also reduced from 8.4% to 6.8% between 2013 and 2017. The percentage of overweight decreased from 2.6% to 1.4% between 2011 and 2017[52].

The nutritional status of adults aged 18 or older (Figure 2-13) is characterized by a steady decline in underweight (Body Mass Index (BMI) < 18.5) and a continuous increase of overweight (BMI ≥ 25.0). The percentage of underweight decreased from 13.5% for men and 8.8% for women in 2003 to 10.9% and 7.3% in 2014, respectively, whereas the incidence of overweight continued to rise from 15.7% for men and 31.6% for women in 2003 to 21.1% and 39.6 in 2014, respectively[53].

In 2014, 47.2% of women of reproductive age were anemic. This number improved from 51.8% in 2003, but the percentage is still high (Figure 2-14).

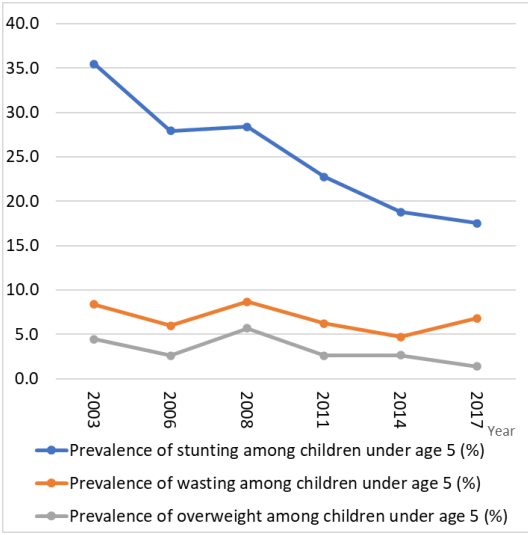

Figure 2-12: Trends in key nutrition-related indicators in Ghana (Children under 5 years old)

Source: Global Nutrition Report

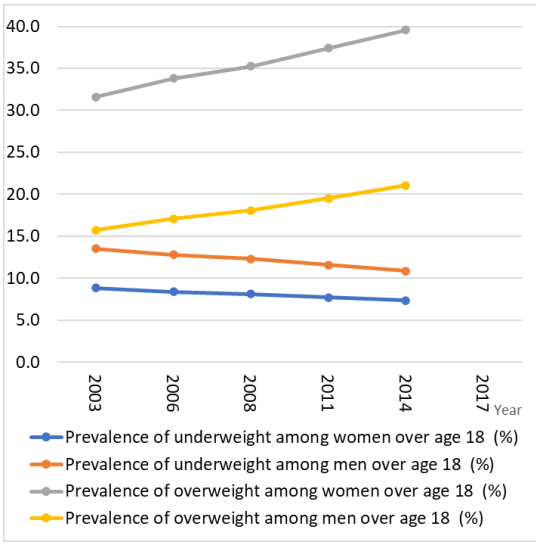

Figure 2-13: Trends in key nutrition-related indicators in Ghana (Adults 18 years and older)

Source: Global Nutrition Report

[52] Multi Indicator Cluster Survey (MICS) in 2006 and Demographic and Health Survey (DHS) in 2008 do not describe the causes of the increase between 2006 and 2008 and decline since then.

[53] The trends of overweight and obesity (BMI ≥ 30) for youths aged 15-19 years is similar to those for adults.

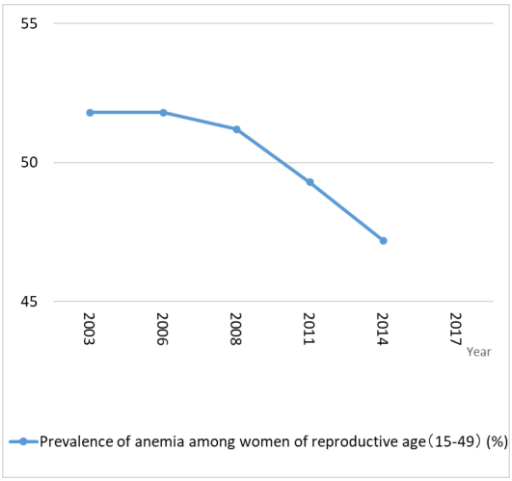

Figure 2-14: Anemia among women of reproductive age in Ghana
Source: Global Nutrition Report

（2） Diet and Childcare

The five indicators in Figure 2-15 and Figure 2-16 show that there has been little improvement. All five indicators declined between 2014 and 2017, with the exception of minimum dietary diversity (MDD).

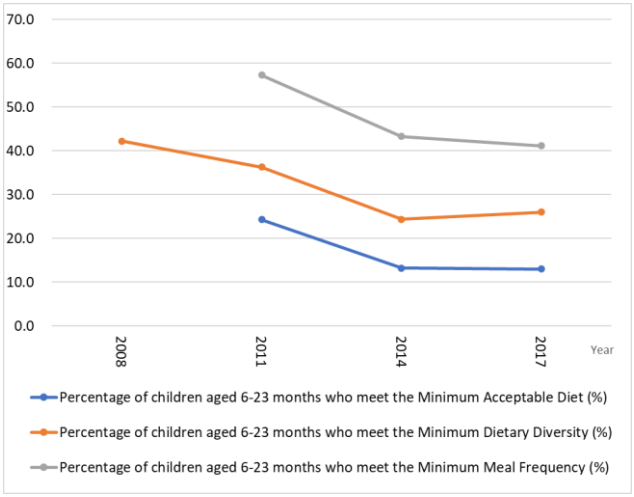

Figure 2-15: Trends in key feeding indicators in Ghana (Children under 2 years of age)
Source: Global Nutrition Report

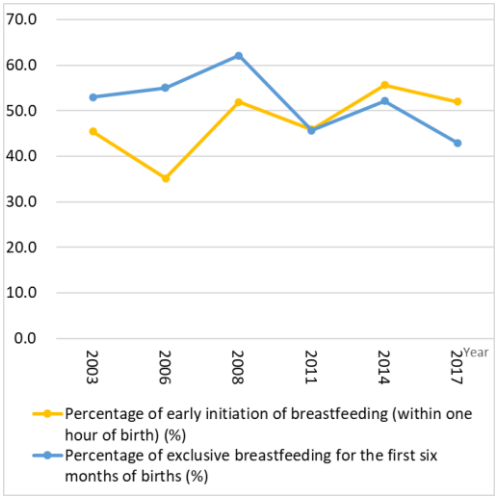

Figure 2-16: Trends in key care indicators in Ghana
Source: Global Nutrition Report

（3） Health, Water, Sanitation and Hygiene, and Education

Basic health services, water, sanitation, and hygiene (WASH) and education are services in nutrition sensitive interventions. As described in Figure 2-17, more than 90% of women in Ghana attended antenatal consultation (ANC) performed by skilled health personnel at least once.

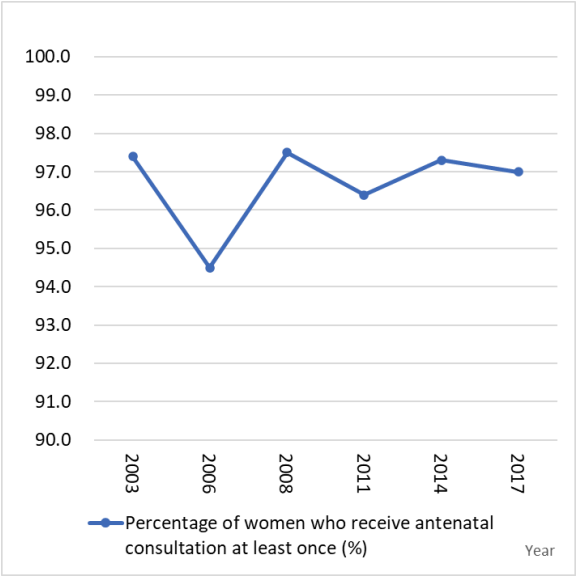

Figure 2-17: Percentage of women of reproductive age receiving ANC at least once in Ghana

Source: Global Nutrition Report

The percentage of households with access to a safely managed water source improved from 13.3% to 41.4% between 2000 and 2020 (Figure 2-18). Those with access to safely managed sanitation increased from 4.4% in 2000 to 13.3% in 2020 (Figure 2-19), but the percentage remains low.

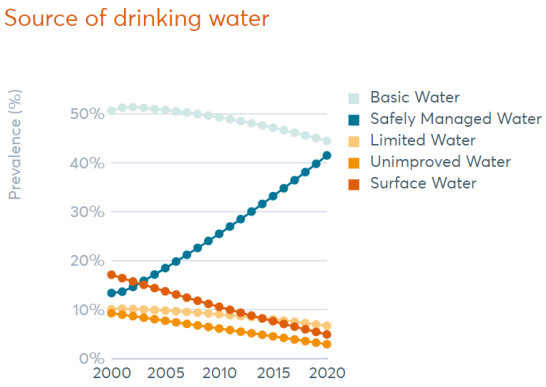

Figure 2-18: Ratio of households by the source of drinking water in Ghana

Source: Global Nutrition Report

Figure 2-19: Ratio of households by the type of sanitation facility in Ghana

Source: Global Nutrition Report

The net enrolment rate of female secondary education has increased continuously since 2003 (Figure 2-20).

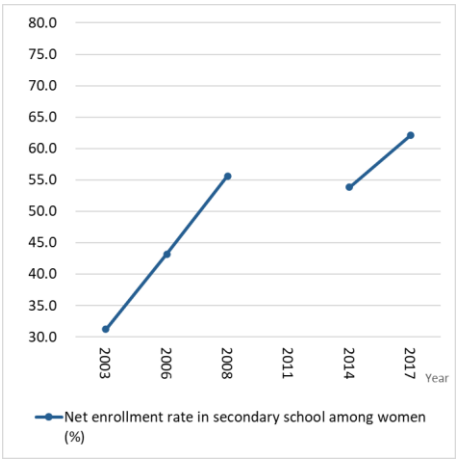

Figure 2-20: Net secondary school enrollment rate among women in Ghana

Source: Global Nutrition Report

(4) Income Level

Ghana's GDP per capita (2017 constant prices in PPP dollar) has grown significantly, particularly between 2008 and 2014 (Figure 2-21).

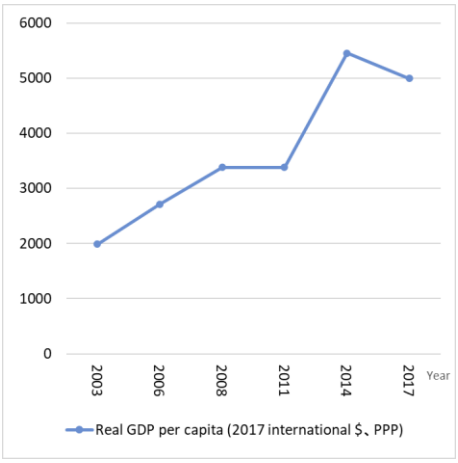

Figure 2-21: Real GDP per capita in Ghana (PPP, constant 2017 international US$)

Source: World Bank, World Development Indicators

(5) Distribution of Wealth (Wealth Index)

As income levels rise in Ghana, the percentage of the population that live below the poverty line (below 1.90 PPP$ a day or below 3.20 PPP$ a day) reduced from 24.8% and 46.7% in 2003 to 9.5% and 24.7% in 2017, respectively[54].

However, wealth inequality, including income, remains high. The wealth index[55] in Ghana DHS in 2014 illustrates that 71.6% of the people in Northern Region, 78.5% in Upper East and 60.2% in Upper West were in the lowest wealth quintile (Table 2-5).

[54] Global Nutrition Report (https://globalnutritionreport.org/resources/nutrition-profiles/africa/western-africa/ghana/)

[55] The wealth index is a composite measure of a household's cumulative living standard, calculated using easy-to-collect data on a household's ownership of selected assets, such as televisions and bicycles; materials used for housing construction; and types of water access and sanitation facilities.

Table 2-4: Distribution of wealth in Ghana

Region	Wealth quintile					total
	Lowest	Second	Middle	Fourth	Highest	
Western	6.0	23.3	29.4	25.3	16.1	100.0
Central	4.7	30.2	32.1	19.3	13.7	100.0
Greater Accra	2.6	3.7	11.4	30.1	52.2	100.0
Volta	21.7	33.3	28.2	12.8	4.1	100.0
Eastern	12.6	29.5	27.7	17.9	12.4	100.0
Ashanti	6.5	18.0	19.5	28.9	27.1	100.0
Brong Ahafo	25.2	30.9	22.8	13.9	7.2	100.0
Northern	71.6	15.3	7.7	3.5	2.0	100.0
Upper East	78.5	9.4	6.1	4.4	1.7	100.0
Upper West	60.2	19.9	9.3	7.7	3.0	100.0
Total	20.0	20.0	20.0	20.0	20.0	100.0

Source: Ghana Demographic and Health Survey 2014, p18

2.3.2. Evolution of multi-sectoral nutrition-related policies and programs in Ghana

This section describes the transition and current situation of the multisectoral approach to nutrition policies and programs in Ghana since 1995.

（1） National Plan of Action on Food and Nutrition 1995-2000

The multisectoral approach to nutrition improvement programs in Ghana originates from the National Plan of Action on Food and Nutrition 1995-2000 (NPAN). Following the World Summit for Children in 1990 and 1992 International Conference on Nutrition held in Rome, Ghana realized at the time that hunger and undernutrition are caused by several factors that require coordinated efforts[56].

The NPAN, which aims to improve the nutritional status of all Ghanaians, consisted of 11 programs and involves various stakeholders, including the National Development Planning Commission (NDPC), Ministry of Health, Ministry of Agriculture, Ministry of Education, universities and research institutions, UNICEF and NGOs in the implementation of the activities (Table 2-6)[57].

Table 2-5: NPAN programs and their responsibilities

Programme	Responsibility
1 Adequate food/nutrient intake for individuals	MOH/MOE/MOFA/NMIMR/Univ./NGO
2 Improved household food security	MOFA/MOH/MOLG/Univ/UNICEF/NGO
3 Sensitisation of policymakers on food and nutrition-related issues	NDPC
4 Strengthening coordination of food and nutrition issues	NDPC
5 Capacity building for food and nutrition-related education and services	MOE/MOH/MOFA/UNICEF
6 Institution of preventive measures against nutrition-related diseases	MOH/MOFA/MOE/NMIMR/UG
7 Promotion of ideal breastfeeding practices	MOH/MOE/Univ
8 Enhanced participatory approach to intervention in food/nutrition projects	NDPC/MOFA/MOH/MOLG/NGO
9 Promotion of good hygiene practices	MOE/MOH/MOLG
10 Promotion of appropriate weaning practices	MOH/MOE/MOFA
11 Effective management of NPAN	NDPC

Source: Government of Ghana, National Plan of Action on Food and Nutrition (1995-2000)

Coordination, which was to be strengthened in the NPAN, was the responsibility of the Cross-sectoral Planning Group of the NDPC at the national level and Regional/District Planning Coordinating

[56] Government of Ghana, *National Plan of Action on Food and Nutrition (1995-2000)*, pp1-2
[57] *ibid.*, pp12-24

Units at regional and district levels[58]. However, as the NPAN was not used to make resources (funds, human resources, etc.) available from the sources of the Ghanaian government, and the government's commitment to the NPAN's implementation was inadequate in terms of coordination, it was not fully implemented[59].

（2） Nutrition Policy and Program Led by Ministry of Health and Ghana Health Service

The health sector i.e., the Ministry of Health and Ghana Health Service (GHS) have been at the center of nutrition improvement in Ghana, especially the Nutrition Department of GHS[60]. The Ministry of Health's Health Sector Program of Work 2007-2011 prioritized the issue of nutrition by following two strategic objectives: i) promoting individual lifestyle and behavior models for improving health and ii) to scale up high impact health- and reproductive and nutrition interventions and services[61].

The Ministry of Health has been implementing the National Nutrition Policy since 2014. The Policy has three objectives, namely (1) to increase coverage of high-impact nutrition-specific interventions that ensure optimal nutrition of Ghanaians throughout their lives with special reference to maternal health and child survival, (2) ensure high coverage of nutrition-sensitive interventions to address the underlying causes of malnutrition, and (3) reposition nutrition as a priority multi-sectoral development issue in Ghana. It follows the framework for actions to achieve optimum fetal and child nutrition and development illustrated in Lancet (2013)[62]. The nutrition-specific interventions include generation-specific nutritional requirements and activities (e.g., iron and folic acid supplements for women of child-bearing age and breastfeeding for infants), as well as capacity building in the prevention and treatment (management) of malnutrition. As for nutrition-sensitive interventions, the measures include preventing infectious diseases and taking nutritional measures associated with AIDS and TB; improving access to safe water; scaling up Community-Led Total Sanitation (CLTS)[63]; promoting hand washing with soap at all times; improving access to adequate, diverse, safe and affordable food; promoting local production for local consumption; extending cash transfers; and ensuring school meals. However, although all ministries are to have a nutrition plan and budget line item, it is less multi-sectoral, as the foreword is signed by the Minister for Health, the role of other central ministries is not mentioned in the chapter on research, coordination, monitoring and evaluation, and there are insufficient references to initiatives in other sectors.

Meanwhile, the Ministry of Health and GHS are working to improve nutrition in the Ghana Reproductive, Maternal, Newborn, Child and Adolescent Health and Nutrition (RMNCAH&N) Strategic Plan 2020-2025 from 2020[64]. In addition to the conventional focus areas of further promoting

[58] *ibid.*, p28
[59] Adom Baisie Ghartey (2010) *Nutrition Policy and Programs in Ghana: The Limitation of a Single Sector Approach*, p40
[60] *ibid*, p42. It is currently referred to as Family Health Division.
[61] *ibid*, p33
[62] Black (2013) "Maternal and Child Undernutrition and Overweight in Low-income and Middle-income Countries" *Lancet 382*, pp427-451.
[63] CLTS is an innovative methodology for mobilizing communities to completely eliminate open defecation
[64] Ministry of Health and Ghana Health Service, *Ghana Reproductive, Maternal, Newborn, Child and Adolescent Health and Nutrition Strategic Plan 2020-2025*, pp25-26

breastfeeding and complementary feeding, promoting optimal nutrition for pregnant women, and strengthening measures to address anemia and micronutrient deficiencies, the RMNCAH&N Strategic Plan has devised measures against overweight and obesity, as described in the next section.

（3） Response to Overnutrition

The Coordinated Program of Economic and Social Development Policies 2017-2024 presented by the President in response to the emerging problem of overnutrition as seen in the previous chapter, states that the measures to be addressed are the following: "promotion of the production and utilization of locally grown and nutrient-rich food" and "adoption of a life-cycle approach to reduce malnutrition at all levels", as well as "reviewing and scaling up the Regenerative Health and Nutrition Program (RHNP)" and "elimination of child and adult overweight and obesity"[65].

The RHNP was initiated in 2006 to promote healthier lifestyles in the aspects of diet, exercise, rest, and hygiene and reduce the risk of diseases and disorders among individuals, households, and communities[66].

The National Nutrition Policy of the Ministry of Health/GHS has an item called “prevention and management of obesity and diet-related non-communicable diseases” in the nutrition-specific interventions[67]. The RMNCAH&N Strategic Plan 2020-2025 also prioritizes the reduction of overnutrition and obesity by identifying the causes, improving school feeding, advocacy for behavioral changes, and building the capacity of the relevant workers[68].

（4） Nutrition Policy and Program of Other Sectors

1） Ministry of Education/Ghana Education Service (GES)

The School Health Education Program (SHEP) was initiated in 1992. The Policy Guidelines that are currently implemented were revised in 2012. The Education Strategic Plan 2013-2015 has SHEP as a strategic objective to “promote the values of good health and environmental sanitation in schools and institutions”[69].

2） Ministry of Gender, Children and Social Protection/Ghana School Feeding Program (GSFP)

GSFP commenced in 2005 as a pilot program and extended from 2006 onwards and is currently being implemented in line with the National School Feeding Policy endorsed in 2016.

3） Ministry of Gender, Children, and Social Protection /LEAP Secretariat

Livelihood Empowerment Against Poverty (LEAP) is a program to transfer cash to the poor,

[65] Government of Ghana, *The Coordinated Programme of Economic and Social Development Policies 2017-2024*, p73
[66] https://www.moh.gov.gh/regenerative-health-nutrition/ および *Ghana Demographic and Health Survey 2008*, p206
[67] Government of Ghana (2016), *National Nutrition Policy*, p14
[68] Ministry of Health and Ghana Health Service, *Ghana Reproductive, Maternal, Newborn, Child and Adolescent Health and Nutrition Strategic Plan 2020-2025*, p26
[69] Ghana Education Service (2012), *School Health Education Programme Policy Guidelines*, p15

implemented by the LEAP Secretariat under the Ministry of Gender, Children, and Social Protection, with a total of 213,000 beneficiaries across Ghana as of 2016. The Secretariat is also implementing LEAP 1000 for pregnant women and infants in the Northern (currently divided into the Northern, Northeast, and Savanna regions) and Upper East regions.

4) Ministry of Food and Agriculture

The Food and Agriculture Sector Development Policy (FASDEP II), which was implemented from 2007, aimed to provide hygienic and adequate quantities of food at adequate and affordable prices. The strategy included the introduction of high-yielding and short-season crops; development of processing and storage methods; and improved access to distribution, nutritional enhancement, and dissemination of nutrition and health information. In addition, the Medium-term Agricultural Sector Investment Plan 2014-17 (METASIP II), which was developed under the FASDEP II, planned programs that focused on promoting nutrition-sensitive agriculture (e.g., nutrition education for rural women and children to improve their intake of micronutrient-containing foods, promotion of production and processing, and improvement of food safety), agricultural productivity improvement, etc.

(5) Improvement of Nutritional Status through a Multisectoral Approach in Ghana

In general, it is difficult to say whether a multi-sectoral approach could have contributed to improved nutrition in Ghana. From the interviews with Ghanaian officials, their impression is that Ghana has not been proactive in its multi-sectoral approach to improving nutrition. For example, they recogniszd that the 'battle for leadership' between the NDPC and the GHS was an obstacle to effective collaboration[70]. Consequently, the current status of the multi-sectoral approach is “sharing common targets like SDGs and Global Nutrition Targets” [71].

One-off multi-sectoral initiatives have been developed for nutrition improvement. For example, the SHEP Policy Guidelines and Improving the Nutrition of Rural Households: An Extension Agent’s Handbook were collaboratively formulated by the Women in Agricultural Development (WIAD) of the Ministry of Food and Agriculture, GES, and GHS. However, MOFA does not receive active participation from other ministries and agencies for the development of Food-based Dietary Guidelines for Ghana[72].

As far as the relevant policies and program were reviewed, little emphasis appeared to have been placed on multi-sectoral approach at the implementation stage or in resource mobilization.

(6) Recent Development on the Improvement of Nutrition through a Multisectoral Approach

1) Towards a Full-scale Multisectoral Approach

In 2021, NDPC unveiled the Ghana Multi-Sector Food and Nutrition Security Guidelines with the aim of fully promoting a multi-sectoral approach to improving nutrition. Based on the guidelines, situation analysis, priority setting, formulation of programs, cost estimation, monitoring, and evaluation

[70] From interview with NDPC and JICA MCH-RB Project.
[71] From interview with Family Health Division, GHS.
[72] From interview with WIAD, Ministry of Food and Agriculture.

will be performed by the central (led by NDPC's Cross-sectoral Planning Group and involving the Ministries of Health, Food and Agriculture, Education, Water and Labour, Local Government, Gender, Children and Social Protection, Finance, etc., supported by UNICEF-led SUN-DP[73]), regional (Regional Planning and Coordination Unit: RPCU), and district (District Planning and Coordination Unit: DPCU) levels.

A series of movements towards a multi-sectoral approach appears to have accelerated since the current in-charge of nutrition was appointed in the NDPC.

2） Acceleration of Multi-Sectoral Approach in a Single Ministry

Even in a single ministry and agency, moves to accelerate a multi-sector approach have begun. The RMNCAH&N Strategic Plan 2020-2025 describes "addressing issues of maternal, newborn, child, and adolescent health and nutrition through multi-sectoral collaboration" as a prioritized strategy[74]. Based on this, GHS began collaborating with other ministries to formulate a plan to improve nutrition[75].

3） Addressing Overnutrition and Obesity

As mentioned earlier, Ministry of Health/GHS has started to address overnutrition and obesity as an emerging issue in the RMNCAH&N Strategic Plan 2020-2025. A related initiative is health and nutrition for the elderly, for which a division has been set up within the GHS[76].

(7) Implications to the Improvement of Nutrition

The above-mentioned trends give the impression that multi-sectoral nutrition improvement in Ghana is just beginning. Assessing the effectiveness and impacts of these moves towards multi-sectoral approach in about four years (i.e., 2025), the final year of the current RMNCAH&N Strategic Plan, is crucial.

2.3.3. Major nutrition improvement projects in Ghana

(1) Nutrition Improvement Projects and Multisectoriality

Events from 2008 and 2014 when nutrition indicators improved markedly include Ghana's participation in Scaling Up Nutrition (SUN) and the launch of Renewed Efforts Against Child Hunger and Under-nutrition (REACH) in 2011. These initiatives were expected to facilitate the coordination of various sectors and stakeholders for nutrition improvement. However, according to the joint evaluation of REACH in 2015, they galvanized joint working for planning at regional level, but many plans

[73] SUN-DP is the successor of Renewed Efforts Against Child Hunger (REACH) in Ghana.
[74] Ministry of Health and Ghana Health Service, *Ghana Reproductive, Maternal, Newborn, Child and Adolescent Health and Nutrition Strategic Plan 2020-2025*, pp14-17
[75] From interview with Family Health Division, GHS.
[76] From interview with Family Health Division, GHS. As for nutrition of the elderly, Ministry of Health and Ghana Health Service, *Ghana Reproductive, Maternal, Newborn, Child and Adolescent Health and Nutrition Strategic Plan 2020-2025*, p30.

remained unimplemented due to the lack of financial and institutional capacity[77].

(2) Nutrition Improvement Projects Mainly Implemented by a Single Sector

Apart from REACH, which is described above, many of the key projects for nutrition improvement were implemented by a single sector, or "stand-alone" project.[78]

- Maternal and Child Health and Nutrition Project (2015-2020)

Implementing agencies: World Bank, Ministry of Health/GHS, National Health Insurance Authority

Project type: Stand-alone (health)

The objective of the project development was to improve the utilization of community-based health and nutrition services. The number of children under two years of age who received at least one IYCF visit per month was used as an indicator to evaluate whether the objective was achieved, and improved coverage of essential health and nutrition services at PHC level; capacity building of service delivery at PHC level; improved health literacy and care seeking behavior; and capacity building of monitoring, supervision, mentoring, and evaluation at all levels were the outputs needed to achieve the project development objective. Lessons from the project include the project design using lessons from previous projects, existing data, as well as the implementation structure of PHC, importance of constant political commitment to PHC, and necessity of a holistic investment in PHC.

- Maternal and Child Survival Program (2016-2019)

Implementing agencies: USAID

Project type: stand-alone (nutrition education in health)

The program targeted 21 districts in three regions (Central, Upper East and Upper West) to develop evidence-based early childhood development (ECD) materials tailored to the Ghanaian context, to build the capacity of community-based health planning and services (CHPS) staff, community health volunteers, and social welfare officers and create an enabling environment at the national and regional levels to promote institutionalization of ECD activities into government planning.

Lessons from the program include the importance of developing materials that use the community's mother tongue, necessity to find ways to further motivate and encourage mothers to attend the training sessions e.g., training mothers to serve a "co-facilitator" role, highlighting the effectiveness of the "cascade model" of training, demonstrating the activities and including practice opportunities in the training, and emphasizing the importance of the participation and contribution

[77] Joint Evaluation of Renewed Efforts Against Child Hunger and under-nutrition (REACH) 2011-2015, Commissioned by the Office of Evaluation of WFP, FAO, UNICEF, WFP, WHO and DFATD Canada

[78] In the list of nutrition-related projects, the following four categories (devised by the study team) were included based on the type of intervention: 1) "integrated type," in which multi-sectoral activities are implemented in a single project; 2) "combined type (1)," in which nutrition-specific and nutrition-sensitive interventions are combined and implemented in the same target area; 3) "combined type (2)" in which only nutrition-sensitive interventions are combined and implemented in the same area; and 4) "single type" of intervention by a single sector only (in practice, this does not qualify as multi-sectoral).

of male caregivers to their behavioral change in the home and facilitating mothers' attendance at the training.

- MEALS4NCDs[79] : Measuring the healthiness of Ghanaian children's food environments to prevent obesity and non-communicable diseases (2019-2021)

  Implementing agencies: IDRC Canada and University of Ghana

  Project type: Stand-alone (nutrition education)

  MEALS4NCDs aimed to prevent obesity and nutrition-related NCDs and provide information on healthy and unhealthy foods through television, stores, and schools. The project developed the following work packages:

  - Food Promotion Module: to analyze the dissemination of information on food and beverages
  - Food Provision Module: to collect data on and assess the quality of foods distributed in the market
  - Community Readiness Model: to complement the data from the Food Promotion and Food Provision Modules.

- Project for Improving the Continuum of Care for Mothers and Children through the introduction of a combined MCH Record Book: MCH-RB Project (2018-2022)

  Implementing agencies: JICA

  Project type: stand-alone (nutrition education in health)

  The MCH-RB Project aims to improve the health and nutrition of mothers and children for the first 1,000 days of life, as well as the well-being of mothers, children and entire families throughout the course of their lives by integrating nutrition improvement services into the continuum of care for mothers and children using the MCH Record Book, which has been rolled out in Ghana since 2018.

  Nutritionists play an important role in nutrition counseling using illustrations and information in the MCH Record Book (including the information on the height and weight of a child recorded in the Book) based on the living conditions of MCH Record Book users and foods available to them. Agricultural extension workers and school health teachers are rarely involved in the counseling.

- Project for Strengthening Community-Based Health Services Focusing on the Life-Course Approach in the Upper West, Upper East, and Northern Regions: 2017-2022

  Implementing agencies: JICA

  Project type: stand-alone (nutrition education in health)

  The Project targets three regions in Northern Ghana, namely the Northern, Upper East, and Upper West (currently 5 regions, namely Northern, Northeast, Savanna, Upper East and Upper West) to improve nutrition and health for all age groups, based on PHC in line with a national strategy called

[79] https://www.meals4ncds.org/en/

Community-based Health Planning and Services (CHPS). The interventions include the prevention of overnutrition, obesity and nutrition-related NCDs and production of videos to introduce healthy foods and diet.

2.3.4. Lessons learned from implementing the nutrition policy and nutrition improvement project in Ghana

Tables 2-7 and 2-8 summarize lessons for the implementation of activities for nutrition improvement from the aspects of policies and specific projects in Ghana, compared with typical lessons and challenges from previous nutrition improvement practices. The lessons on enabling environment are compiled in Table 2-7 in accordance with the framework proposed by Black et. al. (2013), whereas Table 2-8 lists those on project design and implementation that are not included in the enabling environment[80].

[80] Items that are not in Black et. al. (2013) but are considered to be important (e.g., target setting of a project) are included.

Table 2-6: Lessons learned on enabling environment in Ghana

Item	Sub-Item	Typical Lessons and Challenges from Previous Projects	Experiences in Ghana	Related Policy
Inter-sectoral coordination	**Policy**	The core function of REACH should remain the facilitation and coordination of country-level multisectoral nutrition responses, rather than technical assistance or support. REACH should develop a medium-term vision, strategies, and an operational plan.	[Relevance and Effectiveness of REACH] - Stakeholder- and activity mapping in three northern regions galvanized multisector working at the regional level. However, plans remained unimplemented as funding institutional capacity was lacking. - The lack of understanding on how REACH would complement SUN generated considerable initial confusion and affected the degree of ownership of REACH.	National Nutrition Policy

Table 2-7: Lessons learned on project design and implementation in Ghana

Item	Sub-Item	Typical Lessons and Challenges from Previous Projects	Experiences in Ghana	Related Project
Project design			Strengthening PHC systems, including the delivery of health and nutrition services requires a holistic investment in areas such as essential medicines, commodities, equipment, and infrastructure.	Ghana - Maternal, Child Health and Nutrition Project (World Bank)
Advocacy	**Leadership**		Consistent political commitments to PHC results in improvements in service delivery and utilization of maternal and child health and nutrition.	Ghana - Maternal, Child Health and Nutrition Project (World Bank)

2.4. Mozambique

2.4.1. Trends in key nutrition-related indicators in Mozambique

First, the nutritional status of Mozambique is overviewed.

Regarding the nutritional status of children under five years of age, each indicator is improving slowly (Figure 2-22). The prevalence of stunting and wasting improved from 50.7% to 42.3% and 8.1% to 4.4% between 2001 and 2015, respectively. However, the prevalence of stunting remained high at 42.3%. As for overweight, which indicates overnutrition, the prevalence decreased from 8.8% to 7.0% between 2001 and 2015, but it has been worsening since 2008.

Regarding the nutritional status of adults (18 years and older) (Figure 2-23), there has been the percentage of underweight (BMI < 18.5) men and women has decreased steadily (from 15.5% to 12.6% for men and 12.8% to 9.9% for women between 2000 and 2016). In contrast, the percentage of overweight population (BMI ≥ 25) has increased continuously (from 13.0% to 18.0% for men and 23.7% to 33.6% for women over the same period) [81].

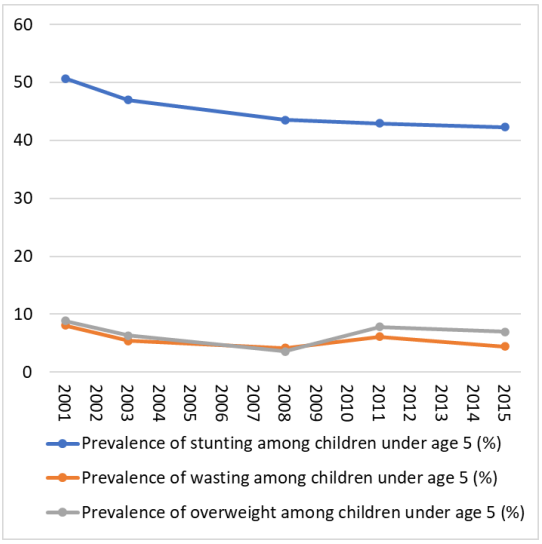

Figure 2-22: Trends in key nutrition-related indicators in Mozambique (Children under 5 years old)

Source：Global Nutrition Report

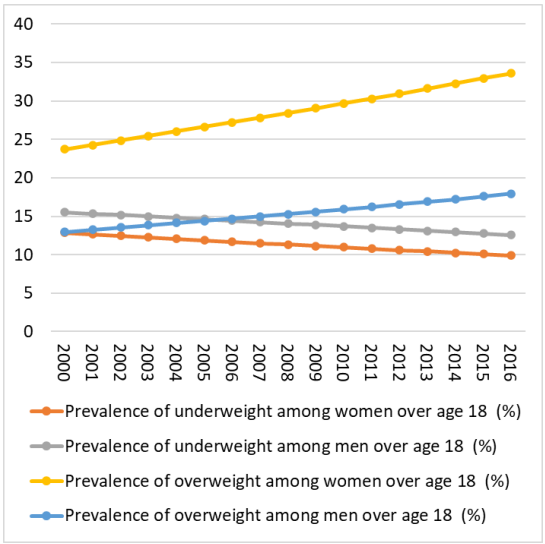

Figure 2-23: Trends in key nutrition-related indicators in Mozambique (Adults aged 18 years and older)

Source：Global Nutrition Report

[81] The trend of overweight and obesity (BMI>=30) among adloscents between 15 and 19 years of the age is not mentioned, but it is same as that of adults.

The rate of anemia among women aged 15-49 years decreased slightly from 50.4% to 49.7% between 2000 and 2009, but then increased slightly to 51.0% in 2016 (Figure 2-24), with no significant change.

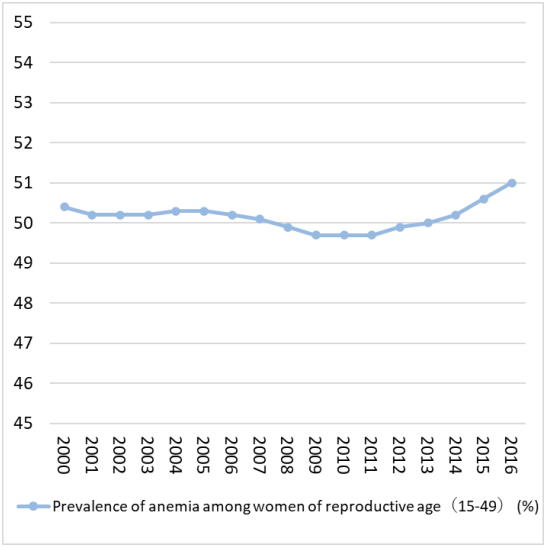

Figure 2-24: Anemia among women of reproductive age in Mozambique

Source：Global Nutrition Report

（1） Diet and care

Next, the trends in the factors affecting the nutritional status observed above are reviewed.

The Minimum Acceptable Diet (MAD), Minimum Dietary Diversity (MDD), and Minimum Meal Frequency (MMF) are only available for 2011, and their trends cannot be captured. However, each of the three are lower than the global standard (Figure 2-25). The incidence of early initiation of breastfeeding increased from 63.8% in 2003 to 76.7% in 2011, but decreased by 7.7% in 2013. The percentage of mothers who breastfeed exclusively increased from 28.7% in 2003 to 41.0% in 2013 (Figure 2-26).

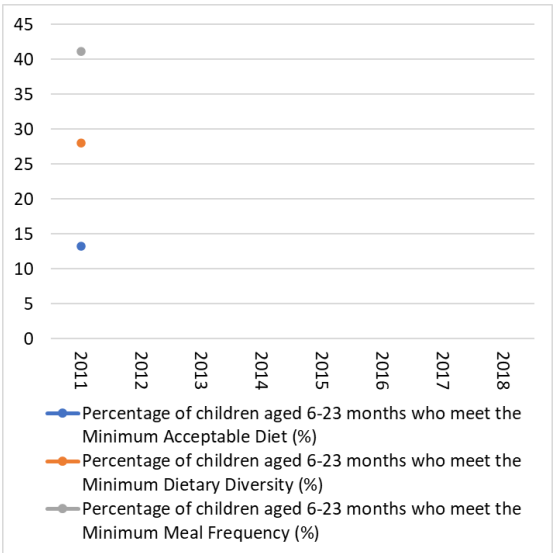

Figure 2-25: Trends in key feeding indicators in Mozambique (Children under 5 years old)

Source: Global Nutrition Report

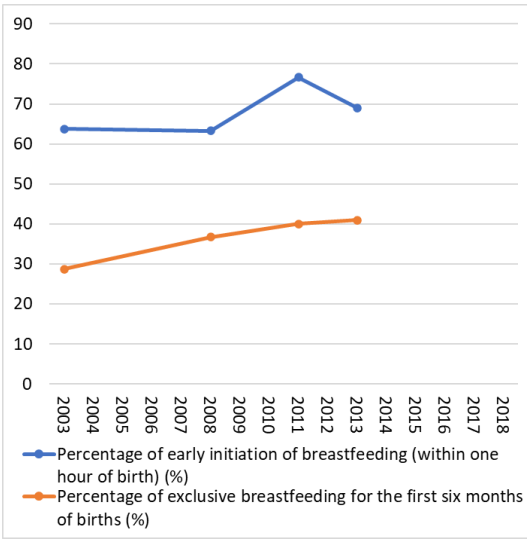

Figure 2-26: Trends in key care indicators in Mozambique

Source: Global Nutrition Report

（2） Health, WASH, and education

Interventions in primary health, WASH, and education are also considered nutrition-sensitive interventions. The percentage of women who received at least one prenatal checkup has remained above approximately 85% since 2003, and reached 94% in 2017 (Figure 2-27). Great improvements in WASH are observed. The percentages of households with access to at least basic water and basic sanitation increased from 21.1% to 63.4% and from 9.1% to 37.2%, respectively (Figure 2-28 and Figure 2-29). The net enrollment rate of women in secondary school increased to 29.1% in 2010, where it has stagnated between 25-30% since 2010 (Figure 2-30). The World Bank (2012) [82] attributes the significant increase in this number between 2001 and 2002 to substantial increases in schools between 2001 and 2003.

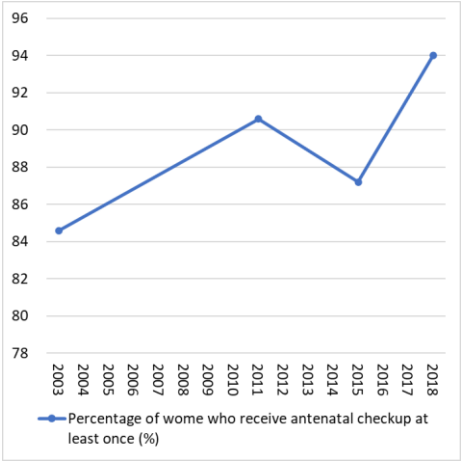

Figure 2-27: Antenatal visits for pregnancy in Mozambique (%)

Source: USAID DHS Database

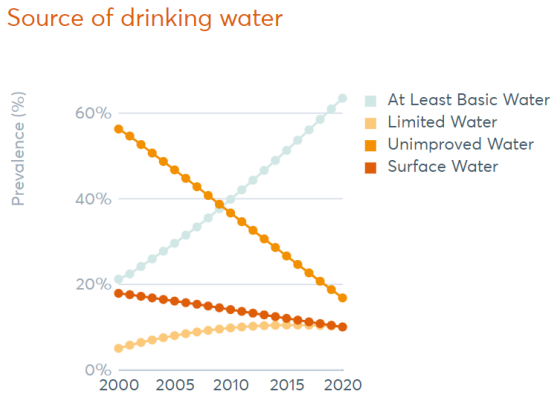

Figure 2-28: Ratio of households by source of drinking water in Mozambique

Source: Global Nutrition Report

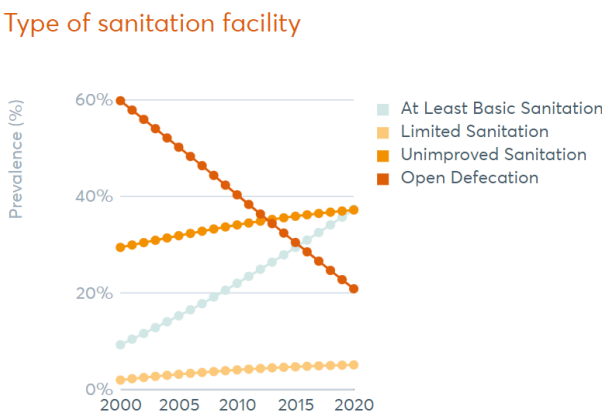

Figure 2-29: Ratio of households by type of sanitation facility in Mozambique

Source: Global Nutrition Report

[82] World Bank (2012), Education Reform in Mozambique: Lessons and Challenges. World Bank; Washington DC.

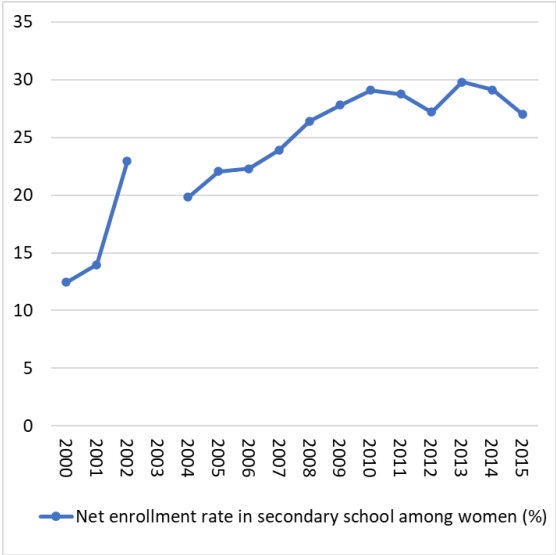

Figure 2-30: Net enrollment rate in secondary school among women in Mozambique (%)

Source: Global Nutrition Report

（3） Economical situation

The GDP per capita (2017 international $, PPP) in Mozambique has been increasing, despite remaining low at 1,281 USD in 2019 (Figure 2-31). It seems that the stagnant growth after 2016 is due to the problem of hidden debt in 2016.

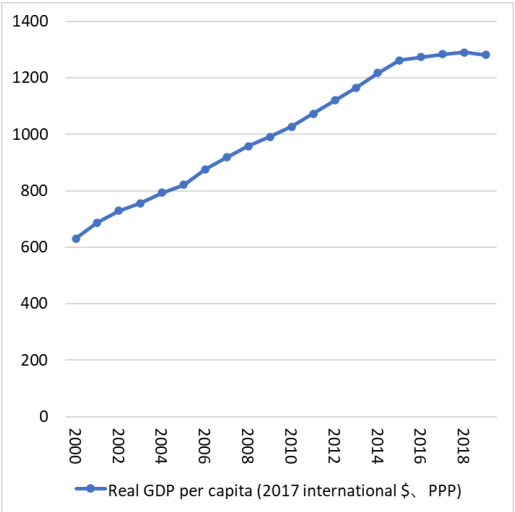

Figure 2-31: Real GDP per capita in Mozambique (PPP, constant 2017 international US$)

Source: World Bank, World Development Indicators

The evaluation report (July 2021) for the Multisectoral Action Plan for the Reduction of Chronic Undernutrition in Mozambique (PAMRDC) (2011-2020) states that while progress has been made in some areas of nutrition, such as health, water, and sanitation, high levels of chronic malnutrition (that is, stunting) persist and anemia and micronutrient deficiencies among women and children remain worrisome. Large geographic and socioeconomic disparities have been reported, with higher rates of stunting and anemia being observed in rural and northern/central regions, and boys are more affected

than girls[83].

2.4.2. Evolution of multi-sectoral nutrition-related policies and programs in Mozambique

Following the 1996 World Food Summit, the Strategy for Food and Nutrition Security (ESAN I), a comprehensive national strategy for food and nutrition security, was developed in Mozambique in 1998. In 2006, the Technical Secretariat for Food and Nutrition Security (SETSAN) was established under the then Ministry of Agriculture. ESAN I was revised to ESAN II (2008-2015) 10 years after its formulation. Within the framework of ESAN II, the Multisectoral Action Plan for the Reduction of Chronic Malnutrition in Mozambique (PAMRDC) (2011-2020) was developed as the principal action plan for improving nutrition. Mozambique's National Five-Year Plan (2015-2019) included the reduction of stunting as one of the indicators of human and social development, and it set a target of 35% by 2020. As of July 2021, the National Policy for Food and Nutrition Security (POSAN) and ESAN III have been drafted and submitted to the Council of Ministers for approval.

（1） Strategy for Food and Nutrition Security (ESAN III) (draft for 2021-2030)

ESAN III[84], long overdue from the final year of the second phase (2015) and awaiting approval, was drafted by the National Council of Food and Nutrition Security (CONSAN) (chaired by the Prime Minister), which was established in 2017 and is presided over by the president. ESAN III, unlike the strategies developed by the agriculture sector for the first and second phases, plans a coordinated framework of interventions by multi-level administrations (central, provincial, and district) and multi-actors (central and local governments, civil society, academic institutions, private sector, and donors and development partners), and aims to promote the coordination and convergence of a range of policies, programs, and sectoral strategies for hunger, food insecurity and malnutrition, as shown in Tables 2-10 through 2-12 below.

The general objective is to “improve Food and Nutrition Security by 2030 by ensuring that all people, children and women in particular, have adequate food on a permanent, sustainable basis within a nationally and internationally recommended standard of acceptable food and nutrition at all stages of life”, which aligns with SDG-2. Compared to the second phase, it emphasizes not only the quantity of food but also its quality, including nutrition. In addition, specific objectives include reducing post-harvest losses, eliminating chronic food insecurity, reducing the incidence of child malnutrition (acute and chronic), reducing anemia in women of reproductive age, and preventing overweight in children. Compared to the second phase, the food-related objectives have been combined into two, and the nutrition indicators of child undernutrition and overnutrition and female anemia have been added. The percentage of stunted children (chronic malnutrition), which was set at 35% by 2020 in the National Five-Year Plan (2015-2019), is aimed be reduced to less than 30% by 2030.

The strategic pillars of the ESAN III are (i) food availability (food production and supply), (ii)

[83] “RELATÓRIO DA AVALIAÇÃO DO PAMRDC (2010-2019)” (July 2021, SETSAN)
[84] “PROPOSTA DA ESTRATÉGIA DE SEGURANÇA ALIMENTAR E NUTRICIONAL (ESAN III)” (July 2021, submitted by SETSAN)

food access, (iii) food use and utilization, (iv) food stability, and (v) financing mechanisms, supported by the cross-cutting pillars of (vi) information systems and (vii) governance[85]. It is structured using the pillars of the second phase, which include the elements of food security ((i) through (iv) above) with additional strengthening of the financial, information, and administrative aspects.

(2) Multisectoral Action Plan for the Reduction of Chronic Undernutrition in Mozambique (2011-2020)

The Multi-sectoral Action Plan for the Reduction of Chronic Malnutrition in Mozambique (PAMRDC)[86] was developed under the leadership of the Ministry of Health and complements the existing nutrition measures in various sectors and is considered the central national action plan for improving nutrition. The general objective was to "accelerate the reduction of chronic undernutrition in children under 5 years of age from 44% in 2008 to 20% in 2020, contributing to the reduction of infant morbidity and mortality and ensuring the development of a healthy and active society" (however, the target for reducing chronic malnutrition was raised to 35% by 2020 in the subsequent National Five-Year Plan (2015-2019)). The PAMRDC focused on setting up a priority package of interventions, complementing the activities contained in other relevant plans and strategies. In particular, it targeted adolescent girls (10-19 years), pregnant and lactating women of reproductive age, and children up to two years of age, with strategic objectives to strengthen nutrition interventions; improve access to and utilization of nutritious foods for households; develop human resources in the field of nutrition; strengthen advocacy, coordination and management capacity in the implementation of nutrition improvement measures at the national level; and strengthen food and nutrition surveillance systems.

The nutrition-related activities specified in the PAMRDC are monitored and coordinated by SETSAN and implemented by the relevant sectors based on their respective plans and programs. The relevant organizations that participate in the PAMRDC are listed in the table below.

Table 2-8: Organizations participating in the PAMRDC (As of July 2021)

Ministries and authorities	Ministry of Agriculture and Rural Development (MADER), Ministry of Health (MISAU), Ministry of Education and Human Development (MINEDH), Ministry of Industry and Commerce (MIC), Ministry of Public Works, Housing and Water Resources (MOPHRH), Ministry of Sea, Inland Water and Fisheries (MIMAIP), Ministry of Gender, Child and Social Action (MGCAS), Secretariat for Youth and Employment (SEJE), National AIDS Council (CNCS), National Institute for Desaster Management and Risk Reduction (INGD), National Institute of Social Action (INAS), etc.
Donors	UNICEF, FAO, WFP, IFAD, USAID, JICA, etc.
Other agencies	Save the Children, Association for Food and Nutrition Security (ANSA), Global Alliance for Improved Nutrition (GAIN), other civil society organizations, private sector, community organizations, etc.

Source: Prepared by the study team based on the questionnaire responses from SETSAN.

[85] As the structure of ESAN III described above.
[86] "MULTISECTORAL ACTION PLAN FOR THE REDUCTION OF CHRONIC UNDERNUTRITION IN MOZAMBIQUE 2011-2015 (2020)" (in English)

In response to the PAMRDC evaluation report (July 2021)[87], SETSAN noted that while many programs have been effective, PAMRDC interventions must be upscaled significantly to achieve the target of a <35% incidence of stunting in the National Five-Year Plan. To further expand the scope of beneficiaries, the allocation of human, material, and financial resources to government agencies that implement interventions in the food and nutrition security must be strengthened. It is also mentioned support for basic human needs (e.g., housing, food, health services, safe water, and improved sanitation) must first be improved to increase the complementarity of each action and program when implementing projects in specific locations. This will require improved participatory planning that involves all stakeholders. This is considered the background for the formulation of ESAN III mentioned above.

（3） Health Sector Strategic Plan (PESS) (2014-2019)

The third PESS (2014-2019) developed by the Ministry of Health aligned with the previously planned PAMRDC and incorporated nutrition under the first pillar of strategic objectives, that is, "more services with better quality". The nutrition program aimed to reduce the number of chronically malnourished children under 5 years of age from 43% in 2011 to 17% by 2019, but as mentioned above, the National Five-Year plan (2015-2019) significantly re-set the target to <35% by 2020. It includes IEC on healthy diets; training specialized community workers to implement education, agriculture and social welfare interventions for health and nutrition; and implementing the PAMRDC. The year 2019 is the final year, but (as of July 2021) it has not been revised to date.

（4） Response to overnutrition

The National Strategic Plan for the Prevention and Control of Non-Communicable Diseases (2008-2014) under the Ministry of Health identifies eating habits as a risk factor for diabetes and breast cancer[88], but the plan has not yet been updated (as of July 2021). A new development in the draft of the Strategy for Food and Nutrition Security (ESAN III) introduced above was to include the prevention of overweight among children under 5 years of age among the specific objectives, which is to be reduced from 7.9% in 2011 to <5% in 2030. It is noteworthy that activities intended to prevent overnutrition will not be limited to the single sector of health.

（5） Other nutrition-related policies and programs

Other than the above, relevant policies, strategies, action plans and/or programs identified by SETSAN that are linked to food and nutrition, are listed in the tables below[89].

[87] "RELATÓRIO DA AVALIAÇÃO DO PAMRDC (2010-2019)" (July 2021, SETSAN)
[88] "PLANO ESTRATÉGICO NACIONAL DE PREVENÇÃO E CONTROLO DAS DOENÇAS NÃO TRANSMISSÍVEIS PARA O PERÍODO 2008-2014"
[89] Some of the implementation periods have passed the final year, but those that have not been renewed may continue with the content of the plan even now.

Table 2-9: Food and nutrition security-related policies

Agenda 2025	Nutrition is on the health sector's agenda and the need to increase the number of human resources with nutritional knowledge is emphasized, as is the need to improve food security.
Disaster Management Policy	It mentions the need to ensure food security in the event of disasters and adverse shocks. Social protection (e.g., Food for Work, job creation, etc.) is also included.
Population Policy	It mentions the importance of maternal and child health, the role of women in society (gender equality), education, access to health care, and distribution of resources. It also discusses growth without infrastructure (e.g., sanitation), inadequate hygiene practices, and environmental problems (including water).
National Policy for Neonatal and Child Health	It recognizes the need for a multi-sectoral approach, and focuses on several nutrition-related indicators and targets.
National Environmental Policy	It encourages the better use of the country's fishing potential to promote the production of protein-rich foods, reduction of losses, and cooperation between other ministries and the fisheries sector.
National Breastfeeding Policy	It has several nutrition-related indicators.
Fisheries Policy and Implementation Strategies (PPEI)	The objective is to align fisheries with national development goals. It aims to develop fisheries, contribute to food security, improve the diet of the people, and increase exports.

Source: Prepared by the study team based on the questionnaire responses from SETSAN.

Table 2-10: Strategies

Rural Development Strategy	It recognizes nutrition as the weakest area in human development. It promotes aquaculture and subsistence fisheries that contribute to the production of nutritious food. It promotes combating malaria, respiratory diseases, and HIV, as well as prenatal care, and women's access to land. Water treatment and regulation are strategic actions.
Integrated School-Age Child Development Strategy	Nutrition a major contributor to child mortality. It considers inadequate nutrition, infections, and early pregnancy to be the main causes of high chronic malnutrition. It recognizes that investments in early childhood have important benefits for child development.
Family Planning Strategy	It recognizes that family planning plays an important role in child nutrition and infectious disease control.
Strategic Plan for Urban Poverty Reduction	It emphasizes employment promotion and social protection, including loans to farmers, public works for water and sanitation infrastructure, and food subsidies. It mentions the correlation between large family size and low consumption per capita (including food consumption).
National Water Resources Management Strategy	Drinking water, sanitation, water for food security, and rural development are recognized as challenges in water resource management. The need for inter-sectoral coordination and the importance of women's participation in the development and implementation of public policies are recognized. Securing water for aquaculture is among the priorities.
Strategic Plan for the Ministry of Women and Social Action	High chronic malnutrition impacts both individuals and the nation significantly, resulting in high morbidity and mortality rates among children under the age of five and limiting child development, school performance, adult productivity, and overall development. High HIV/AIDS infection rates negatively affect education, nutrition, and health levels.
Gender Strategy	It recognizes that food and nutrition security can contribute to poverty reduction and

in the Agricultural Sector	sets specific strategic objectives.
National Strategic Plan for the Response to HIV and AIDS (PEN III, 2010-2014)	It points out the paucity of integrated programs related to HIV/AIDS-related food and nutrition insecurity, and includes nutritional support for people living with HIV/AIDS.
Strategic Plan for Development of the Agricultural Sector (PEDSA, 2011-2020)	It covers comprehensive interventions in the agricultural sector for food and nutrition security, and specific actions on nutrition are identified. It mentions that agriculture is essential for food security. Climate uncertainty and drought, especially in semi-arid areas, are cited as contributing factors to food and nutrition insecurity.
Education Strategic Plan	It mentions that high rates of malnutrition have a negative impact on the cognitive development of school-aged children, and it recognizes that a balanced and appropriate diet is essential for student retention and school performance. It states that nutritional status is directly related to poverty and lack of knowledge about nutrition, and that a multisectoral approach is needed to combat malnutrition.
National Development Strategy	High rates of chronic malnutrition are closely related to poverty, and nutrition is considered as a key issue for improving health indicators. It advocates integrated solutions that improve sanitation, nutrition, and environmental conditions. Food security in agriculture, fisheries, and aquaculture as a means to improve the people's diet, and investment in infrastructure and sanitation are considered important.

Source: Prepared by the study team based on the questionnaire responses from SETSAN.

Table 2-11: Action plans & programs

Food Production Action Plan (PAPA, 2008-2011)	It is among the plans that mobilized the most national and local leaders. Among the pillars of food and nutrition security, "food availability" was identified as the one that deserves the most attention.
National Investment Plan for the Agricultural Sector (PNISA, 2013-2017)	It contributes to reducing weaknesses in agricultural systems that reduce the national capacity to secure adequate food.
National Program for Food Fortification (PNFA, 2011-2015)	A program designed by the government to respond to changes in national nutrition indicators.
National School Feeding Program (PRONAE, 2013-2014/20)	A program developed by the Ministry of Education to mitigate fragile food and nutrition security and its impact on school attendance.

Source: Prepared by the study team based on the questionnaire responses from SETSAN.

（6） Multi-sectoral coordination of nutrition-related policies in Mozambique

Nutrition-related activities specified in PAMRDC, the core national action plan for multi-sectoral nutrition improvement, have been monitored and coordinated by SETSAN through the National Technical Working Group for PAMRDC (GT-PAMRDC), and implemented by relevant sectors based on their respective plans and programs. The GT-PAMRDC is chaired by SETSAN, the national body for the coordination of nutrition-related activities, and involves all relevant ministries and agencies, including agriculture, education, health, public works, gender and social action, and industry, as well as development partners and civil society (as shown in Table 2-8). In cases of disagreements among member agencies in implementing sectoral actions, the GT-PAMRDC will seek the decision of higher-

level organizations depending on the issue[90].

The provincial SETSAN is responsible for coordinating and monitoring the implementation of PAMRDC at the provincial level. The provincial SETSAN focal points are placed under the Provincial Department of Agriculture and Food Security to coordinate, plan and monitor activities through the Provincial GT-PAMRDC. SETSAN plans to replicate the same structure at the district level and establish district SETSAN focal points, but as of November 2017, this effort is underway in only two provinces, while in other provinces, the provincial SETSAN focal points are facilitating and coordinating activities at the district level[91].

Through the coordination and implementation of multi-sectoral nutrition-related activities by GT-PAMRDC, the SETSAN cites improved understanding of the multi-sectoral approach and improved planning processes as achievements. The GT-PAMRDC was also responsible for preparing the annual PAMRDC report to be considered by the Council of Ministers, which has strengthened the multi-sectoral accountability process[92]. At the sub-national level, for example, in the province of Niassa, joint trainings were held on food and nutrition for infant feeding, nutrition education, and school gardens with a focus on PRONAE (school feeding program), along with the production and preservation techniques for nutritious food[93]. In addition, all stakeholders participated in various debriefing sessions, and some provinces conducted joint field monitoring so that corrective actions could be taken during program implementation[94].

On the other hand, although the GT-PAMRDC usually meets twice a month (at least once a month and an annual debriefing in Niassa), or whenever the need arises, ensuring the continuous participation of member agencies in the meetings has been difficult. In each organization, the technical staff who organizes the GT-PAMRDC has changed frequently and moved to other organizations, causing the working group to stagnate. Other challenges were the lack of timely provision of sectoral information for the preparation of the PAMRDC annual report, and difficulty in securing the budget for holding GT-PAMRDC meetings and monitoring interventions across the country[95].

The PAMRDC was led by the Ministry of Health, but its implementation was coordinated by the GT-PAMRDC and it was chaired by the SETSAN under the Ministry of Agriculture and Food Security. In other words, different agencies took leadership in the planning and coordination phases. Although the Ministry of Health transferred the coordination function from the single-sector to SETSAN, which is comprehensively responsible for food and nutrition security, the fact that SETSAN is under the single-sector by the Ministry of Agriculture and Food Security, at least until the mid-term review of PAMRDC in 2015, has made effective inter-sectoral coordination difficult. Until the mid-term review of PAMRDC in 2015, there was a view that SETSAN was under the Ministry of Agriculture and Food Security, which is also a single sector, making effective sector coordination difficult. However,

[90] Questionnaire response from SETSAN
[91] http://scalingupnutrition.org/sun-countries/mozambique/
[92] Questionnaire response from SETSAN
[93] Questionnaire answer from SETSAN focal point in Niassa Province
[94] Questionnaire response from SETSAN
[95] Questionnaire response from SETSAN

according to SETSAN, both the formulation of PAMRDC and coordination by GT-PAMRDC were facilitated using multi-sectoral mechanisms, and all relevant ministries and agencies participated in both the planning and coordination phases, so no major problems were caused by the difference between the planning and coordination agencies. Since 2017, the National Food and Nutrition Security Council (CONSAN), presided over by the President, has given SETSAN more authority, which may have increased the level of coordination[96].

On the other hand, the more technical coordination related to nutrition was slightly difficult at times. Unlike SETSAN, which is a multi-sectoral coordinating body, the coordination within a single sector by the Ministry of Health, which had more nutrition experts, led to more technical disagreements on nutrition among the experts in turn. In other sectors, nutrition-related issues are so complex that basic, sometimes scientific, knowledge of the issue is required for each sector, and non-specialist SETSAN staff can experience obstacles to multi-sectoral coordination[97]. According to the advisor expert dispatched by JICA between 2019 and 2020, the SETSAN has three technical divisions (policy planning, information service, and improvement promotion) in its organization, where the functions of policy planning, training and education, research and study, administrative guidance, and information service are partially assigned, but the roles of each division are not fully fulfilled. Although the organization is large, more than half of the staff are in administrative departments, and the technical staff is very poor. Although three to five staff members are assigned to individual technical departments, their technical level is insufficient due to their lack of background in food and nutrition and the short number of years they have been assigned. In addition, it was pointed out that the head of each department lacks expertise and cannot provide direction and guidance to the staff[98].

(7) Strengthening the implementation of multi-sectoral nutrition improvement activities at the sub-national level

In Mozambique, the core national action plan for multi-sectoral nutrition improvement, PAMRDC, and a working group mechanism, GT-PAMRDC, to coordinate its implementation, have been established at the central and provincial levels. CONSAN has given SETSAN more authority, and the challenges of inter-sectoral coordination seem to have been overcome, at least at the central level.

However, the progress in improving children and women's undernutrition, which has been the target of PAMRDC, has been slow and is far from achieving its goals. Strengthening the functional coordination and implementation of nutrition improvement activities at the sub-national level seems to be essential to significantly expand PAMRDC interventions and increase the scope of the beneficiaries. In this regard, the placement of PAMRDC focal points as well as the establishment of GT-PAMRDC at the district level have been desired for some time. Responding to this, the drafted ESAN III, which is awaiting approval, will be based on ensuring good coordination among all actors at different sub-national levels (provincial, district, and municipal). Just as CONSAN encouraged SETSAN and GT-

[96] Questionnaire response from SETSAN
[97] Questionnaire response from SETSAN
[98] Completion report of expert services (Expert: Toru Rikimaru) (December 2020)

PAMRDC at the national level, its establishment (provincial council) for provinces and CODSAN (district council) for districts is planned as the policy authority for food and nutrition security, which could strengthen the coordination mechanism for multi-sectoral nutrition improvement activities at all sub-national levels by working with diverse stakeholders.

While not a case of a functioning provincial (or district) GT-PAMRDC, JICA's "Project on Promoting Sustainability in Rural Water Supply, Hygiene and Sanitation in Niassa Province" (2013-2017) had reducing diarrhea cases and improving environmental sanitation as one of its objectives. Although the project did not undertake direct activities related to nutrition, it actively worked to revitalize the provincial GAS (Water and Sanitation Group), which brings together members from various sectors such as health, agriculture, education, and environment. For example, through the GAS, the project collaborated with the provincial health, education, and environment departments to install water fountains and sanitary blocks in elementary schools. This may have contributed in some way to the nutritional status of the residents in the target areas[99].

（8） Realization of the convergence approach through JICA projects

In previous nutrition improvement projects in Mozambique, each project was isolated and often combined multiple nutrition interventions within the same project or single-sector projects were made more nutrition-sensitive. In contrast, in addition to the "Project on Promoting Sustainability of Water Supply System and Sanitation in Niassa Province", which started in FY2021, JICA planned to develop a nutrition service model based on the Maternal and Child Health Handbook and a technical cooperation project on household-level food and nutrition security and livelihood improvement, respectively, in the same province during the same period. The plan is an attempt to adopt a convergence approach, in which projects across the sectors of water, hygiene and sanitation, health, and agriculture will be implemented simultaneously in the same area. Although the projects are all realized within JICA, they are expected to provide lessons for implementing the convergence approach within the framework of GT-PAMRDC.

Responding to this, the advisor who was dispatched to SETSAN until December 2020 comments that disseminating the current model is difficult because there is no evidence that the program contents were considered for dissemination outside the target area in the process of forming the multi-sectoral program. As each project progresses, the contents that can be disseminated in a simplified model will need to be identified[100].

The drafted ESAN III, which is awaiting approval as of July 2021, also clearly states the need to promote collaboration and "convergence" of various policies, programs, and sectoral strategies to address malnutrition, with the different levels of food and nutrition security councils at the core: CONSAN (national/central); COPSAN (provincial); and CODSAN (district). In addition to planning within the same agency, JICA, the challenge is to plan for convergence with other donors and

[99] Questionnaire responses from Project C/P
[100] Completion report of expert services (Expert: Toru Rikimaru) (December 2020)

government agencies.

Based on the above trends, multi-sectoral nutrition improvement in Mozambique may be moving away from the stage of developing a coordination mechanism for plans by different agencies towards a stage of functional coordination at sub-national level and strengthening the implementation of nutrition improvement activities at a level closer to that of the communities.

To upscale PAMRDC interventions and further expand the range of beneficiaries, the need arises to increase the complementarity of actions and programs and ensure that support for basic human needs (e.g., shelter, food, health services, safe water, improved sanitation facility, etc.) is provided first when implementing projects in specific locations (convergence). In addition, information, education, and communication (IEC) or nutrition education on dietary habits linked to PESS, which was the health sector's plan to implement PAMRDC, and training specialized community workers to implement education, agriculture, and social welfare interventions as well as health care are also important. It is also recommended that each institution participating in the SETSAN and ESAN III frameworks at the central and other levels (especially at the district level) should increase the number of nutrition professionals (e.g., dietitians).

2.4.3. Major nutrition improvement projects in Mozambique

● Orange-fleshed Sweet Potato (2006-2009)

(Implementing agency: HarvestPlus/World Vision/Helen Keller Foundation/EMBRAPA), Combined Type (1): Agriculture + health + hygiene)

This project introduced vitamin A-enriched sweet potatoes to Uganda and Mozambique. Agricultural and nutritional extension workers disseminated the product with group education on topics related to agriculture, health, hygiene, such as storage, marketing, and sanitation, as well as production methods.

● Renewed Efforts Against Child Hunger and Undernutrition (REACH) initiative (2008-)

(Implementing agency (partners): United Nations (WFP, FAO, WHO, UNICEF), Advisory: IFAD, Combined Type (1): Health + agriculture + multi-sectoral planning)

This is a UN initiative to assist participating countries in strengthening the governance and management of nutrition programs. Mozambique joined in 2011.

● Artisanal Fisheries Promotion Project (ProPESCA) (2011-2019)

(Implementing agency: IFAD, Single Type: Fishery)

The project objective was to increase revenues from fish sales for fishers and small-scale sellers to improve the incomes and livelihoods of poor households engaged in fishing in Mozambique. All levels of the value chain were targeted, including fishing operations, fish transportation, handling and processing, marketing, and sales.

● Accelerating Nutrition Improvements (2012-2016)

(Implementing agency: WHO/Ministry of Health/Global Affairs Canada, Combined Type (1): Health)

This project aimed to strengthen information collection systems on nutrition implemented in 11 countries in sub-Saharan Africa. Dissemination of intervention guidelines, increasing the capacity of communication health workers, support provision for evidence-based nutrition interventions, and updating of databases on the implementation of nutrition actions were implemented.

2.4.4. Lessons learned from implementing the nutrition policy and nutrition improvement project in Mozambique

The lessons learned from implementing nutrition policies and projects in Mozambique to date are presented in Table 2-12 and Table 2-13 below, in comparison with typical lessons and challenges in implementing nutrition improvement activities. In Table 2-12, lessons related to the enabling environment are organized in accordance with the framework of Black et. al (2013). Table 2-13 shows the lessons learned in project design and implementation that are not included in the enabling environment.

Table 2-12: Lessons learned on the enabling environment in Mozambique

Major entries	Sub-entries	Typical lessons learned and challenges associated with nutrition-related projects	Current situation and experiences in Mozambique	Corresponding projects and policies
General/Whole		Plan to avoid overlap in areas of responsibility and agencies between different initiatives.	There is a large overlap in areas and persons-in-charge in some initiatives.	PAMRDC
General/Whole		1. Establish a clear and common framework for the policy implementation process. 2. Clarify the role of the multi-sectoral coordinating body and the meaning of collaboration (what is and how it is to be done).	What and how SETSAN should coordinate within the framework of PAMRDC was unclear.	PAMRDC
Inter-sectoral coordination	**Leadership**	Establish a clear authority at the top of single sectors to ensure that the plan is implemented.	Preparing and approving a strategic document does not guarantee meaningful implementation of the plan.	REACH
Inter-sectoral coordination	**Setting policy issues**	Conduct joint surveys and debriefings to promote a common understanding of nutrition among different disciplines.	The reason for the different opinions is that different professionals interpret the same word in different ways. When different sectors with different educational backgrounds come together, they may use the same word in different ways.	PAMRDC
Inter-sectoral coordination	**Setting policy issues**	Review and revise the content and methods of collaboration regularly.	The disagreement in policy making is due to the fact that each agency focuses on different contents and methods of collaboration.	PAMRDC
Inter-sectoral coordination	**Existence of a coordinating body**	Establish a specialized coordinating body at the top of single sectors, or transfer authority from a higher body.	One of the reasons for the confusing nature of the discussion in the multi-sectoral approach to nutrition improvement is that all coordination responsibilities are left to a single agency. At the same time, this may be due to the tendency to seek both the original role of the coordinating body and the role of "collaboration".	PAMRDC
Inter-sectoral coordination	**Effective coordination mechanism**	Even if the core agency at the time of planning is the single health sector, a more appropriate agency should be set up to facilitate multi-sectoral coordination.	An informal working group called "Nucleus", consisting of officials from the Ministry of Health, UN agencies, and NGOs, took the initiative to develop PAMRDC and provided support to SETSAN. The transfer of leadership of the PAMRDC from the Ministry of Health to SETSAN came about at the request of "Nucleus".	PAMRDC
Capacity		Technical experts identify their own role in making a multi-sectoral policy system work.	Technical experts do clearly understand their role in policy. They only understand one part of policymaking and not what is needed for the system to function.	PAMRDC

Major entries	Sub-entries	Typical lessons learned and challenges associated with nutrition-related projects	Current situation and experiences in Mozambique	Corresponding projects and policies
Capacity		It is important to strengthen the following capabilities. ➢ Understanding the mechanism and significance of coordination and collaboration among various related organizations and the work required in the implementation process. ➢ Communication, facilitation, advocacy, follow-up functions, and specialized nutrition skills by a central coordinating body. ➢ Increase planning capacity and nutrition human resources at the provincial level.	(i) Repeated absences from various meetings of GT-PAMRDC have reduced the quality of follow-up work and tasks. (ii) SETSAN's communication and facilitation skills are low, and the work does not proceed smoothly. (iii) SETSAN should serve as an advocacy and follow-up function based on the decisions of GT-PAMRDC. (iv) While it is satisfied that SETSAN leads PARMDC, it lacks capacity in carrying out certain roles. (v) To improve the lack of planning capacity at the provincial level, training is needed, and human resources should be increased.	PAMRDC
Capacity	**Resources**	Resources for nutrition improvement efforts need to be secured by existing sectoral budgets.	The resources for nutrition improvement efforts are provided from the existing budgets of each sector.	Accelerating Nutrition Improvements
Capacity	**Domestic resources**	Each implementing agency secures the necessary funds to implement the plan at the national and sub-national levels.	The promotion of national and sub-national plans remained unimplemented due to lack of funds.	REACH
Capacity	**Training**	Support sector ministries in their planning processes and prioritize nutrition in their plans in addition to the coordinating body. In addition, support and strengthen the planning process at the sub-national level.	In addition to the agency responsible for coordination, sector ministries were supported in their planning processes to ensure that nutrition is prioritized in sector plans. Planning manuals are also being used at the provincial level to facilitate the planning process.	REACH
Advocacy		The coordinating body facilitates discussions on policy functions that need to be coordinated, but having strategies to increase implementation capacity in cases where the implementing agencies are different is necessary.	The coordinating body must facilitate discussions on policy functions that need to be coordinated. Both strategic capacity (advocacy and informal governance) and implementation capacity are important for a multi-sectoral administration.	PAMRDC

Major entries	Sub-entries	Typical lessons learned and challenges associated with nutrition-related projects	Current situation and experiences in Mozambique	Corresponding projects and policies
Project design	**Targeting**	Mapping stakeholders and activities guides decision-making on the geographic targeting of interventions and resource allocation.	Mapping stakeholders and activities guided decision-making on the geographic targeting of interventions and resource allocation.	REACH

Table 2-13: Lessons on project design and implementation learned in Mozambique

Major entries	Sub-entries	Typical lessons learned and challenges associated with nutrition-related projects	Current situation and experiences in Mozambique	Corresponding projects
Horizontal coordination	**Local ownership**	Working with community groups and associations improves the interventions' sustainability after the project ends.	Working with women's groups or other self-help groups and unions improves the sustainability of the interventions after the project ends.	Accelerating Nutrition Improvements
Horizontal coordination	**Local ownership**	Increase community participation in nutrition improvement efforts by conducting consultation meetings at various levels.	Consultation meetings need to be held at different levels to increase community participation in the project.	Accelerating Nutrition Improvements
Capacity	**Training**	Training all health care workers, not just specific professionals or health workers, improves the sustainability of nutrition improvement activities after the project ends.	Training all health care workers in the target health centers improves the sustainability of nutrition improvement activities after the project ends.	Accelerating Nutrition Improvements
Project design	**Targeting**	Interventions required by the health, agriculture, and water and sanitation sectors to introduce timely complementary feeding will be incorporated into the activity plan.	Since the introducing timely complementary feeding requires the intervention of all three sectors - health, agriculture, and water - it can be a starting point for collaboration among these sectors.	Project planning in Niassa Province by JICA
Combination of activities at the field level	**Health**	Integrating project interventions into the existing health systems can improve the sustainability of interventions at a low cost.	Integrating the project activity into the existing health system (observation by community health teams, support by health care facilities, and growth monitoring in early childhood clinics) can improve the sustainability of the intervention at a low cost.	Accelerating Nutrition Improvements
Combination of activities at the field level	**Agriculture and health**	Promote nutrition improvement activities at the community level by combining frontline workers and strengthening their capacity from both agricultural and health sectors.	Extension activities were conducted by pairing male agricultural extension workers and female nutritional extension workers to provide group education on topics related to agriculture and nutrition, including production methods and storage of nutritionally enhanced sweet potato, marketing, IYCF, and hygiene.	Orange-fleshed Sweet Potato

Major entries	Sub-entries	Typical lessons learned and challenges associated with nutrition-related projects	Current situation and experiences in Mozambique	Corresponding projects
Combination of activities at the field level	**Health and education**	Incorporate key nutrition improvement messages into school curricula and other youth activities to improve the nutrition of the youth and disseminate the messages to their families and communities.	Recruiting youth as disseminators of key messages for improved nutrition has the dual benefit of improving the youth's nutrition and disseminating the message to their families and communities.	Accelerating Nutrition Improvements
Combination of activities at the field level	**Fishery and agriculture**	By providing nutritional interventions to fisherfolk, the beneficiaries can extend the shelf life of foodstuffs and improve their diets by making them more food secure throughout the year.	Nutritional interventions for the fisherfolk included home gardens, cooking demonstrations using locally available ingredients, nutrition education radio programs, and nutrition education in schools. Processing and preservation techniques enabled the beneficiaries to extend the shelf life of foodstuffs, resulting in year-round food availability and increased vegetable consumption.	ProPESCA
Combination of activities at the field level	**Fishery and gender**	By improving food storage and cooking methods, people will not only be able to consume more nutritious food, but they will also be able to increase their income and buy more nutritious food by selling it with added value.	The couples or wives attended nutritional training and changed the way they stored and cooked fish to make it more nutritious. They used to eat cassava flour, but now that their income has increased, they are able to buy rice, chicken, and beef.	ProPESCA
Combination of activities at the field level	**Fishery and agriculture**	In low-income countries that are heavily dependent on staple foods, fisheries are important nutritional sources, and improved post-landing processing will reduce losses in both quantity and quality. Locally available agricultural products can be used to diversify nutrient sources at low cost.	Fish is a highly perishable commodity, and improving post-landing processing for reducing losses in both quantity and quality (nutrition) is crucial. Locally available agricultural products can be used to diversify nutrient sources at low cost.	ProPESCA

2.5. Nigeria

2.5.1. Trends in key nutrition-related indicators in Nigeria

（1） Nutritional status

Figure 2-32 shows the trends in the key indicators of under and over-nutrition among under-five-year-olds in Nigeria. The stunting rate among under-five-year-olds decreased slightly from 42% in 2003 to 37% in 2018, but the reduction has been low and remained high throughout this period. The wasting rate showed an improving trend from 2008 (14%) to 2018 (7%). Overweight, which indicates overnutrition, was 10% in 2008 and decreased to 3% in 2011. It has remained low since then.

Figure 2-33 shows the trends of the key indicators of nutritional status among adults (18 years and older). The percentage of underweight men and women (BMI < 18.5) decreased consistently from 2000 to 2016. On the other hand, the percentage of the population that is overweight (BMI > 25) has increased continuously over the same period. The percentage of overweight women is also higher than that of men.

The anemia rate among women of reproductive age (15-49 years) was 50% as of 2016, even though it has been decreasing between 2000 and 2016, and remains as high as before (Figure 2-34)

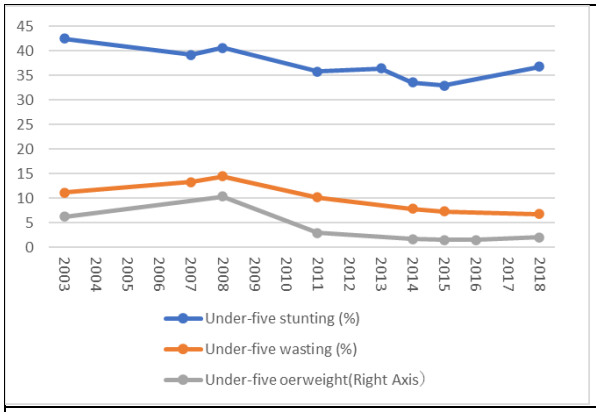

Figure 2-32: Trends in key nutrition-related indicators in Nigeria (Children under 5 years old)

Source: Global Nutrition Report

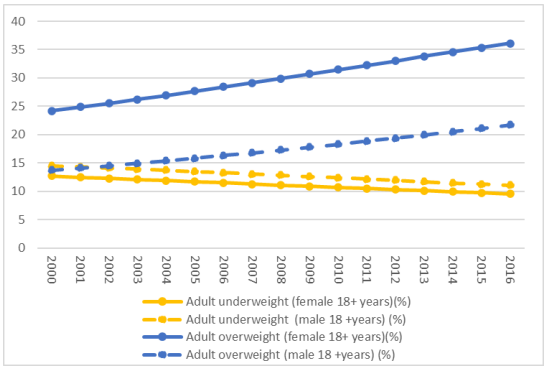

Figure 2-33: Trends in key nutrition-related indicators in Nigeria (Adults 18 years and older)

Source: Global Nutrition Report

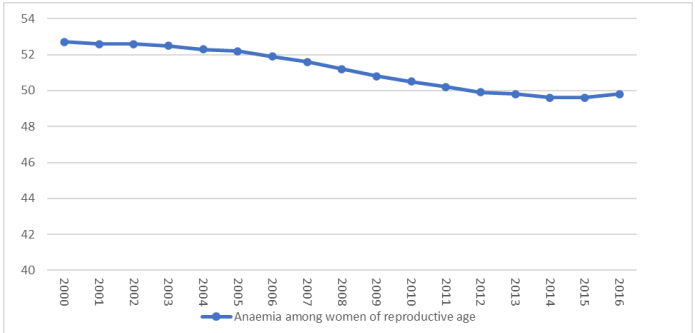

Figure 2-34: Anemia among women of reproductive age in Nigeria

Source: Global Nutrition Report

（2） Feeding and care

This section reviews the trends in the factors that affect nutritional status. Figure 2-35 shows the trends in key indicators related to feeding at under 2 years of age. The minimum meal frequency has been improving, and has increased from about 24% in 2011 to 42% in 2018. Minimum diet diversity also improved between 2013 and 2018, but it remains low at 22% as of 2018. The minimum acceptance diet has also remained very low at about 10% between 2013 and 2018.

Figure 2-36 shows the trends in indicators related to childcare. Early initiation of breastfeeding has hovered around 30% since 2003 but has improved since 2016. The rate of exclusive breastfeeding was approximately 11% in 2007, but had improved to 29% by 2018.

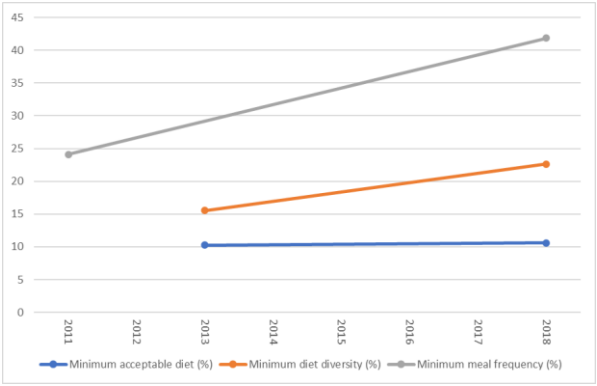

Figure 2-35: Trends in key feeding indicators in Nigeria (Children under 5 years old)

Source: Global Nutrition Report

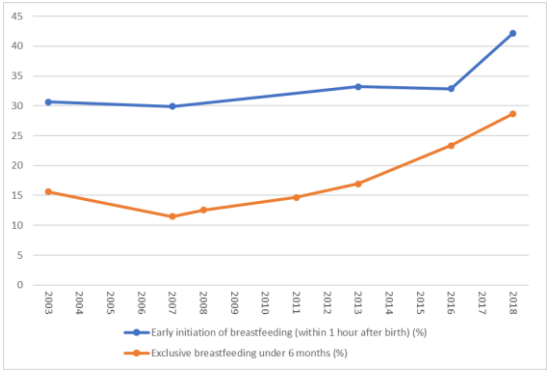

Figure 2-36: Trends in key care indicators in Nigeria

Source: Global Nutrition Report

（3） Health, Water and Sanitation, Education

Figure 2-37 shows the percentage of pregnant women who received at least one prenatal checkup as an indicator for the health sector, which exhibited an upward trend between 2007 and 2018.

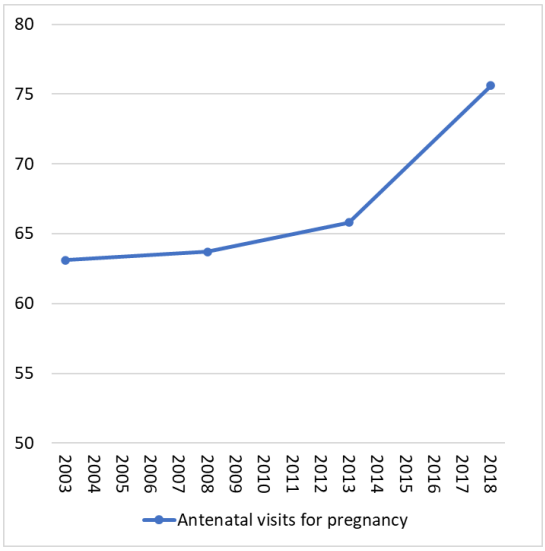

Figure 2-37: Antenatal visits for pregnancy in Nigeria (%)

Source: USAID DHS Database

Figure 2-38 shows the trend in the percentage of households with access to different sources of drinking water. In 2000, 43.1% of households had access to both safely managed water and Basic water, but the percentage had risen to 77.6% by 2020. Figure 2-39 shows the trend in the percentage of households by type of sanitation facility. The number of households with access to safely managed sanitation and basic sanitation increased from 28.6% to 42.7% between 2000 and 2020.

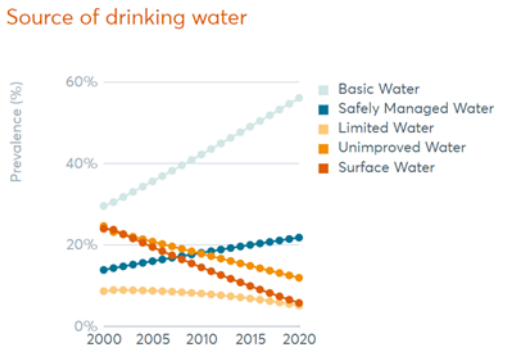

Figure 2-38: Ratio of households by source of drinking water in Nigeria
Source: Global Nutrition Report

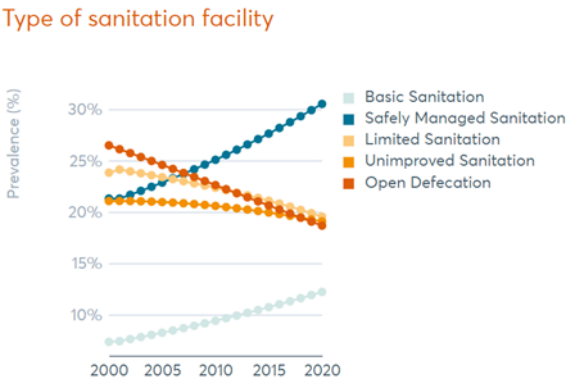

Figure 2-39: Ratio of households by type of sanitation facility in Nigeria
Source: Global Nutrition Report

Figure 2-40 shows the trend of women's net enrollment rate in secondary school in Nigeria as an indicator of education level. It has been increasing since 2000.

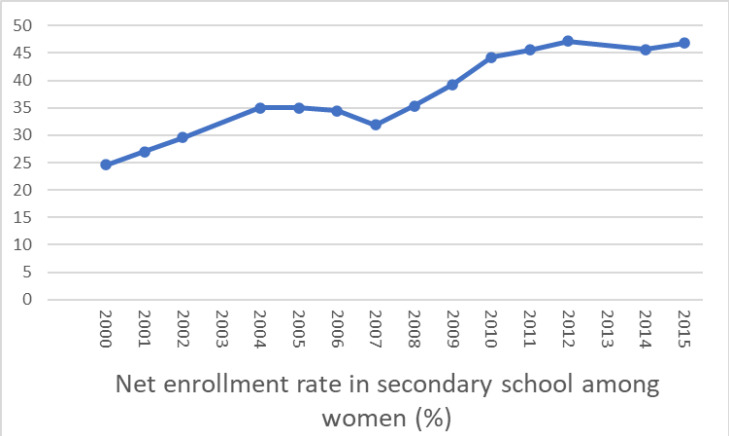

Figure 2-40: Net enrollment rate in secondary school among women in Nigeria (%)

Source: Global Nutrition Report

(4) Income level

Figure 2-41 shows the trend of Real GDP per capita in Nigeria (PPP, constant 2017 international US$). It increased significantly between 2000 and 2014, but has been on a downward trend since 2015.

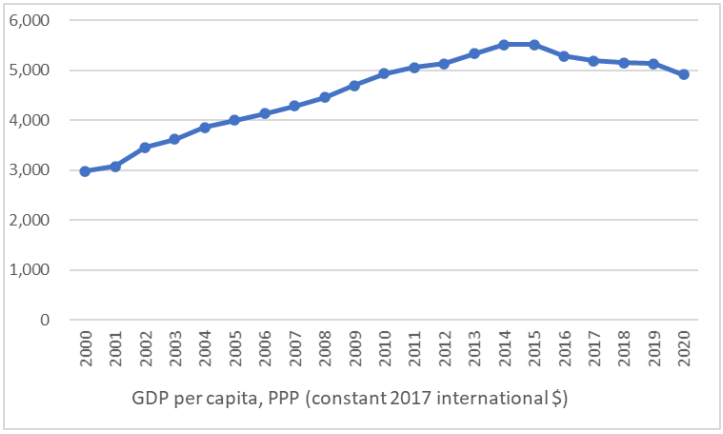

Figure 2-41: Real GDP per capita in Nigeria (PPP, constant 2017 international US$)

Source: World Bank, World Development Indicators

2.5.2. Evolution of multi-sectoral nutrition-related policies and programs in Nigeria

The following sections describe the transition and current status of multi-sectoral nutrition-related policies and programs in Nigeria since 2004.

（1） National Policy on Food and Nutrition

The National Policy on Food and Nutrition was formulated in 2004 and was the first nutrition policy in Nigeria. The policy was developed in coordination with the policies of nine relevant sectors[101], including the health, agriculture, and science and technology sectors. The main policy objectives of the policy are listed below. The health, sanitation, and education sectors are also identified as key areas of action, but the overall focus falls more on food security and poverty reduction without explaining the relationship between food security, health, and environmental sanitation activities.

- Improved food security at the household and national levels
- Improved household capacity to care for their children in terms of breastfeeding, child-care practices, and maternal care
- Improved delivery of human services, including health care, environmental sanitation, education, and community development
- Improved national capacity to address food and nutrition issues
- Increased understanding of malnutrition issues at all levels of society

The policy also states that the National Committee on Food and Nutrition (FCFN) [102]will serve as the coordinating body for nutrition-related policies.

[101] 1. Health Sector Nutrition Policy, Agricultural Policy, Science and Technology Policy, National Policy on Education, Social Development Policy, Rural Development Policy, Women in Development Policy, Mass Communication Policy, Industrial Policy

[102] The NCFN was established in 1990 under the Ministry of Health and was transferred to the National Planning Commission (NPC) in 1994.

（2） National Plan of Action on Food and Nutrition

The National Plan of Action on Food and Nutrition, which intended to achieve the goals of the National Policy on Food and Nutrition, was launched in 2005. The Action Plan set the following targets for 2010, and the Project Implementation Agency (PIA), which includes representatives from relevant ministries and agencies, was responsible for the monitoring and evaluation of these targets.

- A 10% reduction in poverty levels
- Minimization of hunger and chronic hunger by increasing food intake
- Reduce undernutrition among children, women, and the elderly, especially under-five-year-olds, by 30%
- Reduction in micronutrient deficiencies, especially iodine deficiency
- Reducing the proportion of low-birth-weight babies to less than 10% of the current level
- Reducing NCDs attributable to diet by 25%
- Improve general sanitation, including the provision of safe drinking water.
- Reduce the prevalence of infectious and parasitic diseases that exacerbate poor nutrition in infants and children to 25% of the current level.

However, this action plan was not fully implemented due to a lack of funding and ineffective coordination and monitoring of policy implementation[103]. As mentioned in the previous section, the nutrition situation in Nigeria did not improve during this period and the action plan was terminated in 2010.

（3） National Strategic Plan of Action for Nutrition

In 2014, a new strategy, the National Strategic Plan of Action for Nutrition (NSPAN), was developed to improve the nutritional status of Nigeria. The following areas have been selected as priority areas in this strategy.

- Nutrition for pregnant and nursing mothers
- Nutrition for infants and young children
- Reduction of severe acute malnutrition in children under 5 years of age
- Micronutrient deficiency control
- Diet-related NCDs
- Nutrition information systems

NSPAN was implemented for five years until 2019, during which time indicators such as stunting, reduction in low birth weight, and anemia in women did not change. However, the Ministry of Health believes that NSPAN has made some progress in improving nutrition as the wasting rate

[103] National Food and Nutrition Policy (2016).

decreased from 14% in 2008 to 7% in 2018, and the percentage of full breastfeeding has also increased during this period[104].

However, it has been noted that NSPAN has contributed little to improving nutrition due to the following implementation problems[105].

- In addition to the Ministry of Health, the Ministry of Agriculture and Ministry of Budget and National Planning (MB&NP) took the lead role in NSPAN and planned multi-sectoral activities that went beyond the health sector, but there was little inter-ministerial coordination.
- As a result, NSPAN became a comprehensive program within the health sector and not a comprehensive nutrition improvement activity that included the agriculture and education sectors[106].
- Since few states introduced and implemented NSPAN, the plan was only partially implemented.
- Neither the federal nor the state governments had sufficient budgets for nutrition activities, and even when they did, some activities were not implemented.

(4) Revision of the National Food and Nutrition Policy

A major revision of the National Food and Nutrition Policy was undertaken in 2016, and the following factors were cited as the reason behind this revision[107].

- The results of the 2013 Demographic Health Survey (DHS) revealed very high levels of wasting and stunting rates (approximately 18%), as well as deficiencies in certain micronutrients such as vitamin A, anemia, and iodine.
- The Ministry of Budget and National Planning set up a committee of stakeholders to review the initial draft of the 2004 nutrition policy, but it became clear that the policy failed to achieve its initial goals due to delays in implementation, lack of funding, and poor coordination.
- It was also found that the policy formulated in 2004 was outdated as it did not consider new concepts and issues, such as the framework for improving nutrition through the efforts of other sectors and agencies, the increase in NCDs, and the first 1,000 days[108]. Although Nigeria joined the SUN movement in 2011, there was a clear divergence from the comprehensive and effective nutrition policy framework recommended by SUN.
- The fact that nutrition is a necessary condition for national development was growing more widely recognized, as enshrined in the Millennium Development Goals (MDGs).

[104] According to an interview with the Ministry of Health. Ngozi S. Onuora, a nutrition expert at UNICEF's Rivers Field Office, expressed similar views. Reviewing Nigeria's National Strategic Plan of Action for Nutrition (2014–2019) https://nigeriahealthwatch.medium.com/fundnutritionng-reviewing-nigerias-national-strategic-plan-of-action-for-nutrition-2014-2019-55b493bf5049

[105] Reviewing Nigeria's National Strategic Plan of Action for Nutrition (2014–2019).

[106] Reviewing Nigeria's National Strategic Plan of Action for Nutrition (2014–2019).

[107] Shaping national food and nutrition policy in Nigeria 2016, National Food and Nutrition Policy(2016) and the interview with MB&NP.

[108] The first 1000 days is the period between conception and the second birthday. UNICEF and WHO suggest that proper nutrition during this period is important for future health maintenance.

The revision of the National Food and Nutrition Policy was developed through the following three meetings to ensure ownership by the relevant national agencies[109].

- State level meetings
- A technical meeting at the national level
- A validation meeting where all the committee members participated

1） **Policy targets**

The National Food and Nutrition Policy of 2016 aims to achieve the following targets by 2025. We can see that it covers a wide range of activities in the food, health, water and sanitation, and education sectors, and also includes measures related to overnutrition, such as obesity and NCDs.

- A 50% reduction in the proportion of people with chronic hunger and malnutrition
- Increase the rate of full breastfeeding to 65%
- An increase in the proportion of children aged 6 months and older receiving adequate complementary nutrition to 40%
- A reduction in the rate of stunting in children under five to 18%
- A reduction in the incidence of childhood wasting syndrome, including severe acute nutritional disorders, to 10%
- Achieving and maintaining universal household access to iodized salt
- To increase the rate of zinc supplementation for diarrhea control to 50% of children who require it
- Increasing the percentage of children who receive anthelmintics to 50%
- Reducing the incidence of anemia among pregnant women to 40%
- A reduction of 25% in the prevalence of diet-related NCDs
- Increasing vitamin A supplementation to 65%
- Increasing the number of households with knowledge and practice of nutrition by 50%
- Increasing access to potable water to 70%
- Increasing the number of relevant ministries at all levels with functional nutrition units by 75% by 2017.
- Reducing the incidence of malnutrition among victims of emergencies by 50%
- Mainstream nutrition targets into the social protection and safety net programs of all nutrition-related ministries by 2020
- Ensure that all school children in pre-school and basic classes have access to school-based feeding programs
- Stop the rise of obesity in adolescents and adults

[109] This process took more than a year, as convening a meeting with all the stakeholders was difficult due to the Boko Haram issue, as was raising funds for the meeting. Shaping national food and nutrition policy in Nigeria https://www.ennonline.net/shapingnationalfoodandnutritionpolicyinnigeria

2） Implementing organizations of nutrition policy

The 2016 National Food and Nutrition Policy states that the National Council on Nutrition (NCN), Ministry of Budget and National Planning (MB&NP), National Committee on Food and Nutrition (NCFN), federal ministries, state ministries, and local governments have their respective roles in implementing nutrition policy. The MB&NP and State Committee on Food and Nutrition (SCFN) at the federal and provincial levels, respectively, and the Local Government Committee on Food and Nutrition (LGCFN) at the local level will coordinate with other stakeholders, including the relevant ministries. The main roles of these agencies are as follows[110].

i) National Council on Nutrition (NCN)

The NCN is the highest decision-making body on food and nutrition in Nigeria, chaired by the Vice President of the Federal Government and consists of ministers from relevant ministries, governors of Nigerian states, and representatives of private organizations. The Council also meets every other year.

ii) Ministry of Budget and National Planning (MB&NP)

The MB&NP will serve as the national focal point for planning and coordinating food and nutrition policy related programs in Nigeria[111]. The MB&NP will also serve as the secretariat for the National Committee on Food and Nutrition (NCFN) and NCN, and liaise with the state secretariats and provide a forum for regular interaction. The specific coordination roles include the following.

- The Under-Secretary of the MB&NP will chair the NCFN, convene NCFN meetings, and prepare an annual report on progress regarding food and nutrition.
- The Nutrition Partners Forum, national working groups, and sub-committees on food and nutrition will be established and meet regularly (at least quarterly).

iii) National Committee on Food and Nutrition (NCFN)

The NCFN was established within the MB&NP to provide technical support to MB&NP in the implementation of the nutrition policy. The NCFN committee members comprise members of relevant ministries and nutrition-related programs and have the following mandates.

- Provide necessary technical and professional assistance and support to the Secretariat (MB&NP).
- Propose and review policies and programs that may affect food and nutrition on an ongoing basis.
- Advise on appropriate actions for monitoring and evaluating policies and programs.

iv) State Committee on Food and Nutrition (SCFN)

The SCFN was established within the State Planning Ministry to implement the nutrition

[110] National Food and Nutrition Policy (2016).

[111] The MB&NP has a unique role as a government agency responsible for the coordination and monitoring of all national policies and programs, including the budget process.

policy programs in each state, and the members of its committee are selected from representatives of nutrition-related ministries, agencies, and the private sector. The State Planning Ministry has a Secretariat, which is responsible for the administration of the State Nutrition Program. The SCFN is headed by the Under-Secretary of the Ministry or equivalent, and the State Nutrition Officer is the Executive Director.

- Provide the necessary technical support to the Secretariat within the State Planning Department to plan and implement nutrition related programs.
- Ensure adequate funding in state development plans.
- Propose and review programs that may affect food and nutrition issues on an ongoing basis.
- Ensure effective implementation of the respective area of each representative on the committee.
- Advise on the implementation of the monitoring and evaluation of nutrition programs.
- Assist the State Planning Department (or equivalent agency in the State) to set up and maintain a database of nutrition activities.

The LGCFN is responsible for implementation and coordination of nutrition policy in the district and is established within each district government. LGCFN membership and its primary duties are the same as those of SCFN.

3） **Monitoring and evaluation**

The National Food and Nutrition Policy of 2016 clearly states that monitoring and evaluation practices will be conducted by the NCFN and overseen by the MB&NP. The main duties of the NCFN in monitoring and evaluation are as follows.

- Collect and collate relevant data from the relevant federal, state, and local ministries.
- Incorporate the above data into the national monitoring and evaluation database.
- Prepare an annual report on how the implementation of policy objectives and achievement of targets as stated in the nutrition policy are progressing.

In addition, the planning, research, and statistics departments of the relevant ministries and agencies will collect the data necessary for monitoring and evaluation, and submit them to the NCFN[112].

The state planning manages and coordinates the monitoring of nutrition policies in each state.

（5） National Multi-Sectoral Plan of Action for Food and Nutrition 2021-2025 (MNPFAN)

The National Multi-Sectoral Plan of Action for Food and Nutrition (MNPFAN), a multi-

[112] The results of the Nigeria Demographic and Health Survey (NDHS), UNICEF Multiple Indicator Cluster Surveys (MICS) など will be used for monitoring and evaluations.

sectoral plan of action involving 14 ministries and agencies to achieve the policy objectives of the National Food and Nutrition Policy revised in 2016, is currently being prepared under the leadership of MB&NP. The final version of the plan is expected to be released by the end of 2021.

Based on this plan, a coordination committee at the federal level organized by the MB&NP will meet every three months starting in September 2021, and a mid-term review will be conducted in 2023 to confirm the plan's progress. Each state will also develop its own action plan using the MNPFAN as a basis.

（6） Characteristics and challenges of multi-sectoral coordination in nutrition

The characteristics and challenges of multi-sectoral coordination in Nigeria's nutrition policy as of 2021 include the following points.

- Political commitment to nutrition policy is improving

Since joining the SUN Movement in 2011, donors, NGOs, and others have increased awareness and understanding of nutrition within the government, and the current administration has shown more interest in multi-sectoral efforts to improve nutrition compared to the past. The current administration is more interested in multi-sectoral efforts to improve nutrition than before.[113]

- Limitation of the authority and capacity of the MB&NP

As the coordinating body for nutrition policy in Nigeria, the MB&NP is responsible for ensuring consistency with the nutrition-related activities of ministries and agencies, as well as monitoring and evaluating nutrition-related goals and activities; however, it does not have the authority to make budgetary decisions. Therefore, it does not provide financial incentives to ministries and agencies to implement nutrition improvement activities[114].

In the absence of authority in the budget, it can be said that the main function of the BNNC is to educate and advocate for the relevant ministries. In fact, it has been pointed out that the understanding and motivation of relevant ministries and agencies towards nutrition has increased through the revision of the National Food and Nutrition Policy and the creation of MNPFAN[115].

The National Plan of Action on Food and Nutrition (2005-2010) and the National Strategic Plan of Action for Nutrition (2014-2019) emphasized the importance of multi-sectoral efforts and their coordination. Despite the importance placed on multi-sectoral efforts and their coordination in the Action on Food and Nutrition (2005-2010) and the National Strategic Plan of Action for Nutrition (2014-2019), inter-agency coordination was ineffective, which contributed to the limited results of both plans.

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[113] However, when the current draft of the National Food and Nutrition Policy was prepared in 2015, there was testimony that it was very difficult and time-consuming to gain support for the nutrition policy amendment from the newly formed administration (National food and nutrition policy in Nigeria（2016).

[114]Even on the basis of the National Policy on Food and Nutrition 2004, the implementation of nutrition activities was limited due to the absence of a budget line in the nutrition sector. Therefore, the federal government is seeking a specific budget line to fund the action plan. The President has instructed the relevant ministries to establish a budget line for nutrition activities, but this has not yet been achieved.（Shaping national food and nutrition policy in Nigeria www.ennonline.net/shapingnationalfoodandnutritionpolicyinnigeria）

[115] According to the interview with the Ministry of Agriculture.

Even now, inter-ministerial coordination is difficult and the formulation of MNPFAN is taking longer than originally planned. It has also been pointed out that MB&NP still lacks the experience and capacity to effectively coordinate nutrition policies[116].

- The agricultural sector's contribution to the nutrition policy is unclear[117]

It has been pointed out that the National Food and Nutrition Policy and MNPFAN do not sufficiently reflect the importance of the agricultural sector in improving nutrition. For example, among the policy objectives of the National Food and Nutrition Policy, the only one related to the agricultural sector is "2. minimize hunger and chronic hunger by increasing food intake," and the promotion of fortified foods by the Ministry of Agriculture was not included in the objectives of the policy or MNPFAN[118].

- Lack of commitment of state governments to nutrition policy

In the National Strategic Plan of Action for Nutrition (2014-2019), only a few states introduced and implemented it, so the plan was only partially implemented, which limited its contributions to improving nutrition.

Since most of MNPFAN's activities are expected to be implemented at the state level with the budget of the state government, implementing the plan requires the state governments to ensure their commitment and ownership of the nutrition policy. In the revision of the National Food and Nutrition Policy, state-level meetings were held to educate state governments on the importance of nutrition policy, and the State Committee on Food and Nutrition (SCFN), the coordinating body for nutrition policy at the state level, was established.[119]

2.5.3. Major Nutrition Improvement Projects in Nigeria[120]

- Maximizing Agricultural Revenue and Key Enterprises in Target Sites (MARKETS Nigeria) (2005-2012)

(Implementing agency: USAID, Integrated Type: Farming + household improvement + nutrition education)

The project aims to increase food security, agricultural productivity, and income in the northern region of the country, where the nutritional situation is poor. The project activities consist of the following three components.

- ✓ Business skills (market information gathering, business planning, value-added creation,

[116] According to the interview with the Ministry of Agriculture
[117] According to the interview with the Ministry of Agriculture
[118] The promotion of fortified foods is included in the Agriculture Sector Food Security and Nutrition Strategy (2016 - 2025), a strategy for the agriculture sector.
[119] According to the interview with MB&NP
[120] In the list of nutrition-related projects, four categories (devised by the study team) were applied based on the form of the intervention: 1) "integrated type," in which multi-sectoral activities are implemented in a single project; 2) "combined type (1)," in which nutrition-specific and nutrition-sensitive interventions are combined and implemented in the same target area; 3) "combined type (2)" in which only nutrition-sensitive interventions are combined and implemented in the same area; and 4) "single type" in which only a single sector is involved (in practice, this does not qualify as multi-sectoral).

financial planning, pricing)

- ✓ Household management (household asset management, cost-benefit analysis)
- ✓ Nutrition practices (breastfeeding, weaning, balanced diet, cooking, hygiene)

The project trained female facilitators using experimental learning techniques based on USAID's custom-designed nutrition and household asset management modules. It also implemented capacity building in 14 Community Based Organizations (CBOs) in the target areas, including training in activity planning and the design of monitoring and evaluation tools.

According to the evaluation report of the project[121], the main outcomes of the project were as follows.

- ✓ In total, 98% of project participants reported an increase in women's income.
- ✓ The practice of full breastfeeding increased from 20% before the start of the project to 75% at the end.
- ✓ The percentage of people who wash their hands with soap increased from 46% before to 99% at the end of the project.
- ✓ The number of people owning their own vegetable gardens increased from 27% to 95%.
- ✓ The report also states that the following conclusions can be drawn from the evaluation results:
- ✓ As a result of the project, the awareness of the project participants has shifted from a symptomatic approach to the crisis to household food access and long-term planning. An integrated approach to business, household finances, and nutrition was appropriate to facilitate behavioral changes among food-insecure households.
- ✓ There were two notable changes in the increase in income earned by women.

1) Women are now better able to invest in food for their families and save for unforeseen circumstances.

2) Women's empowerment has been promoted as they are now able to manage household assets and make important decisions regarding food security.

In addition, the following lessons were learned from implementing this project.

- ✓ In this project, activities were conducted in collaboration with organizations already working in the field, and capacity building activities were also performed for these organizations to improve the sustainability of the project outcomes. Among the capacity building activities, those related to monitoring and evaluating the activities were particularly useful, as community organizations became more aware of the need to provide quality services through proper monitoring and evaluation.
- ✓ People's behaviors related to food and nutrition are often related to personal values, community beliefs, and cultural norms. Therefore, working on these beliefs and norms in addition to providing information on food and nutrition is essential to promote changes in food and nutrition behaviors.

[121] USAID MARKETS Livelihood and Household Nutrition Activity Assessment (2012).

- ✓ Women's empowerment programs are intended to benefit women, but the benefits must be understood by male community members and they must not feel threatened by the activities.

- Child Development Grant Program (2013-2019)

(Implementing agency: UKAID, Integrated Type: Cash transfer + nutrition education)

In two northern states of Nigeria, more than 90,000 pregnant women were targeted with an unconditional cash transfer and a campaign to promote nutrition counseling and behavioral changes. The implementing agencies were Save the Children and Action Against Hunger.

Along with the cash transfer, a nutrition education program was provided to communities participating in the program. In the nutrition education program, two approaches were tested:

1. Low-intensity education programs: education programs through posters, radio messages, text messages, lectures on healthcare and health, and food demonstrations.
2. High-intensity education programs: education programs that provide one-on-one counseling to the women receiving support.

According to the project evaluation report[122], the following outcomes and behavioral changes were observed as a result of the project being implemented.

- ✓ The proportion of stunted children decreased in households that received cash transfers.
- ✓ In the communities where the education program was implemented, 51% of women who were pregnant at the end of the program received prenatal checkups, compared to 36% in the other communities.
- ✓ The incidence of diarrhea and the percentage of children who were sick or injured decreased, and the percentage of children who received deworming medication at the end of the program compared to before it began increased.

In addition, the effectiveness of the low-intensity and high-intensity educational program[123] interventions implemented in this project did not differ significantly. It is suggested that the above "low intensity" approach is sufficient to enhance the people's knowledge and facilitate behavior changes.

On the other hand, women were more likely to attend health talks and cooking demonstrations in the community, whereas men were more likely to recall messages from radio announcements. Because men and women access messages in different ways, we conclude educational programs should be offered through multiple channels.

- Project on Capacity Development for Nutrition Improvement in Federal Capital Territory. (2019 -2024)

(Implementing agency: JICA, Integrated Type, Nutrition + Hygiene + Agriculture + Livelihood

[122] Oxford Policy Management, Child Development Grant Program endline evaluation (2017).
[123] See the note above.

Improvement)

The project aims to develop an effective approach to improving nutrition through food and build a multi-sectoral system in the Federal Capital Region through the development of manuals and guidelines for improving nutrition and strengthening the capacity of extension workers.

In the first phase (2019-2021), the project developed approaches based on the sectors of nutrition and health, agriculture, and livelihood improvement to improve the quality and quantity of diets and diversify the types of diets to be inoculated, mainly for households with pregnant women, infants under two years of age, and their mothers. The main counterpart agencies involved in these three areas are the Agricultural Women's Unit of the Department of Agriculture, the Agricultural Extension Unit of the Department of Agriculture, and the Department of Primary Health Care. Initially, it was difficult to get these agencies to work together. To address this, the project has established a multi-sectoral implementation system and is working to establish a mechanism for collaboration among different ministries and agencies. For example, the Department of Primary Health Care provides advisory services on crops to be grown through nutritional guidance, and the Agricultural Women's Group provides classes on cooking and processing the crops.

In the second phase (March 2021-February 2022), the residents who received training in the first phase are continuously provided with training in the abovementioned sectors as well as practical cultivation training to further consolidate their knowledge and skills. In addition, the residents with good participation rates in the training and cultivation performance in the field during the first phase are appointed as leaders and share their knowledge and skills with the newly selected residents.

2.5.4. Lessons learned from the nutrition policy and nutrition improvement project implementation in Nigeria

The lessons learned from the implementation of nutrition policies and projects in Nigeria to date are presented in Table 2-15 and Table 2-16 below, in comparison with the typical lessons and challenges in implementing nutrition improvement activities. In Table 2-15, lessons related to the enabling environment are organized according to the framework of Black et. al (2013). Table 2-16 shows lessons learned in project design and implementation that are not included in the enabling environment.

Table 2-14: Lessons learned on enabling environment in Nigeria

Major entries	Sub-entries	Typical lessons learned and challenges associated with nutrition-related projects	Current situation and experiences in Nigeria
Leadership		Direct involvement at a high level of the executive branch (presidential or prime ministerial level) is important.	Prior to 2015, the administration's understanding and interest in nutrition policy was low, but after 2015, this understanding was gained, leading to the National Policy on Food and Nutrition being revised and MNPFAN being developed as a multi-sectoral action plan.
Policy	**Setting policy issues**	Creating a single narrative about the severity of malnutrition can help to set clear policy goals.	The National Food and Nutrition Policy, revised in 2016, is a policy document that better articulates the relationship between nutrition improvement and broader sectoral activities, moving away from the policy's previous bias toward food security. Awareness-raising activities by the SUN movement, in which Nigeria participated in 2011, promoted the government’s understanding of multi-sectoral nutrition improvement.
Horizontal coordination	**Existence of a coordinating body**	The main roles of the coordinating body are to facilitate interagency cooperation, promote effective allocation of funds, monitor progress, and facilitate the participation of other stakeholders in the decision-making process.	In the National Plan of Action on Food and Nutrition (2005-2010) and the National Strategic Plan of Action for Nutrition (2013-2019), there was little interagency coordination, which contributed to the limited contribution of these action plans to improving nutrition.
Incentives	**Financial incentives**	In nutrition policy implementation, the use of financial incentives at any level of policy (e.g., national, local, project, and individual levels) has led to better outcomes.	The implementation of nutrition activities has been limited due to the absence of a budget line in the nutrition sector under the National Policy on Food and Nutrition 2004. Therefore, the federal government seeks a specific budget line to fund the action plan starting in 2021. The President has instructed the relevant ministries to establish a budget line for nutrition activities, but this has not yet been achieved.

Major entries	Sub-entries	Typical lessons learned and challenges associated with nutrition-related projects	Current situation and experiences in Nigeria
Vertical coordination	**Local ownership**	Local ownership of nutrition programs and their outcomes is needed.	In the revision of the National Food and Nutrition Policy, state-level meetings were held to educate the state governments on the importance of nutrition policy, and the State Committee on Food and Nutrition (SCFN), the coordinating body for nutrition policy at the state level, was established. In the revision of the National Food and Nutrition Policy, state-level meetings were held to educate the state governments on the importance of nutrition policy, which seems to have increased the commitment and ownership of the state governments in the implementation of nutrition policy.
Monitoring and evaluation		Nutrition-related data collected in an accurate and timely manner is very important in developing nutrition strategies.	The National Food and Nutrition Policy revised in 2016 clearly states that the MB&NP will be responsible for monitoring and evaluation, and MNPFAN plans to conduct a mid-term review in 2023.

Table 2-15: Lessons learned on project design and implementation in Nigeria

Major entries	Sub-entries	Typical lessons learned and challenges associated with nutrition-related projects	Current situation and experiences in Nigeria	Corresponding projects
Domestic resources		If there are insufficient resources to implement the plan, the use of other organizations (NGOs, etc.) to supplement the missing resources should be considered.	In the absence of nutrition-specific public services, collaboration with Community Based Partners (CBP) already working in the field was essential for the efficient and effective implementation and sustainability of the project.	MARKETS
Monitoring and evaluation		Although monitoring and evaluation requires specialized techniques and skills, such as physical measurements and dietary surveys, strengthening the local monitoring and evaluation capacity is a worthwhile investment for improving nutrition.	The project strengthened the monitoring and evaluation capacity of CBP (e.g., physical measurements and dietary surveys), and as a result (because of the clarification of outcome indicators), their willingness to provide quality services increased.	MARKETS

Major entries	Sub-entries	Typical lessons learned and challenges associated with nutrition-related projects	Current situation and experiences in Nigeria	Corresponding projects
Combination of activities at the field level	**Agriculture and gender**		Even if the project targets women, the role of men in the household may also be important in improving nutrition; therefore, gaining the understanding of men and community leaders and reaching out to them is crucial.	MARKETS
Others			In some cases, nutrition education alone is insufficient to promote behavioral changes related to nutrition; the food and nutrition norms that exist in the community must be understood and one must work to change those norms.	MARKETS
Others	**Tool**	Posters and radio for women and men, respectively, were found to be the most effective media for promoting behavior changes to facilitate improved nutrition. It is also crucial that a variety of media is utilized.	The following low- and high-intensity nutrition education program interventions were implemented with no significant differences in their effectiveness. The "low intensity" approach was shown to be sufficient to enhance knowledge and promote behavior changes. 1. low-intensity education programs: education programs through posters, radio messages, lectures, food demonstrations, etc. 2. high-intensity education programs: education programs that provide one-on-one counseling to women receiving support.	CDGP

Chapter 3. Quantitative Analysis on Nutritional Improvement through a Multi-Sectoral approach

3.1. Background, objectives, and methods

（1） Background

Factors influencing nutrition improvement involve a wide range of sectors, including health, water, sanitation, and hygiene (WASH), and agriculture, and the need for a multi-sectoral approach to improve nutrition is widely recognized. On the other hand, few studies analyzing the quantitative effects of the multi-sectoral approach on nutrition improvement have been conducted to date. The World Bank (2018) [124] is one of those studies. It estimated the determinants of stunting in 33 countries in Sub-Saharan Africa and used individual data from the Demographic and Health Surveys (DHS) program[125] to conduct a multivariable analysis of the effects of access to services such as maternal health, child health, and WASH on reducing stunting. The study shows the quantitative impact of access to services in each sector on reducing the incidence of stunting.

（2） Objectives

The present study aims to quantitatively analyze the impact of interventions in related sectors such as agriculture, WASH, and health on improving child undernutrition and overnutrition, along with female undernutrition, which are major nutritional challenges in developing countries[126], and also tries to examine the effectiveness of the multi-sectoral approach to the improvement of nutrition.

The research questions for this study are as follows.

- Undernutrition in children

In World Bank (2018), an analysis of 33 African countries showed that the multi-sectoral approach effectively improves the incidence of child stunting. Our analysis derives more general policy implications by conducting the following analysis based on the World Bank (2018).

- Does the multi-sectoral approach effectively reduce stunting even when the analysis includes Asian countries in addition to African countries (Section 3-3)?
- What combinations are effective with respect to interventions such as feeding, water and sanitation, and health (Section 3-3)?
- Does the multi-sectoral approach effectively improve wasting? Additionally, what combinations of interventions are effective (Section 3-3)?
- In the World Bank (2018), the interventions were not sorted by sector. Is the multi-sectoral approach effective even after the interventions are re-sorted by sector? Also, what combinations of interventions are effective (Section 3-4)?

We also examine the following issues, which were not discussed in World Bank (2018).

124 World Bank "All Hands on Deck : Reducing Stunting through Multisectoral Efforts in Sub-Saharan Africa" (2018).
125 Operated by USAID since 1984. It mainly conducts and supports research on health and population trends, family planning, gender, HIV/AIDs, nutrition, and other issues in developing countries.
126 For example, the WHO's Global Nutrition Target 2025 identifies these 3 issues as the main nutrition problems in developing countries.

- The Minimum Acceptable Diet (MAD), which is used as an intervention variable in feeding and agriculture sectors, can be divided into the Minimum Meal Frequency (MMF) and Minimum Dietary Diversity (MDD). What is the relationship between child undernutrition, and MMF and MDD (Section 3-4)?
- Factors such as women's empowerment, maternal education level, and household Wealth Index correspond to "Basic Causes" that influence "Underlying Causes" of undernutrition such as feeding, WASH, and health in the conceptual framework for maternal and child nutrition proposed by UNICEF (1990). Is the relationship between the basic- and underlying causes in the UNICEF model appropriate (section 3-4)?

➢ Overnutrition among children

- Is the multi-sectoral approach also effective in improving overweight among children (Section 3-5)?

➢ Anemia among women

- Does the multi-sectoral approach effectively improve the incidence of anemia among women (Section 3-6)?

➢ Effectiveness of interventions in bottleneck sectors

- Are focused interventions in the least developed sectors, which may be bottlenecks, more effective than comprehensive interventions in multiple sectors?

3.2. Data and methods

(1) Data

Similar to World Bank (2018), we used individual data from the Demographic and Health Surveys (DHS) program. We selected seventeen countries from Africa and seven from Asia out of the DHS database as shown in the table below. The countries were selected considering their potential as candidates for JICA projects and their distinctive activities in nutrition improvement.

Table 3-1: Selected countries

Africa (17 countries)		Asia (7 countries)
Benin 2017-2018	Malawi 2015-2016	Bangladesh 2014
Burkina Faso 2010	Mozambique 2011	Cambodia 2014
Chad 2014-2015	Nigeria 2018	Kyrgyz Republic 2012
Egypt 2014	Rwanda 2014-2015	Myanmar 2015-2016
Ethiopia 2016	Senegal 2010-2011	Nepal 2016
Gabon 2012	South Africa 2016	Tajikistan 2017
Ghana 2014	Zambia 2018	Timor-Leste 2016

Africa (17 countries)		Asia (7 countries)
Kenya 2014	Zimbabwe 2015	
Madagascar 2008-2009		

The DHS program uses the following two-step cluster sampling method (see Figure 3-1).

- The first step: First, each province or state of the target country is divided into urban and rural areas, which are subdivided into clusters the size of a large village in rural areas and a block in urban areas. In each area, clusters are randomly selected using a probability proportional sampling method based on their population. A total of around 300~500 clusters is extracted from each country.
- The second step: The researcher visits the selected clusters and makes a list of the households in each cluster. From this list, 20-30 households are randomly selected.

The DHS data uses sample sizes that are calculated to be statistically representative of the population. The questions of the DHS program are about the household and individuals, such as women (age 15-49), men (age 15-59), and children (under age 5). All women and men in the household who fall into the age categories answer the questions. This study uses data for the household, women (age 15-49), and children (under 5). The process used to develop the dataset used is shown in Appendix 2.

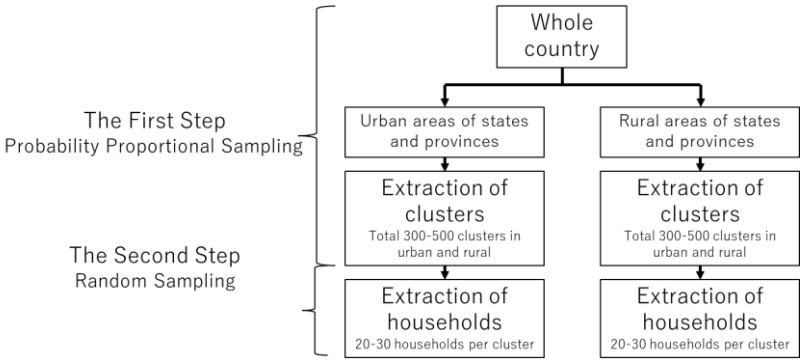


Figure 3-1: Sampling flow of the DHS program

（2） Method

We examine the impact of the multi-sectoral approach on nutritional status, including cumulative and combination variables of agriculture, WASH, and health services as explanatory variables. Logistic regression analysis[127] is employed as an analytical method because we treat the objective variables, namely indicators of nutritional status, as dummy variables[128]. In the analysis, we used R version 3.6.2 software. The following sections show the analyses corresponding to each objective and research question.

[127] A method of multivariable analysis that can be used when the objective variable is a two-valued variable such as a dummy variable.

[128] For example, we used height and weight data from the individual dataset and transformed them into dummy variables: Stunting children = 1, non-stunting children = 0,.

3.3. Analysis of the determinants of undernutrition among children under two years of age (three categories)

This section examines the determinants of child undernutrition (stunting and wasting) based on the World Bank (2018) classification of interventions to determine whether the multi-sectoral approach effectively improves nutrition and which combinations are more effective.

（1） Variables

In accordance with World Bank (2018), the objective variables and explanatory variables are set as follows.

The following indicators of child undernutrition were created from DHS data for the objective variables.

- Stunting
- Wasting

Indicators for the following four categories of nutrition-related interventions were created from the DHS data to use as explanatory variables. These four categories correspond to the underlying causes of child undernutrition in the conceptual framework for maternal and child nutrition proposed by UNICEF (1990) (see Figure 3-2)

- Food security
- Care and feeding practice
- Sanitary environment
- Health service

Of these, food security and care and feeding practices are defined as factors related to “Feeding practices”, sanitary environment as access to “WASH”, and health services as access to “Health services”. Each category is judged as fulfilled if the following conditions are met, and also serves as a dummy variable to be assigned 1 if it is fulfilled, or 0 if not.

- Feeding practice
  1. The Minimum Acceptable Diet (MAD)[129]
  2. Age-appropriate breastfeeding (appropriate combination of complementary foods and breastfeeding for children over six months in age)
  3. Early initiation of breastfeeding

(Feeding is considered to be satisfied if MAD is satisfied, and at the same time at least 2 or 3 is satisfied)

[129] The Minimum Acceptable Diet is defined as a diet that meets both the WHO/UNICEF definition of the Minimum Meal Frequency (MMF) and the Minimum Dietary Diversity (MDD).

- Access to WASH services
  1. Access to safe drinking water
  2. Access to improved sanitation facilities
  3. Percentage of open defecation at the local level (less than 75%)
  4. Proper hand washing facilities
  5. Proper disposal of children's stool

(If three out of the five are satisfied, WASH is considered satisfied.)

- Access to health services
  1. Prenatal checkup
  2. Support by medical personnel during childbirth
  3. Postnatal checkup
  4. Having received the DPT[130] vaccine three times
  5. Sleeping under a mosquito net.

(If three out of the five are satisfied, health is considered satisfied.)

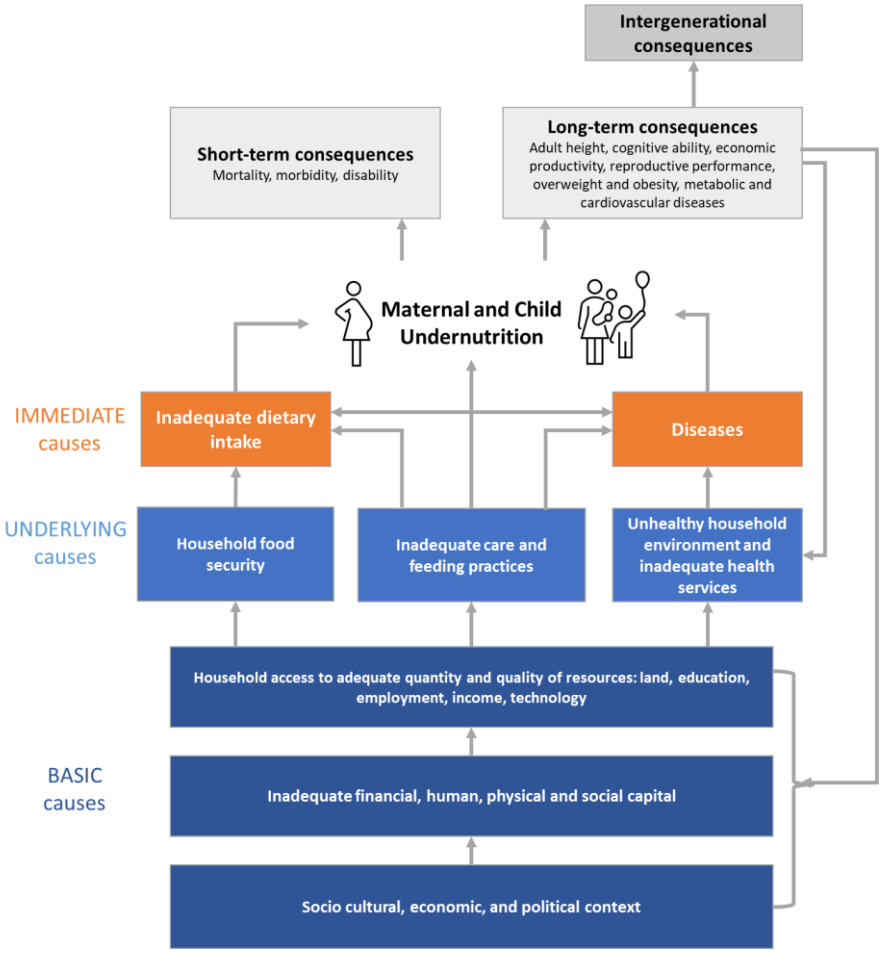


Figure 3-2: UNICEF's conceptual framework for maternal and child nutrition (1990)

Source: Prepared based on UNICEF (1990).

[130] DPT (Diphtheria, Pertussis, Tetanus): Combination vaccine against diphtheria, pertussis and tetanus

The variables in the table below are used as control variables.

Table 3-2: Control variables

	Variable name	Data Contents
Genetic factor	Child's sex	Boy: 0, girl: 1
	Mother's height	Logarithmic value of mother's height (log (mother's height))
Household composition	Multiple birth (e.g. twins, triplets, etc.)[131]	Single: 0, multiple: 1
	Number of children under the age of five in the household	Real number
	Birth order	1~
	Number of household members	Real number
Mother's factors	Marital status of the mother	Married: 1, Otherwise: 0
	Mother's age at first birth	Real number
	Women's empowerment	We determined that women's empowerment is met if all of the following three factors are met. ● The mother makes the decision to visit a medical institution on her own or after consulting with her husband. ● The mother makes decisions about major expenses alone or in consultation with her husband. ● The mother visits family or relatives alone or in consultation with her husband
	Mother's education level	Did not complete primary education: 0, completed primary education: 1, completed secondary education: 2, completed higher education: 3
Economic factor	Wealth Index	poorest: 1 to richest: 5
Social factor	Area of residence	urban: 0, rural: 1

(2) Cumulative model with three categories

The objective of this analysis is to understand the effectiveness of the multi-sectoral approach against child undernutrition. The hypothesis of the model is that the probability of stunting and wasting will decrease as the number of interventions increases.

1) Objective variable: Stunting

The model is as follows.

$$Stunted = \alpha + \alpha_1 Aany1 + \alpha_2 Aany2 + \alpha_3 Aall3 + X + \mu + \varepsilon$$

Stunted: a dummy variable showing the following: stunted children under two = 1, otherwise 0

$Aany1$: One out of feeding, WASH, and health is met

$Aany2$: Two out of feeding, WASH, and health are met

$Aall3$: Feeding, WASH, and health are all met

X: Control variable (Table 3-2)

[131]Single birth: A child born as a single fetus in the mother's womb.
Multiple birth: Children born as more than one fetus in the mother's womb, such as twins or triplets.

μ: Dummy variable for each country

ε: Error term

Table 3-3 shows the summary statistics[132] of the data analyzed in this section for the above estimation model. Out of the total 56,406 children, the percentage of stunted children is approximately 22% (12,609) of the total sample. The proportion of children who meet one category is approximately 51% (28,529). The percentage of children who meet two categories is around 20% (28,529), and only 2% of children meet all three categories. These trends are similar in Africa and Asia, indicating that the multi-sectoral approach is not yet visible at the household level. (see Figure 3-3)

Table 3-3: Summary statistics of the cumulative model (category, stunting)

		Africa	Asia	Africa + Asia
Objective variable	Stunted	9,804	2,805	12,609
Explanatory variables	*Aany1:* Adequate in any one category	21,848	6,681	28,529
	Aany2: Adequate in any two categories	7,482	3,644	11,126
	Aall3: Adequate in all categories	906	328	1,234
Sample size		43,053	13,353	56,406

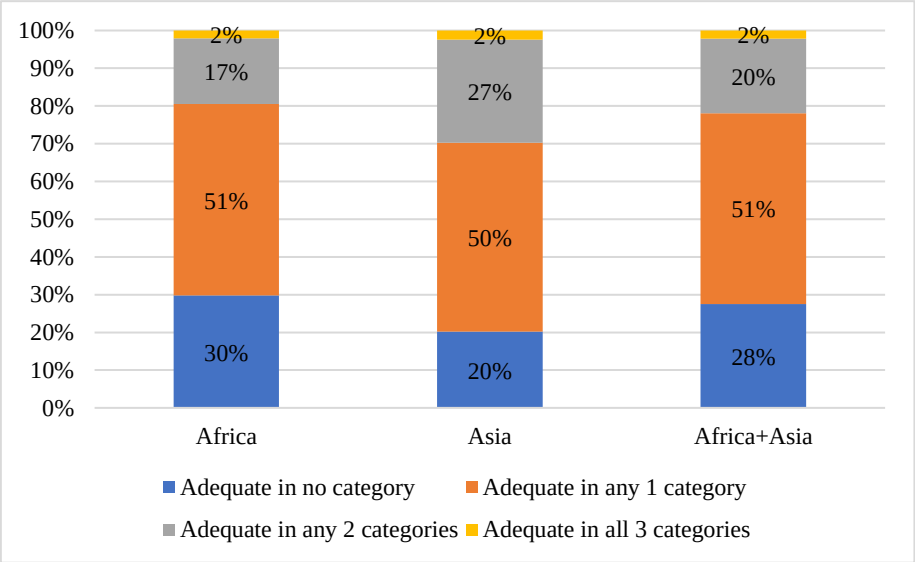


Figure 3-3: Percentage of children in each number of categories fulfilled

Table 3-4 and Figure 3-4 show the results of the above model. The absolute values of the coefficients of Aany3 (when feeding, WASH, and health are all met) are higher than those of Aany2

[132] Summary statistics: It refers to the sample characteristics such as mean, median, standard deviation, etc. However, this study uses many dummy variables (variables that take values of 0 or 1), and the table shows the number of children who took values of 1 for each variable.

(when two of the categories of feeding, WASH, and health are met) in all cases for Africa, Asia, and the full sample (Africa + Asia). Also, the absolute value of the coefficient of Aany2 is larger than Aany1. It shows that as the number of intervention categories increases, the probability of stunting decreases.

The results bring us the following implications.

- The more intervention categories are implemented (feeding, WASH, and health), the greater the effect on stunting for children under the age of two.
- The effect of the multi-sectoral approach is recognized even when the target countries are expanded beyond Sub-Saharan Africa, which was already verified by the World Bank (2018).
- Although the coverage of interventions in one category is relatively high (about 50% of the total sample), only 2% of households receive interventions in all categories. It seems that the multi-sectoral approach is not yet implemented at the household level.

Table 3-4: Results of analyzing the effect of cumulative interventions on stunting in children aged under two years with three categories (regression coefficients)

Explanatory variables	Africa	Asia	Africa + Asia
Aany1: Adequate in any one category	-0.178***	-0.191***	-0.182***
Aany2: Adequate in any two categories	-0.332***	-0.203***	-0.295***
Aall3: Adequate in all three categories	-0.365***	-0.415**	-0.369***
Significant control variables	Girl, single birth, older mother at first birth, higher education level of mother, taller mother, fewer children under age five in the household, higher Wealth Index, living in an urban area	Girl, older children, higher education level of mothers, higher height of mothers, more household members, fewer children under age five in the household, higher Wealth Index, living in rural areas	Girl, single birth, older mother at first birth, higher education level of mother, taller mother, fewer children under age five in the household, higher Wealth Index
Sample size	43,053	13,353	56,406

***1%, **5%, *10% significant

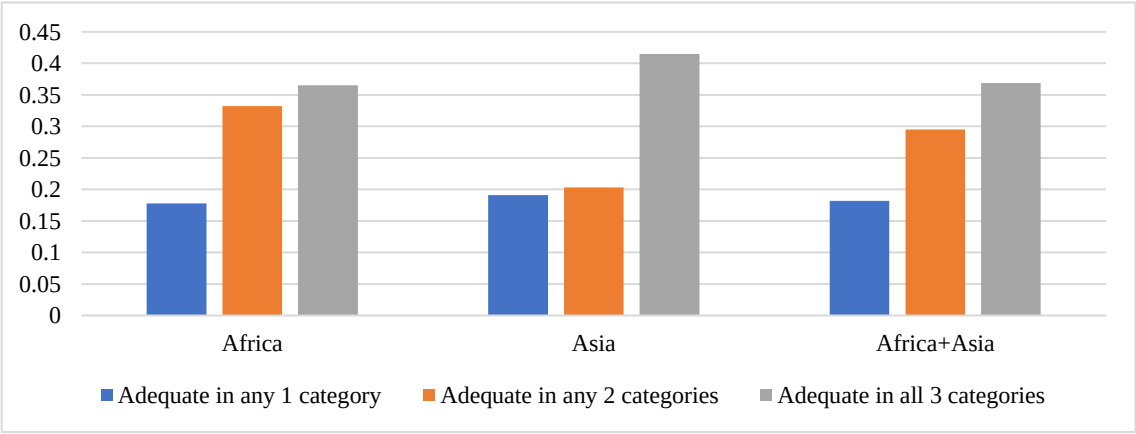


Figure 3-4: Results of analyzing the effect of cumulative interventions on stunting in children aged under two years with three categories (regression coefficient).

2） **Objective variable: Wasting**

The model is as follows.

$$Wasted = \alpha + \alpha_1 Aany1 + \alpha_2 Aany2 + \alpha_3 Aall3 + X + \mu + \varepsilon$$

Wasted: a dummy variable showing wasted children under two years of age = 1, otherwise = 0

$Aany1$: One category out of feeding, WASH, and health is met.

$Aany2$: Two categories out of feeding, WASH, and health are met.

$Aall3$: Feeding, WASH, and health are all met.

X: Control variables (all variables listed in table 3-2)

μ: Dummy variables for country

ε: Error term

Table 3-5 shows the summary statistics of the data analyzed in this section. Among the total sample (56,406), the proportion of wasted children is about 10% (5,469), which is less than the number of stunted children (about 22% (12,609)).

Table 3-5: Summary statistics of the cumulative model (category, wasting)

		Africa	Asia	Africa + Asia
Objective variable	Wasted	3,928	1,541	5,469
Explanatory variables	*Aany1:* Adequate in any 1 category	20,849	6,682	27,531
	Aany2: Adequate in any 2 categories	7,359	3,646	11,005
	Aall3: Adequate in all 3 categories	898	328	1,126
Sample size		41,238	13,356	54,594

Table 3-6 shows the results of the above model. In the case of Africa and Asia, the dummy variables that indicate the number of intervention categories fulfilled are not significant in many cases. However, in the case of all sample countries (Africa + Asia), all explanatory variables are significant. This indicates that the probability of wasting decreases as the number of intervention categories increases.

The results bring us the following implications.

- Even with wasting as the dependent variable, wasting among children under two decreases significantly as the number of intervention categories (feeding, WASH, and health) increases in a limited case. In other words, the multi-sectoral approach reduces wasting effectively.

Table 3-6: Results of analyzing the effect of cumulative intervention on wasting in children aged under two years with three categories (regression coefficients)

Explanatory variables	Africa	Asia	Africa + Asia
Aany1: Adequate in any one category	-0.074	-0.096	-0.084**
Aany2: Adequate in any two categories	-0.121*	-0.123	-0.123**
Aall3: Adequate in all three categories	-0.148	-0.295	-0.177*
Significant control variable	Girl, single birth, higher maternal education level, fewer children under the age of five in the household, higher Wealth Index, living in a rural area	Girl, higher maternal education level, higher Wealth Index, living in a rural area	Girl, single birth, higher maternal education level, fewer children under the age of five in the household, higher Wealth Index, living in a rural area
Sample size	41,238	13,356	54,594

***1%, **5%, *10% significant

（3） Combination model with three categories

The objective of this section is to quantify the effect of various combinations of three intervention categories on child undernutrition.

1） Objective variable: stunting

The model is as follows.

$$Stunted = \alpha + \beta_1 F + \beta_2 W + \beta_3 H + \beta_4 F_W + \beta_5 F_H + \beta_6 W_H + \beta_7 Aall3 + X + \mu + \varepsilon$$

Stunted: a dummy variable showing the following: stunted children under two = 1, otherwise = 0

F: Only feeding is met

W: Only WASH is met

H: Only health is met

F_W: Only feeding and WASH are met

F_H: Only feeding and health are met

W_H: Only WASH and health are met

$Aall3$: Feeding, WASH, and health are all met

X: Control variables (all variables listed in Table 3-2)

μ: Dummy variables for each country

ε: Error term

Table 3-7 shows the summary statistics of the data analyzed in this section. Regarding sample meeting the single category, the percentage of children that only meet health (*H*) is relatively high at 42% (21,648), whereas the percentage of children that only meet feeding (*F*) is low at about 2%. In addition, children who only satisfy feeding and WASH (F_W) are about 2% (793).

Table 3-7: Summary statistics of the combination model (category, stunting)

		Africa	Asia	Africa + Asia
Objective variable	Stunted	9,060	2,530	11,590
Explanatory variables	*F*: Feeding only	545	248	793
	W: WASH only	1,544	670	2,214
	H: Health only	16,893	4,755	21,648
	F_W: Feeding and WASH only	123	28	151
	F_H: Feeding and Health only	1,727	1,106	2,833
	W_H: WASH and Health only	5,030	2,210	7,240
	Aall3: All categories	906	328	1,234
Sample size		39,585	12,045	51,630

Table 3-8 and Figure 3-5 show the results of the above model. In Asia, Africa, and the full sample (Africa + Asia), interventions including feeding only (*F*), WASH only (*W*), and both (F_W) are not significant. However, when both feeding and WASH are combined with the health category, they become significant, suggesting that they reduce stunting effectively. When all categories are included, the absolute coefficient value is larger than the other cases and significantly impacts the effect of reducing stunting.

The results bring us the following implications.

- Feeding- and WASH interventions alone do not reduce stunting, but when these categories are combined with interventions in the health category, those interventions improve stunting. In addition, more intervention categories yield greater improvement.

Table 3-8: Results of analyzing the effect of combined interventions on stunting in children aged under two years with three categories (regression coefficients)

Explanatory variables	Africa	Asia	Africa + Asia
F: Feeding only	-0.063	0.007	-0.049
W: WASH only	0.214***	-0.191	0.094
H: Health only	-0.216***	-0.209***	-0.214***
F_W: Feeding and WASH only	-0.316	-0.017	-0.256
F_H: Feeding and Health only	-0.305***	-0.224**	-0.276***
W_H: WASH and Health only	-0.309***	-0.225**	-0.294***
Aall3: All categories	-0.339***	-0.391**	-0.353***
Significant control variables	Girl, single birth, older mother at first birth, higher education level of mother, taller mother, fewer children under the age of five in the household, higher Wealth Index, living in an urban area	Girl, older children, higher education level of mother, taller mother, fewer children under the age of five in the household, higher Wealth Index, living in a rural area	Girl, single birth, older mother at first birth, married mother, higher education level of mother, taller mother, fewer children under age five in the household, higher Wealth Index
Sample size	39,585	12,045	51,630

***1%, **5%, *10% significant

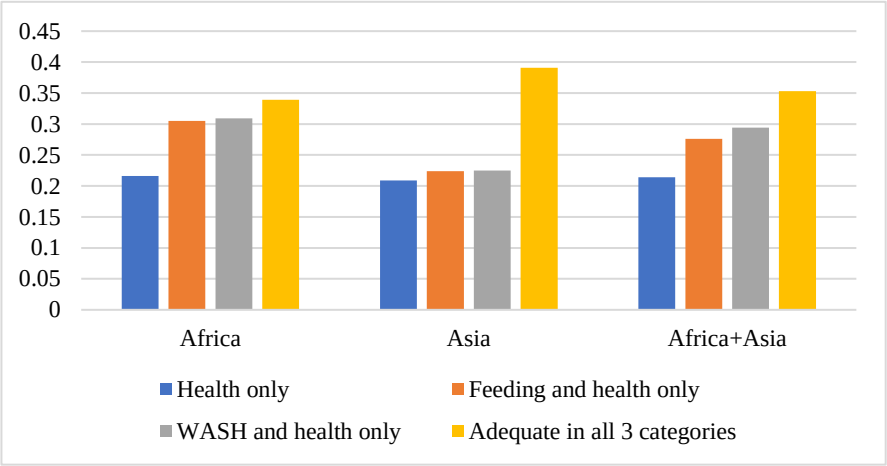


Figure 3-5: Results of the analysis of the effect of combined interventions on stunting in children aged under two years with three categories (regression coefficient)

2) **Objective variable: wasting**

The model is as follows.

$$Wasted = \alpha + \beta_1 F + \beta_2 W + \beta_3 H + \beta_4 F_W + \beta_5 F_H + \beta_6 W_H + \beta_7 Aall3 + X + \mu + \varepsilon$$

Wasted: a dummy variable showing wasted children under the age of two = 1, otherwise = 0

F: Only feeding is met

W: Only WASH is met

H: Only health is met

F_W: Only feeding and WASH are met

F_H: Only feeding and health are met

W_H: Only WASH and health are met

$Aall3$: Feeding, WASH, and health are all met

X: Control variables (all variables listed in table 3-2)

μ: Dummy variables for each country)

ε: Error term

Table 3-9 shows the summary statistics of the data analyzed in this section.

Table 3-9: Summary statistics of the combination model (category, wasting)

		Africa	Asia	Africa+. Asia
Objective variable	Wasted	3,560	1,407	4,967
Explanatory variables	*F*: Feeding only	551	248	799
	W: WASH only	1,538	671	2,209
	H: Health only	15,909	4,755	20,664
	F_W: Feeding and WASH	122	28	150

	only			
	F_H: Feeding and Health only	1,719	1,107	2,826
	W_H : WASH and Health only	4,923	2,211	7,134
	Aall3: All categories	898	328	1,226
Sample size		37,792	12,048	49,840

The table below shows the results. In the case of Africa, as in the case of stunting above, feeding only (*F*) and WASH only (*W*) do not reduce wasting significantly, whereas health only (*H*) affects the reduction of wasting. In addition, the combination of feeding and health is significant for all regions[133].

Table 3-10: Results of analyzing the effect of combined intervention on wasting in children aged under two years with three categories (regression coefficients)

Explanatory variables	Africa	Asia	Africa + Asia
F: Feeding only	0.155	0.189	0.168*
W: WASH only	-0.004	0.107	0.036
H: Health only	-0.105**	-0.114	-0.111**
F_W: Feeding and WASH only	-0.391	-0.596	-0.437
F_H: Feeding and Health only	-0.278***	-0.202*	-0.239***
W_H: WASH and Health only	-0.053	-0.073	-0.063
Aall3: All categories	-0.138	-0.273	-0.162
Significant control variable	Girl, single birth, higher maternal education level, fewer children under the age of five in the household, higher Wealth Index, living in a rural area	Girl, higher education level of mother, higher Wealth Index, living in a rural area	Girl, single birth, younger age of mother at first birth, higher maternal education level, fewer children under the age of five in the household, higher Wealth Index, living in a rural area
Sample size	37,792	12,048	49,840

***1%, **5%, *10% significant

[133] The combinatorial model for wasting is discussed further in Section 3-4 (2).

3.4. Analysis of the determinants of undernutrition among children under two years of age (three sectors)

In this section, the interventions are re-organized by sector, after which we examine the determinants of child undernutrition (stunting and wasting) as in Section 3.3. In addition, the intervention variable for the agricultural sector, namely the MAD, is divided into the MMF and Minimum Dietary Diversity to determine which is more associated with undernutrition (stunting and wasting). We also examine whether various control variables that are not intervention variables (see Table 3-2) can be considered basic causes that influence underlying causes of child undernutrition.

（1） Variables

As in the previous section, the following objective variables will act as indicators of child undernutrition.

- Stunting
- Wasting

Regarding the explanatory variables, the analysis in Section 3.3 is based on the World Bank (2018) and categorized factors related to nutrition improvement as follows: feeding practices, access to WASH services, and access to health services. However, this categorization does not allow for an evaluation of each sector as the feeding practices are not organized by sector. For example, food-related indicators, which are closely related to the agriculture sector, are mixed with indicators of breastfeeding, which are closely related to the health sector.

In this section, the various interventions were reclassified into the agriculture, WASH, and health sectors to clarify the effect of interventions in these sectors on improving undernutrition (see Figure 3.1), and services in these sectors are viewed as fulfilled if the following conditions were met

- Agriculture

MAD

(Agriculture is satisfied if the MAD is considered satisfied.)

- Water and Sanitation (WASH)

1. Access to safe drinking water
2. Access to improved sanitation facilities
3. Percentage of open defecation at the local level (less than 75%)
4. Hand washing facilities
5. Proper disposal of children's stool

(If three out of the five are satisfied, WASH sector is considered satisfied.)

- Health

1. Prenatal checkup

2. Support by medical personnel during childbirth
3. Postnatal checkup
4. Having received the DPT[134] vaccine three times
5. Sleeping under a mosquito net
6. Age-appropriate breastfeeding (appropriate combination of complementary foods and breastfeeding for children over six months of age)
7. Early initiation of breastfeeding

(Health is considered satisfied if four out of the seven conditions are met.)

(2) Cumulative model with three sectors

The objective of this estimation is to understand the effectiveness of the multi-sectoral approach for child undernutrition. The hypothesis of the analysis is that the probability of stunting and wasting will decrease as the number of sectors in which interventions were performed increases.

1) Objective variable: Stunting

The estimation model is as follows.

$$Stunted = \alpha + \alpha_1 Aany1 + \alpha_2 Aany2 + \alpha_3 Aall3 + X + \mu + \varepsilon$$

Stunted: a dummy variable showing the following: stunted children under two years of age = 1, otherwise 0

$Aany1$: One out of agriculture, WASH, or health is met

$Aany2$: Two out of agriculture, WASH, and health are met

$Aall3$: Agriculture, WASH, and health are all met

X: Control variable (All variables listed in Table 3-2)

μ: Dummy variables for each country

ε: Error term

Table 3-11 shows the summary statistics of the data analyzed in this section.

Table 3-11: Summary statistics of the cumulative model (sector, stunting)

		Africa	Asia	Africa+Asia
Objective variable	Stunted	9,804	2,805	12,609
Explanatory variables	*Aany1:* Adequate in any one sector	22,457	6,809	29,266
	Aany2: Adequate in any two sectors	6,796	3,721	10,517
	Aall3: Adequate in all sectors	1,009	349	1,358

[134] DPT (Diphtheria, Pertussis, Tetanus): Combination vaccine against diphtheria, pertussis and tetanus

Sample size	43,053	13,353	56,406

Table 3-12 and

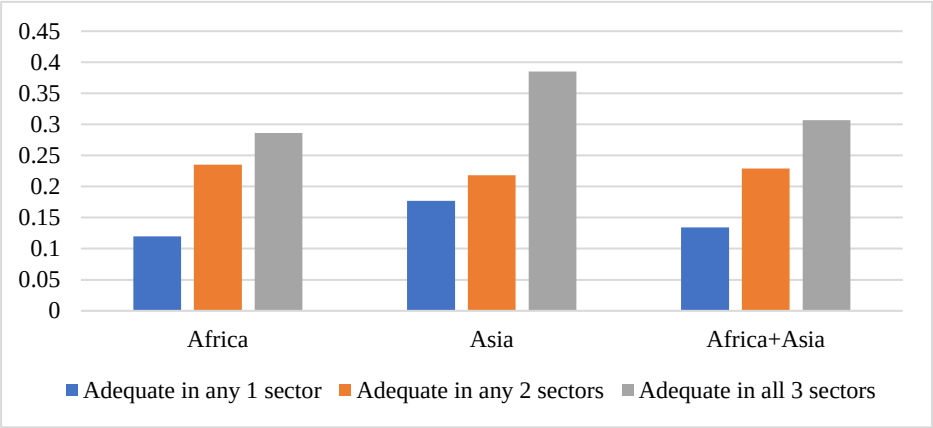


Figure **3-6** show the results of the above model. The absolute values of the coefficients of *Aall3* (Agriculture, WASH, and health are all met) is larger than that of Aany2 (any two of Agriculture, WASH, and Health are met) in Africa, Asia, and the full sample (Africa + Asia). Also, the absolute values of the coefficients of Aany2 are greater than Aany1 (any one of agriculture, WASH, and health is met). It seems that the probability of stunting decreases as the number of intervention sectors increases.

The results bring us the following implications.

- The more sectors (agriculture, WASH, and health) are implemented, the more the probability of stunting among children under the age of two decreases. In other words, even when the interventions are organized by sector, the effectiveness of the multi-sectoral approach in reducing stunting is recognized.

Table 3-12: Results of analyzing the effect of the cumulative interventions on stunting in children aged under two years with three sectors (regression coefficients)

Explanatory variables	Africa	Asia	Africa + Asia
Aany1: Adequate in any one category	-0.120***	-0.177***	-0.134***
Aany2: Adequate in any two categories	-0.235***	-0.218***	-0.229***
Aall3: Adequate in all three categories	-0.286***	-0.385**	-0.307***
Significant control variables	Girl, single birth, older mother at first birth, higher maternal education level, taller mother, fewer children under the age of five in the household, higher Wealth Index, living in an urban area	Girl, older children, higher maternal education level, taller mother, more household members, fewer children under the age of five in household, higher Wealth Index, living in a rural area	Girl, single birth, older mother at first birth, higher maternal education level, taller mother, fewer children under the age of five in the household, higher Wealth Index
Sample size	43,053	13,353	56,406

***1%, **5%, *10% significant

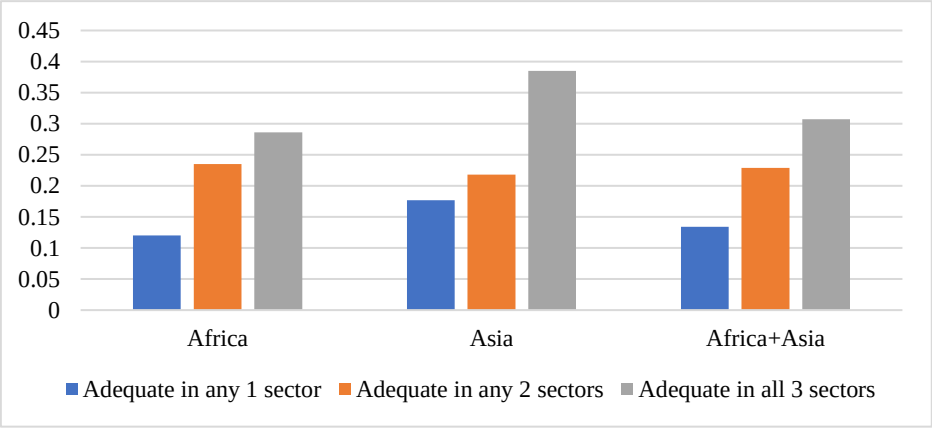


Figure 3-6: Results of the analysis of the effect of the cumulative interventions on stunting in children aged under two years with three sectors (regression coefficient)

2） **Objective variable: Wasting**

The model is as follows.

$$Wasted = \alpha + \alpha_1 Aany1 + \alpha_2 Aany2 + \alpha_3 Aall3 + X + \mu + \varepsilon$$

Wasted: a dummy variable showing the following: wasted children under the age of two = 1, otherwise = 0

$Aany1$: One out of agriculture, WASH, and health is met

$Aany2$: Two out of agriculture, WASH, and health are met

$Aall3$: Agriculture, WASH, and health are all met.

X: Control variables (all variables listed in table 3-2)

μ: Dummy variables for each country

ε: Error term

Table 3-13 shows the summary statistics of the data analyzed in this section.

Table 3-13: Summary statistics of the cumulative model (sector, wasting)

		Africa	Asia	Africa + Asia
Objective variable	Wasted	3,928	1,541	5,469
Explanatory variables	*Aany1:* Adequate in any one sector	21,313	6,810	28,123
	Aany2: Adequate in any two secotrs	6,680	3,723	10,403
	Aall3: Adequate in all secotrs	1,001	349	1,350
Sample size		41,238	13,356	54,594

Table 3-14 and Figure 3-7 show the results of the above model. It seems that the sector intervention variables are not significant when Asia is analyzed, but they are all significant when all sample countries (Africa + Asia) are analyzed, and the probability of wasting decreases as the number of intervention sectors increases.

The results bring us the following implications.

- Even when wasting is used as the objective variable, the probability of wasting decreases in a limited case if more sectors are fulfilled (agriculture, WASH, and health). In other words, even when the interventions are organized by sector, the effectiveness of the multi-sectoral approach in reducing wasting is observed.

Table 3-14: Results of analyzing the effect of cumulative interventions on wasting in children aged under two years with three sectors (regression coefficients)

Explanatory variables	Africa	Asia	Africa + Asia
Aany1: Adequate in any one sector	-0.086*	-0.015	-0.065*
Aany2: Adequate in any two sectors	-0.165*	-0.034	-0.117**
Aall3: Adequate in all three sectors	-0.155	-0.316	-0.175*
Significant control variable	Girl, single birth, higher maternal education level, fewer children under the age of five in the household, higher Wealth Index, living in a rural area	Girl, higher maternal education level, higher Wealth Index, living in a rural area	Girl, single birth, higher maternal education level, fewer children under the age of five in the household, higher Wealth Index, living in a rural area
Sample size	41,238	13,356	54,594

***1%, **5%, *10% significant

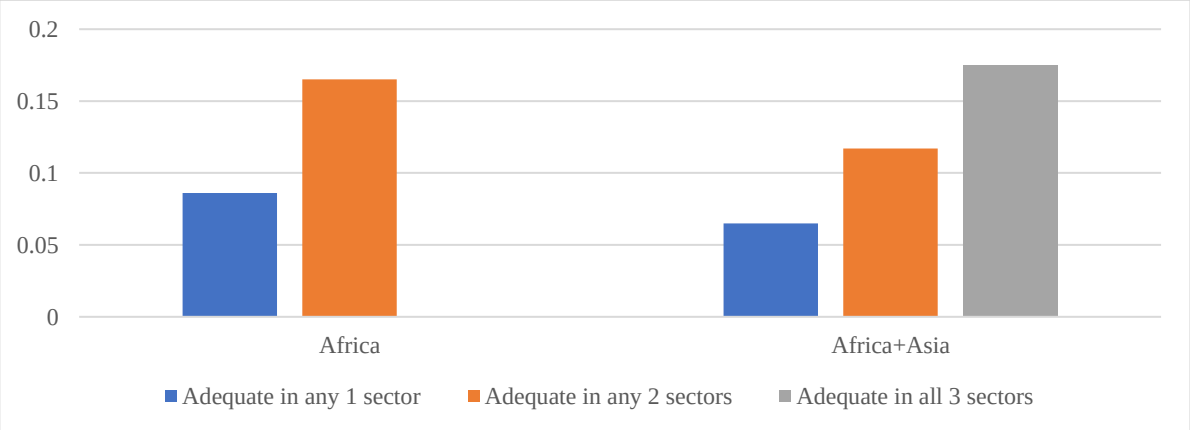


Figure 3-7: Results of analyzing the effect of cumulative interventions on wasting in children aged under two years with three sectors (regression coefficient)

Note: Only coefficients that are significant in the above three models (Africa, Asia, and Africa + Asia) are shown.

(3) Combination model with three sectors

The objective of this estimation is to quantify the effects of various combinations of interventions on child undernutrition.

1） **Objective variable: Stunting**

The model is as follows.

$$Stunted = \alpha + \beta_1 A + \beta_2 W + \beta_3 H + \beta_4 A_W + \beta_5 A_H + \beta_6 W_H + \beta_7 Aall3 + X + \mu + \varepsilon$$

Stunted: a dummy variable showing the following: stunted children under two years of age = 1, otherwise = 0

A: Only agriculture is met

W: Only WASH is met

H: Only health is met

A_W: Only agriculture and WASH are met

A_H: Only agriculture and health are met

W_H: Only WASH and health are met

$Aall3$: Agriculture, WASH, and health are all met

X: Control variables (all variables listed in table 3-2)

μ: Dummy variables for each country

ε: Error term

Table 3-15 shows the summary statistics of the data analyzed in this section.

Table 3-15: Summary statistics of the combination model (sector, stunting)

		Africa	Asia	Africa + Asia
Objective variable	Stunted	8,953	2,495	11,448
Explanatory variables	*A*: Agriculture only	403	150	553
	W: WASH only	2,354	712	3,066
	H: Health only	16,469	4,824	21,293
	A_W: Agriculture and WASH only	138	13	151
	A_H: Agriculture and health only	1,940	1,224	3,164
	W_H: WASH and health only	4,102	2,162	6,264
	Aall3: All categories	1,009	349	1,358
Sample size		39,206	11,908	51,114

Table 3-16 and

Figure 3-8 show the results of the above model. In both Asia and Africa, interventions including agriculture only (*A*), WASH only (*W*), and a combination of the two (A_W) are not significant. However, when both agriculture and WASH are combined with health sector interventions, they become significant. The coefficient of *Aall3* is also larger than those of the other cases and its effect on the

reduction of stunting is the highest.

The results bring us the following implications.

- The results showed that interventions in agriculture only and WASH only do not reduce stunting, but when they are combined with the health sector, the probability of stunting is reduced significantly. The results also show that the more sectors are fulfilled, the greater the effect is on th reduction of stunting.

Table 3-16: Results of analyzing the effect of the combined interventions on stunting in children aged under two years three sectors (regression coefficients)

Explanatory variables	Africa	Asia	Africa + Asia
A: Agriculture only	0.055	0.019	0.042
W: WASH only	0.039	-0.109	-0.006
H: Health only	-0.144***	-0.178***	-0.152***
A_W: Agriculture and WASH only	-0.021	-0.637	-0.085
A_H: Agriculture and health only	-0.247***	-0.223**	-0.237***
W_H: WASH and health only	-0.214***	-0.222**	-0.221***
Aall3: All categories	-0.259***	-0.352**	-0.288***
Significant control variable	Girl, single birth, older mother at first birth, married mother, higher maternal education level, taller mother, fewer children under the age of five in the household, higher Wealth Index, living in an urban area	Girl, older children, higher maternal education level, taller mother, fewer children under the age of five in the household, higher Wealth Index, living in a rural area	Girl, single birth, older mother at first birth, married mother, higher maternal education level, taller mother, fewer children under the age of five in the household, higher Wealth Index
Sample size	39,206	11,908	51,114

***1%, **5%, *10% significant

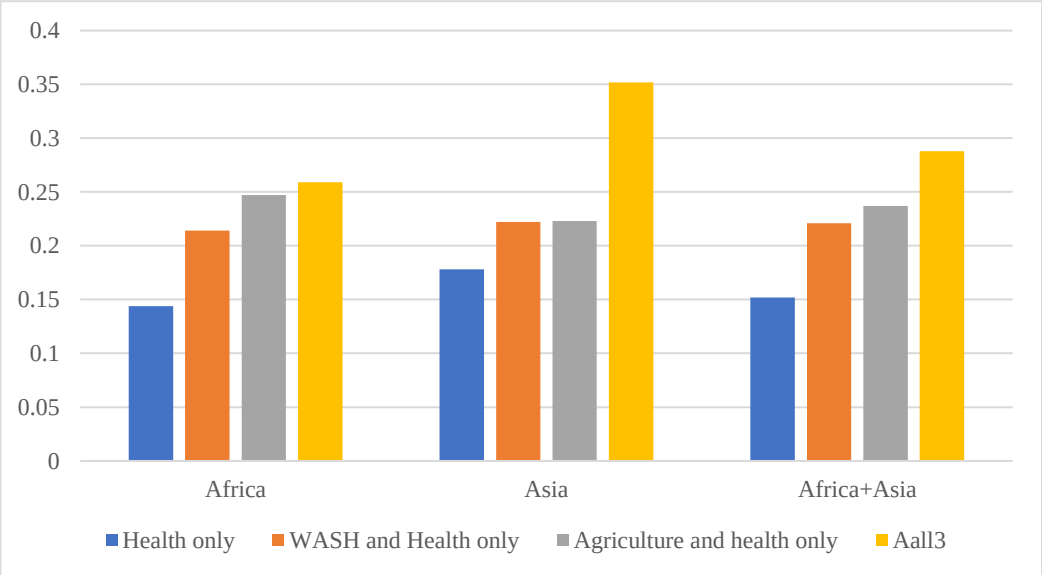


Figure 3-8: Results of analyzing the effect of combined interventions on stunting in children aged under two years with three sectors (regression coefficient)

2） **Objective variable: Wasting**

The estimation model is as follows.

$$Wasted = \alpha + \beta_1 A + \beta_2 W + \beta_3 H + \beta_4 A_W + \beta_5 A_H + \beta_6 W_H + \beta_7 Aall3 + X + \mu + \varepsilon$$

Wasted: a dummy variable showing the following: wasted children under two years of age = 1, otherwise = 0

A: Only agriculture is met

W: Only WASH is met

H: Only health is met

A_W: Only agriculture and WASH are met

A_H: Only agriculture and health are met

W_H: Only WASH and health are met

$Aall3$: Agriculture, WASH, and health are all met.

X: Control variables (all variables listed in Table 3-2)

μ: Dummy variables for each country

ε: Error term

Table 3-17 shows the summary statistics of the data analyzed in this section.

Table 3-17: Summary statistics of the combination model (sector, wasting)

		Africa	Asia	Africa + Asia
Objective variable	Wasted	3,527	1,375	4,902
Explanatory variables	*A*: Agriculture only	407	150	557
	W: WASH only	2,344	713	3,057
	H: Health only	15,343	4,824	20,167
	A_W: Agriculture and WASH only	137	13	150
	A_H: Agriculture and health only	1,934	1,225	3,159
	W_H: WASH and health only	3,999	2,163	6,162
	Aall3: All categories	1,001	349	1,350
Sample size		37,409	11,911	49,320

In the combination model of interventions with wasting as the objective variable, all variables become insignificant when Asia is analyzed. In the case of Africa, as in the case of stunting above, agriculture only and WASH only interventions do not reduce wasting significantly, but health only interventions significantly affect the reduction of wasting. In addition, the combination of agriculture and WASH and that of agriculture and health are significant, indicating that combining interventions in agriculture sector with those in other sectors, it affects the reduction of wasting.

Table 3-18: Results of analyzing the effect of combined interventions on wasting in children aged under two years with three sectors (regression coefficients)

Explanatory variables	Africa	Asia	Africa + Asia
A: Agriculture only	0.221	0.168	0.203*
W: WASH only	0.008	0.128	0.04
H: Health only	-0.110**	-0.034	-0.086**
A_W: Agriculture and WASH only	-0.725**	0.953	-0.479*
A_H: Agriculture and health only	-0.301***	-0.081	-0.202***
W_H: WASH and health only	-0.064	-0.012	-0.047
Aall3: All categories	-0.133	-0.298	-0.156
Significant control variable	Girl, single birth, higher maternal education level, fewer children under the age of five in the household, higher Wealth Index, living in a rural area	Girl, higher maternal education level, higher Wealth Index, living in a rural area	Girl, single birth, higher maternal education, fewer children under the age of five in the household, higher Wealth Index, living in a rural area
Sample size	37,409	11,911	49,320

***1%, **5%, *10% significant

Based on the analysis of the combination model of intervention categories discussed in Section 3.3 (3) 2) and the above analysis, the following suggestions may be made regarding the probability of wasting and combination of interventions.

- Health-only interventions reduce wasting effectively, whereas agriculture- and WASH-only interventions are ineffective.
- There is no clear trend in the combination effects of categories in the sectors[135] unlike in the case of stunting. However, interventions related to the combination of feeding and health, and agriculture and health have certain effects.

One factor that causes an unclear trend regarding the combination of interventions for wasting may have been a limitation of the data. For example, the percentage of wasting in the total sample is < 10%, which is lower than that of stunting. It is also possible that appropriate variables were not included as determinants of wasting. For example, in areas where the probability of wasting is high, high-calorie supplemental foods are often given to wasted children who are deficient in the number of meals or calorie intake per day. The data of such interventions are not covered by the data used and are not included in the analysis, so the above estimating model may not have clearly captured the determinants of wasting.

[135] It seems that the combination of feeding and health are effective in both Asia and Africa, and the combinations of agriculture and health, as well as agriculture and WASH, are only effective in reducing wasting in Africa.

（4） Comparison among the MAD, MMF, and MDD

In the above analyses, the variable for agricultural sector intervention is the MAD, which is a standard that meets two criteria: the MMF and MDD. Although the above analyses found that agricultural sector intervention derived from MAD impacts child undernutrition, the following analysis examines which of the MAD components, namely MMF or MDD, is more strongly related to undernutrition (stunting and wasting).

The estimation model is as follows.

$$Stunted = \alpha + \beta_1 A + \beta_2 W + \beta_3 H + X + \mu + \varepsilon$$
$$Wasted = \alpha + \beta_1 A + \beta_2 W + \beta_3 H + X + \mu + \varepsilon$$

Stunted: a dummy variable showing the following: stunted children under the age of two = 1, otherwise = 0

Wasted: a dummy variable showing the following: wasted children under the age of two = 1, otherwise = 0

A: Agriculture is met

W: WASH is met

H: Health is met

X: Control variables (all variables listed in table 3-2)

μ: Dummy variables for each country

ε: Error term

The table below compares the results of models using the MAD, MMF, and MDD as variables for the agricultural sector (A).

In the model with stunting as the objective variable, A is not significant when the MAD and MMF are used as agriculture sector variables. On the other hand, A is significant when the MDD is used as an agricultural sector variable.

Table 3-19: Determinants of stunting in children aged under two years (comparison among the MAD, MMF, and MDD) (regression coefficients)

Explanatory variables	*A*(Agriculture) refers to MAD	*A*(Agriculture) refers to MMF	*A*(Agriculture) refers to MDD
***A*: Agriculture**	**-0.056**	**0.011**	**-0.088****
W: WASH	-0.05	-0.048	-0.02
H: Health	-0.159***	-0.192***	-0.127***

***1%, **5%, *10% significant

In the model with wasting as the objective variable, the MAD and MDD are not significant;

however, the MMF is significant.

These results show that stunting is strongly related to the MDD, whereas wasting is strongly related to the MMF.

Table 3-20: Determinants of wasting in children aged under two years (comparison among the MAD, MMF, and MDD) (regression coefficients)

Explanatory variables	*A*(Agriculture) refers to MAD	*A*(Agriculture) refers to MMF	*A*(Agriculture) refers to MDD
***A:* Agriculture**	**-0.08**	**-0.103*** **	**-0.047**
W: WASH	0.037	0.02	0.068
H: Health	-0.086**	-0.129***	-0.064

***1%, **5%, *10% significant

The results bring us the following implications.

- Quantitative interventions on diet, such as increasing the frequency of meals, are effective in reducing wasting.
- Quantitative interventions on diet are not effective in reducing stunting, but diversifying food intake is.

(5) Analysis of the underlying causes of undernutrition among children

Various control variables are included as explanatory variables in the analyses of child undernutrition (stunting and wasting) in Section 3.3 and 3.4 in addition to the feeding and policy variables of agriculture, WASH, and health. In the conceptual framework of UNICEF (1990) (see Figure 3-2), those control variables are considered basic causes that influence the underlying causes of child undernutrition.

We analyze the relation between underlying and basic causes, setting the former as the objective variable and the latter as the explanatory variable to determine the impact of these control variables on the following indicators related to feeding and health services, which are considered underlying causes of undernutrition:

Feeding

- ✓ MAD
- ✓ Early breastfeeding
- ✓ Age-appropriate breastfeeding

Health services

- ✓ Prenatal checkup
- ✓ Postnatal checkup
- ✓ Three doses of the DPT vaccine

The results of the analysis are shown in the table below. From the results, the following findings are observed.

- Multiple births negatively impact feeding practices, but affect health service utilization positively[136]. Having several household members also impacts the use of health services positively[137].
- Higher maternal education levels and women's empowerment have a positive impact on the underlying factors as a whole.
- Higher Wealth Indices generally affects the underlying factors positively.

Table 3-21: Influence of control variables on the underlying factors of undernutrition

		Feeding practices			Use of health services		
		MAD	**Early breastfeeding**	**Age appropriate breastfeeding**	**Prenatal checkup**	**Postnatal checkup**	**3 doses of DPT**
Household composition	Multiple birth (single birth: 0, multiple births: 1)	-0.452***	-0.531***	-0.259**	0.735***	0.283***	0.036
	Number of household members	0.019***	-0.007**	-0.002	0.022***	0.007*	0.007
Maternal factors	Mother's marital status (married: 1, other: 0)	0.353***	0.022	-0.058	0.116**	0.05	0.009
	Mother's age at first birth	0.009**	-0.006**	0.008**	0.009**	0.009***	0.017***
	Women's empowerment	-0.002	0.133***	0.081***	0.245***	-0.019	0.139***
	Mother's education level	0.034***	-0.005**	0.030***	0.110***	0.035***	0.066***
Economic factors	Wealth Index	0.105***	0.030***	0.047***	0.315***	0.103***	0.220***
Social factors	Area of residence (urban: 0, rural: 1)	0.011	0.042*	0.039	-0.359***	-0.060**	-0.012

Note: The figures in the table are the regression coefficients for each explanatory variable when multiple regression analysis is conducted, with each indicator for feeding practices and health services as the objective variables and the household, maternal, economic, and social factors as explanatory variables. The regression coefficients for each explanatory variable are as follows

+	Variables with a positive impact.
-.	Variables with a negative impact

***1%, **5%, *10% significant

The results bring us the following implications.

- Women's empowerment and improved education levels improve children nutrition through

[136]This may be because women with multiple births have fewer feeding resources to devote to a child than after a single birth, and feeding practices are relatively lower.

[137] This may be because a larger household means that more resources can be devoted to feeding and caring for children.

improved child feeding and access to health services.

- Feeding practices and health service utilization is also affected by household composition and household Wealth Index. This suggests the need for more intensive interventions for households with multiple births, fewer household members, and lower Wealth Indices, in which feeding practices and health service use levels are relatively low.

3.5. Analysis of the determinants of overnutrition among children under two years of age

In this section, we examine the determinants of overnutrition (overweight) among children. Our analysis uses the same explanatory variables as those in Sections 3.3 and 3.4 to compare the effects of each intervention and combination of interventions on undernutrition and overnutrition.

（1） Combination model with three categories

Based on the model with three categories (feeding, WASH, and health) examined in Section 3.3, we analyzed the effect of combined interventions on child overweight. The model is as follows.

$$Over\_Weight = \alpha + \beta_1 F + \beta_2 W + \beta_3 H + \beta_4 F_W + \beta_5 F_H + \beta_6 W_H + \beta_7 Aall3 + X + \mu + \varepsilon$$

Over_Weight: a dummy variable showing the following: overweight children under the age of two = 1, otherwise = 0

F: Only feeding is met

W: Only WASH is met

H: Only health is met

F_W: Only feeding and WASH are met

F_H: Only Feeding and health are met

W_H: Only WASH and health are met

$Aall3$: Feeding, WASH, and health are all met.

X: Control variables (all variables listed in table 3-2)

μ: Dummy variable for each country)

ε: Error term

Table 3-22 shows the summary statistics of the data analyzed in this section. Of the total sample (49,840), 2,429 children are overweight, which is approximately 5% of the total sample.

Table 3-22: Summary statistics of the combination model (category, overweight)

		Africa	Asia	Africa + Asia
Objective variable	Overweight	1,960	469	2,429
Explanatory variables	*F*: Feeding only	551	248	799
	W: WASH only	1,538	671	2,209
	H: Health only	15,909	4,755	20,664
	F_W: Feeding and WASH only	122	28	150
	F_H: Feeding and Health only	1,719	1,107	2,826
	W_H : WASH and Health only	4,923	2,211	7,134
	Aall3: All categories	898	328	1,226
Sample size		37,792	12,048	49,840

The results are shown in the table below. None of the explanatory variables are significant except for feeding and health in Asia.

Table 3-23: Results of analyzing the combined effect of combined interventions on overweight in children aged under two years with three categories (regression coefficients)

Explanatory variables	Africa	Asia	Africa + Asia
F: Feeding only	-0.021	-0.803	-0.148
W: WASH only	-0.066	-0.039	-0.061
H: Health only	0.093	-0.05	0.063
F_W: Feeding and WASH only	-0.442	-12.051	-0.563
F_H: Feeding and health only	-0.038	-0.651**	-0.177
W_H: WASH and health only	0.13	-0.002	0.100
$Aall3$: All categories	0.233	0.225	0.215
Significant control variable	Boy, multiple birth, shorter mother, fewer children under the age of five in the household, lower Wealth Index	Married mother, more household members, lower Wealth Index	Boy, multiple birth, married mother, shorter mother, lower Wealth Index
Sample size	37,792	12,048	49,840

***1%, **5%, *10% significant

(2) Combination model with three sectors

Based on the model with three sectors (agriculture, WASH, and health) examined in Section 3.4, we analyzed the effect of combined interventions on child overweight. The model is as follows.

$$Over\_Weight = \alpha + \beta_1 A + \beta_2 W + \beta_3 H + \beta_4 A_W + \beta_5 A_H + \beta_6 W_H + \beta_7 Aall3 + X + \mu + \varepsilon$$

Over_Weight: a dummy variable showing the following: overweight children under the age of two = 1, otherwise = 0

A: Only agriculture is met

W: Only WASH is met

H: Only health is met

A_W: Only agriculture and WASH are met

A_H: Only agriculture and health are met

W_H: Only WASH and health are met

$Aall3$: All of agriculture, WASH, and health are met

X: Control variables (all variables listed in table 3-2)

μ: Dummy variable for each country

ε: Error term

Table **3-24** shows the summary statistics of the data analyzed in this section.

Table 3-24: Summary statistics of the combination model (sectors, overweight)

		Africa	Asia	Africa + Asia
Objective variable	Overweight	1,945	466	2,411
Explanatory variables	*A*: Agriculture only	407	150	557
	W: WASH only	2,344	713	3,057
	H: Health only	15,343	4,824	20,167
	A_W: Agriculture and WASH only	137	13	150
	A_H: Agriculture and health only	1,934	1,225	3,159
	W_H: WASH and health only	3,999	2,163	6,162
	Aall3: All categories	1,001	349	1,350
Sample size		37,409	11,911	49,320

The results are shown in the table below. All explanatory variables are insignificant except for agriculture and health in Asia.

Table 3-25: Results of analyzing the effect of combined interventions on overweight in children aged under two years with three sectors (regression coefficients)

Explanatory variables	Africa	Asia	Africa + Asia
A: Agriculture only	0.244	-0.264	0.154
W: WASH only	0.018	-0.348	-0.035
H: Health only	0.090	-0.134	0.042
A_W: Agriculture and WASH only	0.104	-11.127	0.022
A_H: Agriculture and health only	0.000	-0.802***	-0.173
W_H: WASH and health only	0.096	-0.01	0.074
Aall3: All categories	0.240*	0.078	0.192
Significant control variable	Boy, multiple birth, shorter mother, fewer number of children under the age of five in household, lower Wealth Index	Married mother, larger household, lower Wealth Index	Boy, multiple birth, married mother, lower Wealth Index
Sample size	37,409	11,911	49,320

***1%, **5%, *10% significant

The above results suggest that feeding or agriculture, WASH, and health interventions that are effective in improving undernutrition are not effective in reducing overnutrition. It appears that a different approach is needed to improve overweight.

3.6. Analysis of the determinants of anemia among women

This section examines the determinants of anemia, a major indicator of undernutrition among women. The analysis is based on a previous study, namely "WHO (2020): Global Anemia Reduction Efforts among Women of Reproductive Age". The effect of the multi-sectoral approach is examined by including variables of relevant sectoral interventions to improve nutrition.

In the DHS data analyzed in this report, the intervention variable for agricultural sector, which is the indicator for adult diets (MAD), are only included in Madagascar. Therefore, we analyze the determinants of anemia using WASH and health to include all sample countries. Then, we include the intervention variables for the three sectors of agriculture, WASH, and health using only the data from Madagascar to assess the impact of interventions and combinations of interventions on anemia in each sector.

（1） Two sectors (WASH and Health) intervention model

The objective is to analyze the effect of WASH and health interventions on anemia among women. The hypothesis of the model is that WASH and health interventions reduce the probability of anemia among women. Based on WHO (2020) and considering data availability in DHS, the following model is assumed.

$$Anemia = \alpha + \beta_1 W + \beta_2 I + \beta_3 D + \beta_3 M + \beta_5 WE + \beta_6 E + \beta_7 WI + \varepsilon$$

(Objective variable)

Anemia: Woman between 15 and 49 years of age with anemia = 1, otherwise = 0

(Explanatory variable)

- WASH interventions

W: WASH[138] is met

- Health interventions

I: Taking iron pills

D: Taking deworming pills

M: Taking malaria prevention treatment[139]

- Control variables

WE: Women's empowerment[140]

[138] As in the analyses of child undernutrition, WASH is considered satisfied if three of the followingfive factors are met: 1) access to safe drinking water, 2) access to improved sanitation facilities, 3) proportion of open defecation at the community level (less than 75%), 4) proper hand washing facilities, and 5) proper disposal of children's stool.

[139] The way to take malaria prevention treatments. (https://www.mofa.go.jp/mofaj/gaiko/oda/shimin/oda_ngo/shien/pdfs/05_hoken_01.pdf)

[140] As in the analysis of child undernutrition, we determined that women's empowerment is met if each of the following three factors are met. (1) The mother makes decisions about her own medical care alone or in consultation with her husband, (2) The mother makes decisions about major expenses alone or in consultation with her husband, and (3) The mother visits family members or relatives alone or in consultation with her husband.

E: Number of years of schooling for the mother

WI: Asset Ownership Index

- Other

ε: Error term

Table 3-26 shows the summary statistics of the data analyzed in this section. Out of the total sample (51,701), the proportion of women with anemia is about 54% (27,638).

Table 3-26: Summary statistics of the two sector (WASH and health) model (Anemia)

		Africa	Asia	Africa + Asia
Objective variable	Anemia	25,543	2,095	27,638
Explanatory variables	*W*: WASH	5,315	106	5,421
	I: Taking iron pills	40,252	3,576	43,828
	D: Taking deworming pills	20,723	2,825	23,548
	M: Taking malaria prevention treatment	29,151	2	29,153
Sample size		47,930	3,771	51,701

The results are shown in the table below. In Africa + Asia, all health intervention variables (taking iron pills, taking deworming pills, and taking malaria preventive treatment) are significant, whereas WASH is not significant. The trend of the result in Africa is similar to that of Africa + Asia, whereas the explanatory variables for WASH of taking deworming pills and taking malaria prevention are not significant in Asia. The result also shows that women's empowerment significantly reduced anemia in Africa and Africa + Asia.

The results bring us the following implications.

- Overall, interventions in health such as iron supplementation, provision of deworming pills, and malaria preventive treatment are all effective in reducing anemia among women.
- Improving women's empowerment is also effective in reducing anemia among women in certain cases.

Table 3-27: Results of analyzing the effect of two sectors intervention on anemia in women (regression coefficients)

Variable	**Regression coefficient**		
	Africa	**Asia**	**Africa + Asia**
W: WASH is met	0.008	-0.098	0.012
I: Taking iron pills	-0.059**	-0.322**	-0.072***
D: Taking deworming pills	-0.170***	0.006	-0.167***
M: Taking malaria prevention treatment	-0.279***	-0.05	-0.262***
WE: Women's empowerment[141]	-0.165***	0.076	-0.161***

[141] As in the analysis of child undernutrition, we determined that women's empowerment is met if all of the following three

E: Number of years of schooling of mother	-0.024***	0.006	-0.023***
WI: Wealth Index	-0.020***	-0.133***	-0.029***
Sample size	47,930	3,771	51,701

***1%, **5%, *10% significant

（2） Three sector intervention model (Only Madagascar)

Because data on women's feeding is only available for Madagascar, we estimate a three sector intervention model for Madagascar that includes feeding as an agricultural sector variable.

The model is as follows.

$$Anaemia = \alpha + \beta_1 A + \beta_2 W + \beta_3 I + \beta_4 D + \beta_5 M + \beta_6 WE + \beta_7 E + \beta_8 WI + \varepsilon$$

(Objective variable)

Anemia: Woman between 15 and 49 years of age with anemia = 1, otherwise=0

(Explanatory variable)

- Interventions in the agricultural sector

MDD: Female dietary requirements are met (Those who consume five or more out of ten food groups listed in FAO and USAID/FANTA III are 1, otherwise 0)

- WASH interventions

W: WASH[142] is met

- Health Interventions

I: Taking iron pills

D: Taking deworming pills

M: Taking malaria prevention treatment

- Control variables

WE: Women's empowerment[143]

E: Number of years of schooling for the mother

WI: Asset Ownership Index

- Other

ε: Error term

factors are met. (1) The mother makes decisions about her own medical care alone or in consultation with her husband, (2) The mother makes decisions about major expenses alone or in consultation with her husband, and (3) The mother visits family members or relatives alone or in consultation with her husband.

[142] As in the analyses of child undernutrition, WASH is considered met if three of the following five conditions are met: 1) access to safe drinking water, 2) access to improved sanitation facilities, 3) proportion of open defecation at the community level (less than 75%), 4) proper hand washing facilities, and 5) proper disposal of children's stool.

[143] As in the analysis of child undernutrition, we determined that women's empowerment is met if all of the following three factors are met. (1) The mother makes decisions about her own medical care alone or in consultation with her husband, (2) The mother makes decisions about major expenses alone or in consultation with her husband, and (3) The mother visits family members or relatives alone or in consultation with her husband.

The results of this regression model shows that deworming pills and malaria prevention treatment are not significant, so we removed these two variables from the model.

Table 3-28 shows the summary statistics of the data analyzed in this section. Among the total sample (4,138), the proportion of women with anemia is about 61% (2,597).

Table 3-28: Summary statistics of the three sector intervention model (Anemia)

		Madagascar
Objective variable	Anemia	2,597
Explanatory variables	Agriculture (MDD)	602
	WASH	362
	Health (Taking iron pills)	2,380
Sample size		4,138

The results are shown in the table below. Variables related to agriculture, WASH, and health interventions are found to be significant for anemia. Female empowerment and years of schooling of women are also significant.

Table 3-29: Results of analyzing the effect of intervention in three sectors on anemia in women (regression coefficients)

Explanatory variables	Estimated value
Agriculture (MDD)	-0.237**
WASH	-0.243***
Health (Taking iron pills)	-0.211***
Women Empowerment	-0.121***
Years of schooling for women	-0.017*
Wealth Index	0.027
Sample size	4,138

***1%, **5%, *10% significant

(3) Combination of three sectors model (Only Madagascar)

We estimate the following model by applying the World Bank (2018) model used to test the effect of the multi-sectoral approach on child stunting and wasting.

The model is as follows.

$$Anaemia = \alpha + \beta_1 A + \beta_2 W + \beta_3 H + \beta_4 MDD_W + \beta_5 MDD_H + \beta_6 W_H + \beta_7 Aall3 + +\beta_8 WE + \beta_9 E + \beta_{10} WI + \mu + \varepsilon$$

(Objective variable)

Anemia: Woman between 15 and 49 years of age with anemia = 1, otherwise=0

(Explanatory variable)

The explanatory variables used in this analysis are the same as those used in Section 3.6 (2) or combinations of them. However, for WASH, the variable is created with modified definitions due to the small number of cases[144].

A: Only agriculture is met
W: Only WASH is met
H: Only health (taking iron pills) is met
A_W: Only agriculture and WASH are met
A_H: Only agriculture and health are met
W_H: Only health and WASH are met
$Aall3$: Agriculture, WASH, and health sectors are met
WE: Women empowerment
E: Number of years of schooling for the mother
WI: Wealth Index
ε: Error term

Table 3-30 shows the summary statistics of the data analyzed in this section.

Table 3-30: Summary statistics of the combination model (sector, anemia)

		Madagascar
Objective variable	Anemia	2,597
Explanatory variables	A: Only agriculture is met	139
	W: Only WASH is met	477
	H: Only health (taking iron pills) is met	1,082
	A_W: Only agriculture and WASH are met	74
	A_H: Only agriculture and health are met	171
	W_H: Only health and WASH are met	909
	$Aall3$: The agriculture, WASH, and health sectors are met	218
Sample size		4,138

The results are shown in Table 3-31 and Figure 3-9. Agriculture only, WASH only, and health

[144] Using the WASH variable used in the analysis of child undernutrition, very few cases (71) satisfy all three sectors. Therefore, referring to WHO (2020), we determined that WASH is satisfied if one of the following three factors is met: (1) safe source of drinking water, (2) hand-washing station with running water and soap, and (3) toilet availability

only are not significant, but combinations of those sectors are significant. For example, "agriculture and WASH" and "agriculture and health" are particularly high. *Aall3* is slightly higher than the others and is the largest. In addition, women's empowerment significantly reduces anemia.

The results bring us the following implications.

- Single sector interventions do not affect anemia among women, but the multi-sectoral approach has an effect on reducing anemia. The more sectors intervene, the more the probability of anemia decreases. This implies that the multi-sectoral approach to anemia in women is effective.
- Improving women's empowerment is also effective in reducing anemia among women.

Table 3-31: Results of analyzing the effect of combined interventions on anemia in women with three sectors (regression coefficients)

Explanatory variables	estimated value
A: Only agriculture is met	0.048
W: Only WASH is met	-0.166
H: Only health (taking iron pills) is met	-0.142
A_W: Only agriculture and WASH are met	-0.575*
A_H: Only agriculture and health are met	-0.604***
W_H: Only health and WASH are met	-0.388***
$Aall3$: Agriculture, WASH, and health sectors are met	-0.606***
WE: Women empowerment	-0.237***
E: Number of years of schooling for the mother	-0.014
WI: Wealth Index	-0.097***
Sample size	4,138

***1%, **5%, *10% significant

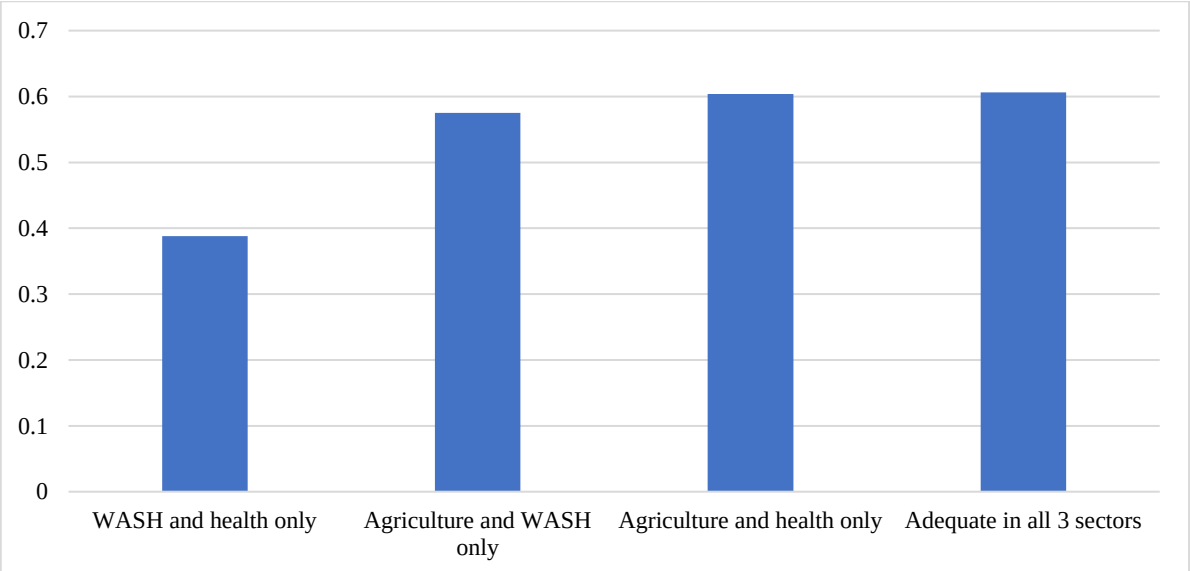


Figure 3-9: Results of analyzing the effect of the combined interventions on anemia in women with three sectors (regression coefficients)

3.7. Analysis reflecting the idea of bottlenecks

The results of the above analyses imply the importance of the multi-sectoral approach in improving undernutrition, especially the effectiveness of interventions in a wide range of categories or sectors. Although stakeholders of project planning and implementation recognize the effectiveness of the multi-sectoral approach, intervening in all sectors with limited resources is often difficult. It means that guidelines for more focused and effective interventions are needed. One hypothesis is that focused interventions in the most underdeveloped sectors in the target area are more effective than comprehensive interventions in multiple sectors. We now call the most underdeveloped sectors bottlenecks. The following analysis is conducted to test this hypothesis.

（1） Method

The more specific hypotheses for the analysis are as follows:

- In countries in which the situation in a sector is sufficiently good, interventions in that sector have little impact on nutrition improvement, whereas the impact on nutrition improvement is greater in countries where the situation is poor.
- Interventions in bottleneck sectors are more effective in nutrition improvement than interventions in all relevant sectors.

The following analysis is conducted to test the above hypothesis:

The countries in the sample are divided into two groups: countries whose situation in each sector is average or better and those whose situation is worse. The differences in the effect of the interventions on nutrition indicators in the two groups are determined. Details of the groupings are provided in the Appendix 3.

To divide the countries into groups, we use the country level indicators shown in the table below. The table shows countries below the first quartile, which corresponds to the lower 25%, that considered to be in poor condition. Countries above the first quartile considered to be in good condition.

Table 3-32: Indicators used to group the countries

Sector	Indicators used for grouping	Reference value for group division (25th percentile)	Reference year for indicators	Source of data
Agriculture	% of children aged 6-23 months who receive the Minimum Acceptable Diet	10.9	2010 to 2018	UNICEF
WASH	% of households with access to basic drinking water	83.3	2014	JMP [145] :.UNICEF & WHO
Health	% of women who received antenatal care from skilled providers	83.7	2009 to 2017	DHS

[145] JMP: Joint Monitoring Program for Water Supply, Sanitation, and Hygiene

(2) Model

The analyses in this section use the following two models. All countries are assigned to one of the two groups based on Table 3-32 to compare the impact of each sector on the reduction in stunting between the groups.

1) Single sector model

The model to examine the impact of interventions in the agriculture, WASH, and health sectors on stunting is as follows.

$$Stunted = \alpha + \beta_1 A + \beta_2 W + \beta_3 H + X + \mu + \varepsilon$$

Stunted: a dummy variable showing the following: stunted children under the age of two = 1, otherwise = 0
A: Agriculture is met
W: WASH is met
H: Health is met
X: Control variables (all variables listed in table 3-2)
μ: Dummy variables for each country
ε: Error term

2) Combination model

The model is as follows.

$$Stunted = \alpha + \beta_1 A + \beta_2 W + \beta_3 H + \beta_4 A_W + \beta_5 A_H + \beta_6 W_H + \beta_7 Aall3 + X + \mu + \varepsilon$$

Stunted: a dummy variable showing stunted children under the age of two = 1, otherwise = 0
A: Only agriculture is met
W: Only WASH is met
H: Only health is met
A_W: Only agriculture and WASH are met
A_H: Only agriculture and health are met
W_H: Only WASH and health are met
$Aall3$: Agriculture, WASH, and health are all met
X: Control variables (all variables listed in Table 3-2)
μ: Dummy variables for each country
ε: Error term

(3) Results

We estimate the determinants of stunting using the 1) single sector model, and 2) combination

model after assigning the countries to the two groups, one in good condition and the other in poor condition in terms of each sector (agriculture, WASH, and health). The results are shown below.

1） **Agriculture**

The impact of each sector on stunting is analyzed after grouping was performed based on the percentage of children between the ages of 6-23 months who meet the MAD. The results are shown in the table below.

Comparing the results in single sector models for both groups, agriculture is significant in the group with a low percentage of children that meet the MAD and affected the reduction in the probability of stunting. On the other hand, for the group with a high percentage of children who meet the MAD, agriculture is not significant, and it does not affect stunting. In other words, the results support the hypothesis that agricultural sector interventions are effective in improving stunting in the group with poor conditions in the agriculture sector, whereas these interventions are ineffective in improving stunting in the group with good conditions in the agriculture sector.

Furthermore, the health-only variable is significant in all models, and it shows that "health only" effectively improves stunting in all situations[146].

The results of the combination model show that the coefficients for agriculture and health in the group with low MAD are larger than the coefficients of *Aall3*. This indicates that a intervention combining agriculture, a sector with a poor situation, and health, which is effective on its own, is more effective than comprehensive interventions in the three sectors.

Table 3-33: Analysis of the effect of the intervention on the stunting of children under two years of age - grouped by indicators of the agriculture sector (regression coefficients)

Explanatory variables	Group with a low percentage of children meeting the MAD		Groups with a high percentage of children meeting the MAD	
	Single sector model	Combination model	Single sector model	Combination model
***A:* Agriculture**	**-0.171****		**-0.009**	
W: WASH	-0.015		-0.064	
H: Health	-0.143***		-0.156***	
A: Agriculture only		0.132		-0.016
W: WASH only		0.015		-0.008
H: Health only		-0.124***		-0.155***
A_W: Agriculture and WASH only		0.622		-0.225
A_H: Agriculture and health only		-0.475***		-0.156**
W_H: WASH and health only		-0.177**		-0.231***
Aall3: All three sectors		-0.438**		-0.249***
Sample size	21,221	22,233	28,356	28,881

***1%, **5%, *10% significant

[146] This result is consistent with the results of the analyses in section 3 and 4

2) WASH

The impact of each sector on stunting is analyzed following grouping based on the proportion of households with access to basic drinking water. The results are shown in the table below.

In the single sector model, WASH is significant in the group with a low proportion of households with access to basic drinking water. This indicates WASH effectively reduces stunting in countries with drinking water services in poor condition. On the other hand, WASH is insignificant in the group with a high proportion of households with access to basic drinking water. The results support the above hypothesis.

Furthermore, the health only variable is significant in all models, which shows that it is effective in improving stunting in all situations

In addition, the results of the combination model show that the coefficients of *Aall3* is the highest. These results do not support the hypothesis that intensive interventions in the underdeveloped sectors are more effective than comprehensive interventions in all sectors. However, it shows that the coefficients of WASH and health in the groups with low access to basic drinking water are sufficiently large. The effect of interventions that combine WASH, an underdeveloped sector, with health, which is effective on its own, is large. This suggests that intensive interventions in both sectors have some effect on reducing stunting.

Table 3-34: Analysis of the effect of interventions on children under two years of age- grouped by indicators of the WASH sector (regression coefficients)

Explanatory variables	Groups with a low proportion of households with access to basic drinking water		Groups with a high proportion of households with access to basic drinking water	
	Single sector model	Combination model	Single sector model	Combination model
A: Agriculture	-0.054		-0.011	
***W*: WASH**	**-0.094****		**0.056**	
H: Health	-0.158***		-0.129**	
A: Agriculture only		0.084		0.039
W: WASH only		-0.100		0.112
H: Health only		-0.155***		-0.131*
A_W: Agriculture and WASH only		0.431		-0.123
A_H: Agriculture and health only		-0.236***		-0.161
W_H: WASH and health only		-0.244***		-0.107
Aall3: All three categories		-0.431***		-0.097
Sample size	37,904	39,202	11,673	11,912

***1%, **5%, *10% significant

3） **Health**

The impact of each sector on stunting is analyzed following grouping based on the rates of prenatal checkups by specialists. The results are shown in the table below.

Single sector models show that the group with the lower rates of prenatal checkups by specialists has a higher absolute coefficient of health value, which impacts the reduction of the incidence of stunting more significantly. This result supports the above hypothesis.

Furthermore, the health-only variable is significant in all models, and it shows that the health only variable effectively improves stunting in all situations

The results of the combination models show that health only and a combination of health and agriculture in the "low rates of prenatal checkups by specialists" group are significantly effective in reducing stunting. This indicates that intensive interventions in health sector, which is a underdeveloped sector, are more effective than uniform interventions in all three sectors.

Table 3-35: Analysis of the effect of the interventions on the stunting of children under two years of age - grouped by indicators of the health sector (regression coefficients)

Explanatory variables	Groups with low rates of prenatal checkups by specialists		Groups with high rates of prenatal checkups by specialists	
	Single sector model	Combinatorial model of intervention	Single sector model	Combinatorial model of intervention
A: Agriculture	-0.03		-0.078*	
W: WASH	0.104		-0.086*	
***H*: Health**	**-0.219*** **		**-0.111** **	
A: Agriculture only		0.036		-0.026
W: WASH only		0.059		0.008
H: Health only		-0.231***		-0.085*
A_W: Agriculture and WASH only		0.815		-0.216
A_H: Agriculture and health only		-0.328***		-0.165**
W_H: WASH and health only		-0.131		-0.203***
Aall3: All three categories		-0.403		-0.264**
Sample size	16,164	16,164	34,507	34,950

***1%, **5%, *10% significant

The results bring us the following implications.

- Single health sector intervention improves stunting effectively in any situation.
- In cases where one sector is sufficient, the intervention has little impact on the sector.
- The hypothesis that "interventions in underdeveloped sectors are more effective in nutrition improvement than comprehensive interventions in all relevant sectors" is proven in the agriculture and health sectors, but not the WASH sector. However, the effect of interventions that combine a underdeveloped sector with health, which is also effective on its own, is sufficiently high, and can be higher than that of comprehensive interventions in the all three sectors in some situations (e.g., when the agriculture sector is underdeveloped).

3.8. Summary of the results

A summary of the results of the quantitative analyses corresponding to the research questions in Section 3.1 is provided below.

（1） Undernutrition among children

- Does the multi-sectoral approach effectively reduce stunting even when the analysis includes Asian countries in addition to African countries (Section 3-3)?
  - Even if the scope of target countries is expanded to Asia, rather than Sub-Saharan Africa alone, which has been analyzed by the World Bank (2018), the multi-sectoral approach is recognized as effective in reducing stunting among children under two years of age. The impact of the multi-sectoral approach increases as the number of categories (feeding, WASH, and health) implemented increases.
  - However, while the coverage of interventions in a single category is relatively high (approximately half of the total sample), only 2% of households receive interventions in all three categories. The multi-sectoral approach does not appear to have progressed at the household level.

- What combinations are effective with respect to interventions such as feeding, water and sanitation, and health (Section 3-3)?
  - Interventions of feeding only and WASH only do not reduce stunting, but when these categories are combined with health category, these combinations improve stunting. In addition, the more intervention categories are implemented, the greater the improvement effect.

- Does the multi-sectoral approach effectively improve wasting? Additionally, what combinations of interventions are effective (Section 3-3)?
  - Even with wasting as the objective variable, the more categories of interventions (feeding, WASH, and health) are included, the more wasting is reduced among children under the age of two while the impact is limited. In other words, the multi-sectoral approach reduces wasting effectively.

- In the World Bank (2018), the interventions were not sorted by sector. Is the multi-sectoral approach effective even after the interventions are re-sorted by sector? Also, what combinations of interventions are effective (Section 3-4)?
  - Even when interventions are organized by sector (agriculture, WASH, and health sectors), the impact of the multi-sectoral approach to reduce stunting and wasting is recognized.
  - When interventions are organized by sector (agriculture, WASH, and health sector), interventions in agriculture- and WASH alone do not reduce stunting. However, combining these sectors with interventions in the health sector improves stunting.

- Health-only intervention is effective in reducing wasting, whereas agriculture only and WASH only intervention is not. There is no clear trend in the improvement of wasting as in the case of stunting, but health sector and feeding interventions do have some effect.

➢ The Minimum Acceptable Diet (MAD), which is used as an intervention variable in feeding and agriculture sectors, can be divided into the Minimum Meal Frequency (MMF) and Minimum Dietary Diversity (MDD). What is the relationship between child undernutrition, and MMF and MDD (Section 3-4)?

- Stunting is strongly correlated MDD, whereas wasting is strongly related to MFF.
- In other words, quantitative interventions, such as increasing the number of meals, effectively reduce the incidence of wasting. On the other hand, quantitative interventions are not sufficient to reduce stunting, suggesting that enhancing the diversity of food intake is essential to improve stunting.

➢ Factors such as women's empowerment, maternal education level, and household Wealth Index correspond to "Basic Causes" that influence "Underlying Causes" of undernutrition such as feeding, WASH, and health in the conceptual framework for maternal and child nutrition proposed by UNICEF (1990). Is the relationship between the basic- and underlying causes in the UNICEF model appropriate (section 3-4)?

- Women's empowerment, maternal education level, and household Wealth Index are considered basic causes that influence the underlying causes of child undernutrition.
- Women's empowerment and higher maternal education levels affect the improvement of children's nutritional status through feeding and increasing their level of access to health services.
- Feeding practices and health service use are also affected by household composition and Wealth Index. This suggests the need for more intensive interventions for households with multiple births, and households with low Wealth Indices to improve their levels of feeding practices and health service use.

(2) Overnutrition among children

➢ Is the multi-sectoral approach also effective in improving overweight among children (Section 3-5)?

- The same analysis as that performed for child undernutrition (stunting and wasting) did not show the effectiveness of feeding (or agriculture), WASH, and health interventions in improving overweight. It appears that a different approach from the one for undernutrition is needed to improve overweight.

（3） Anemia among women

- Does the multi-sectoral approach effectively improve the incidence of anemia among women (Section 3-6)?

  <Analysis targeting 24 countries (Two sector models: WASH and health)>

  - Interventions in the health sectors, such as iron supplementation, deworming pill use, and malaria prevention treatment, are all effective in reducing anemia among women.
  - Improving women's empowerment is also effective in reducing anemia among women in certain cases.

  <Analysis of Madagascar (Three sector models: agriculture, WASH, and health)>

  - Single sector interventions do not affect anemia among women, but the multi-sectoral approach reduces the incidence of anemia. The more sectors intervened in, the more the reduction. This shows the effectiveness of the multi-sectoral approach to anemia among women.

（4） Effectiveness of interventions in bottleneck sectors

- Are focused interventions in the least developed sectors, which may be bottlenecks, more effective than comprehensive interventions in multiple sectors?
  - Health-only intervention is effective in improving stunting in countries with better health services and those with poor health services alike.
  - If the indicator in a sector is sufficiently good, the impact of intervention on nutrition improvement is low in the sector.
  - The hypothesis that "interventions in underdeveloped sectors improve nutrition more effectively than comprehensive interventions in all relevant sectors" is not necessarily proven. However, the effect of interventions that combine underdeveloped sectors with the health sector that are effective alone is sufficiently high, and in some cases (e.g., when interventions in the agricultural sector are underdeveloped) the effect is higher than that of comprehensive interventions in all relevant sectors.

3.9. Limitations of this quantitative analysis

It should be noted that the DHS used in this analysis has the following limitations, and therefore, this analysis has the following.

- The only available indicator of agricultural sector intervention was Minimum Accepted Diet, which is a food-related indicator and does not directly indicate agricultural sector intervention.
- It is also possible that appropriate variables could not be utilized as determinants of wasting in this analysis. For example, in areas with a high incidence of wasting, high-calorie supplemental diets are often given to children with wasting. The presence of such interventions was not covered by the data used and could not be included in the analysis.

- Since appropriate variables as determinants of overnutrition (e.g., physical activity, fat intake, etc.) could not be utilized in this analysis, the same variables as those used in the factor analysis for undernutrition were utilized as the next best option.

Chapter 4. Summary

Implications from the main findings of the analysis in Chapters 2 and 3 are summarized below.

● **Effectiveness and implementation challenges of multi-sectoral initiatives in improving undernutrition**

The quantitative analysis in Chapter 3 showed the effectiveness of multi-sectoral efforts in improving undernutrition, particularly interventions in a wide range of sectors. On the other hand, few households received interventions from the three sectors of agriculture, water and sanitation, and health, confirming the current lack of progress in multi-sectoral interventions at the household level. This may reflect the fact that the ministries in charge of each sector set their own targets for the interventions. For example, as revealed in the analysis in Chapter 2, despite multi-sectoral nutrition improvement policies and strategies having been developed in the surveyed countries, they have not adopted measures and mechanisms to set targets for nutrition improvement and concentrate multi-sectoral interventions.

Intersectoral coordination and geographic concentration of resources would not be a challenge if the services and interventions were delivered regionally and evenly in each sector[147]. However, when resources for interventions are limited, as in the case of developing countries, adopting a convergence approach to geographically and hierarchically concentrate the multi-sectoral interventions needed to improve nutrition may be appropriate.

One model for such an approach is JICA's work in Niassa Province, Mozambique, which was discussed in Chapter 2. In this project, planning and monitoring/evaluation are conducted jointly by the relevant ministries and agencies, but implementation is carried out by each sector on its own, which means that the coordination costs for multi-sectoral efforts are relatively low. However, it is still difficult to coordinate the implementation areas and timing of separate projects in multiple sectors, which requires close coordination in planning.

Target complementary interventions in areas where other donors are conducting nutrition improvement activities may also be both efficient and effective.

Furthermore, activities that promote collaboration and coordination among the relevant sectors at the field level to improve nutrition may also be effective. An example of such an intervention is the JICA-implemented "Project on Capacity Development for Nutrition Improvement in Federal Capital Territory" project. In this project, close multisectoral coordination and collaboration is taking place, but sustaining such a dense multisectoral collaboration is a large obstacle, and it seems that some innovations are needed to ensure sustainability. Examples include providing budgetary measures for multi-sectoral activities and raising awareness of inter-sectoral cooperation by jointly organizing training and events to improve nutrition. However, there are few examples of inter-sectoral collaboration and coordination or good practices at the field level, and more examples, demonstrations, and experience accumulation are needed in the future.

[147] For example, in the process of improving nutrition in postwar Japan, there was no coordination of various policies. See "JICA (2020) Information Collection on Good Practices in Japan that Contribute to Nutrition Improvement and IFNA Promotion."

● **Intervention in bottleneck sectors**

The hypothesis tested in Chapter 3, that interventions in deficient sectors improve nutrition more effectively than uniform interventions in all relevant sectors, was not necessarily substantiated. However, when the situation in a sector is sufficiently good, analysis indicated that intervention in that sector had little impact on the improvement of nutrition. When planning and implementing a project, it is crucial that not only the picture nutrition situation in the field, but also the detailed situation of related sectors be investigated, and one should consider concentrating resources on interventions other than those in deficient sectors.

● **Combining interventions in the agriculture, water, and sanitation sectors with activities in the health sector**

The analysis in Chapter 3 shows that interventions in the agriculture, water and sanitation sectors are less effective when implemented alone, but tend to lead to improved nutrition when combined with the health sector. This suggests that combining the interventions of the agriculture, water, and sanitation sectors with the activities of the health sector is effective.

However, as mentioned above, the differences in the targets of each sector may obstruct the implementation of multi-sectoral initiatives. For example, while vulnerable groups are often the ones most in need of nutrition improvement interventions, the target audience for agriculture sector activities tends to be farmers with a certain level of production capacity, which may result in the targets being mismatched. In this case, measures such as paying attention to the role of agriculture in targeting vulnerable groups for nutrition improvement are required in project planning.

When designing projects in the agriculture, water, and health sectors, which are closely related to nutrition improvement, it may be helpful to include a process to check whether the target sector is a bottleneck sector and to consider whether a nutrition component is necessary at the activity-outcome level.

●**Effectiveness of the UNICEF model on undernutrition (1990)**

The quantitative analysis in Chapter 3 showed that agriculture, water and sanitation, and health sector interventions are the underlying causes that directly affect child undernutrition, whereas women's empowerment, mothers' education level, and household income are factors influencing these underlying causes. The results of this analysis demonstrate the effectiveness of the multilayered conceptual framework for maternal and child nutrition proposed by UNICEF (1990). However, it simultaneously alludes to the diversity and complexity of factors affecting the nutritional situation, and the need for careful planning of activities, goals, and their indicators in project planning.

As shown in the analysis in Chapter 2, in some countries, the structure of nutrition policy targets and indicators is also inappropriately structured[148], and policy makers may not sufficiently

[148] For example, in the nutrition policies of Bangladesh and Nigeria, health and care-related indicators are set alongside the percentage of children with stunting and wasting, which are low nutrition indicators, as well as full breastfeeding and

understand the causal relationship between nutrition improvement indicators and various interventions in some cases. In setting project activities, targets, and indicators, even if they are inconsistent with the country's policy indicators, it is crucial that they be aligned with the factors and structures of nutrition improvement that identified through empirical studies.

In addition to the situation of agriculture, water, sanitation, and health sectors, which are directly related to the nutrition situation, various other information such as socioeconomic factors, household conditions, and the status of women's education and empowerment should be collected and used for setting project targets and measuring effectiveness.

minimum dietary standards, which are the causes of stunting and wasting. Therefore, the impact of nutrition on agricultural activities is unclear.

Appendix 1

Nutritional improvement projects in target countries in " Chapter 2 Review of Multi-sectoral Initiatives"[149]

	Bangladesh	Ghana	Mozambique	Nigeria
Integrated Type	● Strengthening Household Ability to Respond to Development Opportunities (SHOUHARDO) project (Implementing agencies: USAID/CARE, Health + Water and Sanitation + Gender + Agriculture + Disaster Prevention) ● Food and Nutrition Technical Assistance III Project (FANTA) (2012-2018) (Implementing agencies: USAID/FHI 360, Health care + Agriculture + Multisector Planning)			● Maximizing Agricultural Revenue and Key Enterprises in Target Sites (MARKETS Nigeria) (2005-2012) (Implementing agency: USAID, Farming + household improvement + nutrition education) ● Child Development Grant Program (2013-2019), (Implementing agency: UKAID, Cash transfer + nutrition education) ● Project on Capacity Development for Nutrition Improvement in Federal Capital Territory. (2019 - 2024) (Implementing agency: JICA, Nutrition + Hygiene + Agriculture + Livelihood Improvement)
Combined Type (1)	● MDG-F Program (Protecting and Promoting Food Security and Nutrition for Families and Children in Bangladesh) (2010-2013) (Implementing Agencies: WFP, UNICEF, and FAO, agriculture + health care + education) ● Alive & Thrive (A&T) project (2011-2014) (Implementing agencies: Bill & Melinda Gates Foundation/FHI 360, Health		● Orange-fleshed Sweet Potato (2006-2009) (Implementing agency: HarvestPlus/World Vision/Helen Keller Foundation/EMBRAPA), Agriculture + health + hygiene ● Renewed Efforts Against Child Hunger and Undernutrition (REACH) initiative (2008-) (Implementing agency (partners): United Nations (WFP, FAO, WHO, UNICEF), Advisory: IFAD, Health + agriculture + multi-sectoral planning) ● Accelerating Nutrition	

[149] In the list of nutrition-related projects, four categories (devised by the study team) were applied based on the form of the intervention: 1) "Integrated Type" in which multi-sectoral approaches are implemented in a single project; 2) "Combined Type (1)", in which direct and indirect nutrition interventions are combined and implemented in the same target area; 3) "Combined Type (2)", in which only multiple indirect interventions are combined and implemented in the same area; and "Single Type", in which interventions are implemented by a single sector only (which is not actually a multi-sectoral approach).

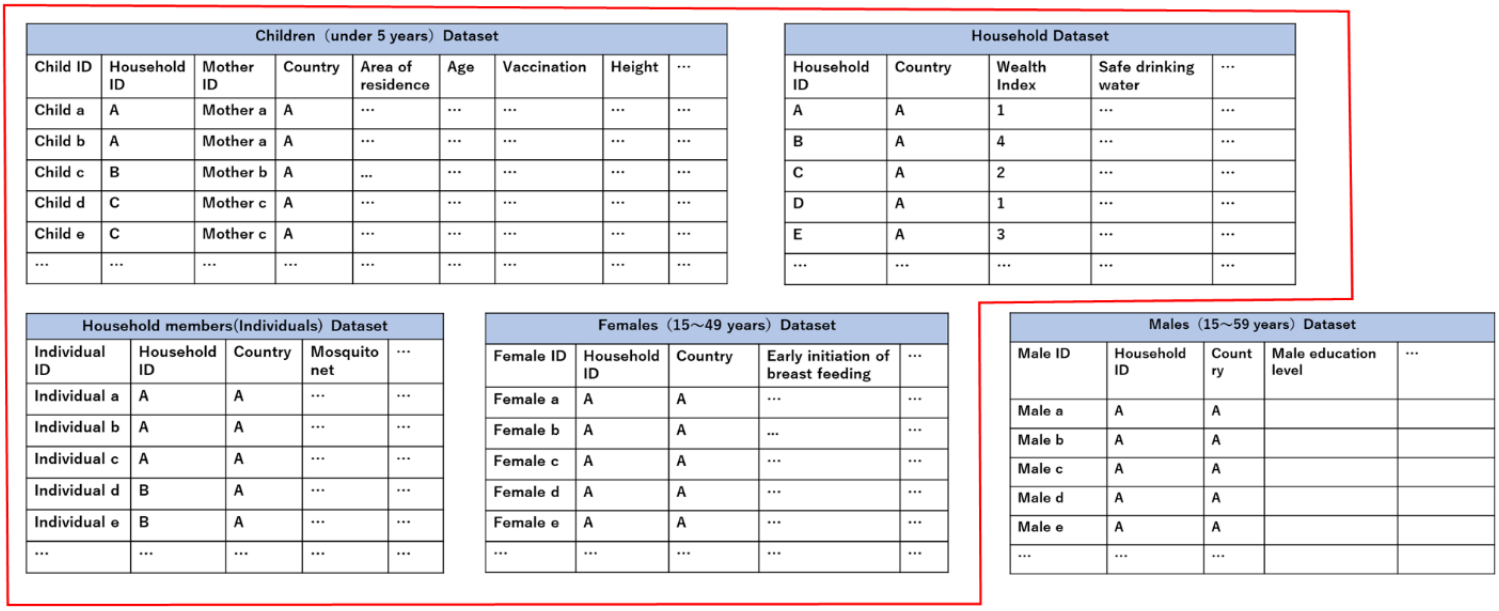
	Bangladesh	Ghana	Mozambique	Nigeria
	Care + Water and Sanitation)		Improvements (2012-2016) (Implementing agency: WHO/Ministry of Health/Global Affairs Canada, Health)	
Combined Type (2)	● Linking Fisheries and Nutrition: Promoting Innovative Fish Production Technologies in Ponds and Wetlands with Nutrient-Rich Small Fish Species in Bangladesh (2010-2013) (Implementing agencies: IFAD/WorldFish, Fisheries + Natural Resource Management + Agriculture + Nutrition Education)			
Single Type	● JICA Project for Strengthening Health Systems through Organizing Communities (2017-2022) (Implementing agency: JICA, Health Care)	● Maternal and Child Health and Nutrition Project (2015-2020) (Implementing agencies: World Bank, Ministry of Health/GHS, National Health Insurance Authority, health) ● Maternal and Child Survival Program (2016-2019) (Implementing agencies: USAID, nutrition education in health) ● MEALS4NCDs : Measuring the healthiness of Ghanaian children's food environments to prevent obesity and Non-communicable dDiseases (2019-2021) (Implementing agencies: IDRC Canada and, University of Ghana, nutrition education) ● Project for Improving the Continuum of Care for Mothers and Children through the introduction of a combined MCH Record	● Artisanal Fisheries Promotion Project (ProPESCA) (2011-2019) (Implementing agency: IFAD, Fishery)	

	Bangladesh	Ghana	Mozambique	Nigeria
		Book: MCH-RB Project (2018-2022) (Implementing agencies: JICA, nutrition education in health) ● Project for Strengthening Community-Bbased Health Services Ffocusing on the Life-Course Approach in the Upper West, Upper East, and Northern Regions: 2017-2022, (Implementing agencies: JICA, nutrition education in health)		

Appendix 2

Development Process of the Dataset[150]

The DHS has five main datasets, as shown in Figure App.-1, namely children (under 5 years), households, household members (individuals), female (15-49 years), and male (15-59 years). The datasets used in the analyses all four datasets, except the "male" dataset. The dataset for children (under 5 years) includes data on all children born to women within five years before the survey, whereas the dataset for households includes the data for each household unit. The dataset for household members (individuals) includes the data for all members of the surveyed households. The female (15-49 years) dataset includes data for all women in the surveyed households, whereas the male (age 15-59 years) dataset includes data for all men in the surveyed households.



Children (under 5 years) Dataset

Child ID	Household ID	Mother ID	Country	Area of residence	Age	Vaccination	Height	…
Child a	A	Mother a	A	…	…	…	…	…
Child b	A	Mother a	A	…	…	…	…	…
Child c	B	Mother b	A	…	…	…	…	…
Child d	C	Mother c	A	…	…	…	…	…
Child e	C	Mother c	A	…	…	…	…	…
…	…	…	…	…	…	…	…	…

Household Dataset

Household ID	Country	Wealth Index	Safe drinking water	…
A	A	1	…	…
B	A	4	…	…
C	A	2	…	…
D	A	1	…	…
E	A	3	…	…
…	…	…	…	…

Household members(Individuals) Dataset

Individual ID	Household ID	Country	Mosquito net	…
Individual a	A	A	…	…
Individual b	A	A	…	…
Individual c	A	A	…	…
Individual d	B	A	…	…
Individual e	B	A	…	…
…	…	…	…	…

Females (15～49 years) Dataset

Female ID	Household ID	Country	Early initiation of breast feeding	…
Female a	A	A	…	…
Female b	A	A	…	…
Female c	A	A	…	…
Female d	A	A	…	…
Female e	A	A	…	…
…	…	…	…	…

Males (15～59 years) Dataset

Male ID	Household ID	Country	Male education level	…
Male a	A	A		
Male b	A	A		
Male c	A	A		
Male d	A	A		
Male e	A	A		
…	…	…		

Figure App.- 1: Datasets in DHS

When creating the dataset to be used in the analysis, we use the dataset for children (under 5 years of age) as the basic dataset, and add variables included in the other data sets (household, household members (individuals), and women (15-49 years)). The variables were added by linking the IDs of each unit of the datasets, as shown in Figure App.- 2. For example, when adding variables for the household dataset, the household IDs of the child dataset and those of the household dataset are linked together. This allowed us to add variables that were included in the household dataset, but not the child dataset. Similarly, by linking the child dataset to the woman dataset, we add the variables related to the child's mother to the children dataset.

[150] For more details, please refer the R command files and each datasets provided based on your request

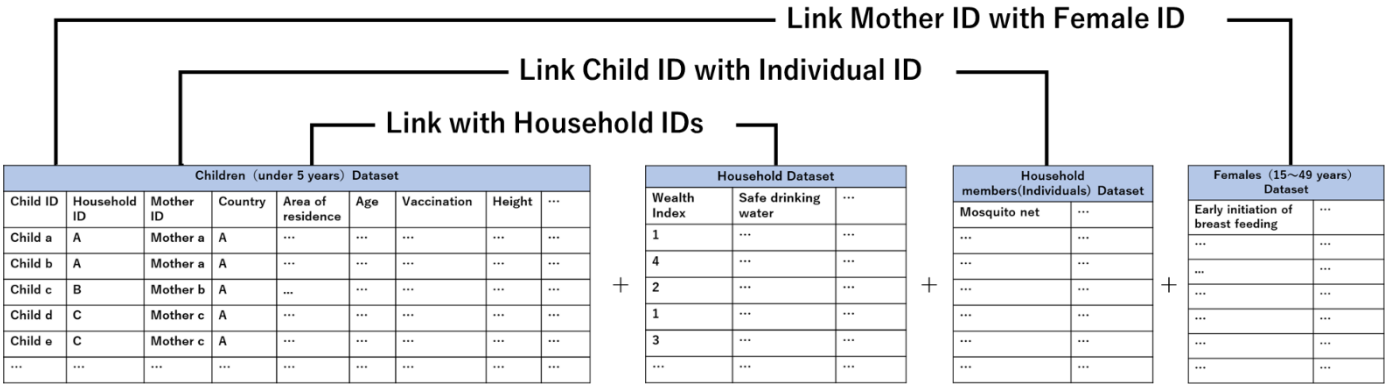


Figure App.- 2: Linking each dataset with the "children" dataset

Adding the variables creates a dataset of children in one country of analysis (country A) as shown in Figure App.- 3. This dataset contains the household- and mother variables added to the original "children" dataset.

Children（under 5 years）Dataset（after adding variables in other datasets）														
Child ID	Household ID	Mother ID	Country	Area of residence	Age	Vaccination	Height	…	Wealth Index	…	Mosquito net	…	Early initiation of breastfeeding	…
Child a			A											
Child b			A											
Child c			A											
Child d			A											
Child e			A											
…			A											

Figure App.- 3: Dataset of children in country A

The same procedure is applied to the 24 countries that were analyzed, then the datasets for children in each of the 24 countries are combined to create a dataset for children in the 24 countries (Figure App.- 4). This is used to assess undernutrition (stunting and wasting) and overnutrition (overweight) among children.

Children（under 5 years）Dataset（after combining 24 countries）														
Child ID	Household ID	Mother ID	Country	Area of residence	Age	Vaccination	Height	…	Wealth Index	…	Mosquito net	…	Early initiation of breastfeeding	…
Child a			A											
Child b			A											
…			…											
Child a'			B											
Child b'			B											
…			…											

Figure App.- 4: Dataset of children's undernutrition and overnutrition in the 24 countries

For the analysis of anemia among women, only the variables used to analyze anemia among women are extracted from the dataset in Figure App.- 4.

Appendix 3

Grouping in Analysis Reflecting Bottleneck Ideas

	Agriculture		Water and Sanitation		Hygiene	
Country	**Groups with a low percentage of children that meet MAD**	**Groups with a high percentage of children that meet the MAD**	**Groups with a low proportion of households with access to basic tap water services**	**Groups with a high proportion of households that can access basic water services**	**Groups with low rates of prenatal checkups by specialists**	**Groups with high rates of prenatal checkups by specialists**
Bangladesh		✓	✓		✓	
Burkina Faso	✓		✓			✓
Benin		✓	✓		✓	
Egypt		✓		✓		✓
Ethiopia	✓		✓		✓	
Gabon	✓		✓			✓
Ghana		✓	✓			✓
Guatemala		✓		✓		✓
Kenya		✓	✓			✓
Cambodia		✓	✓			✓
Kyrgyzstan		✓		✓		✓
Madagascar		✓	✓			✓
Myanmar		✓		✓		✓
Malawi	✓		✓			✓
Mozambique		✓	✓			✓
Nigeria	✓		✓		✓	
Nepal		✓		✓		✓
Peru		✓		✓		✓
Rwanda		✓		✓		✓
Senegal	✓		✓			✓
Chad	✓		✓		✓	
Tajikistan	✓			✓		✓
Timor-Leste		✓	✓			✓
South Africa		✓		✓		✓
Zambia		✓	✓			✓
Zimbabwe	✓		✓			✓