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Standard Operating Procedure

Inclusion of dried small fish in Supplementary Nutrition Programme (SNP)

Pilot Study in Odisha, India

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About WorldFish

WorldFish is an international, nonprofit research organization that harnesses the potential of fisheries and aquaculture to reduce hunger and poverty. Globally, more than one billion poor people obtain most of their animal protein from fish and 800 million depend on fisheries and aquaculture for their livelihoods. WorldFish is a member of CGIAR, a global research partnership for a food-secure future.

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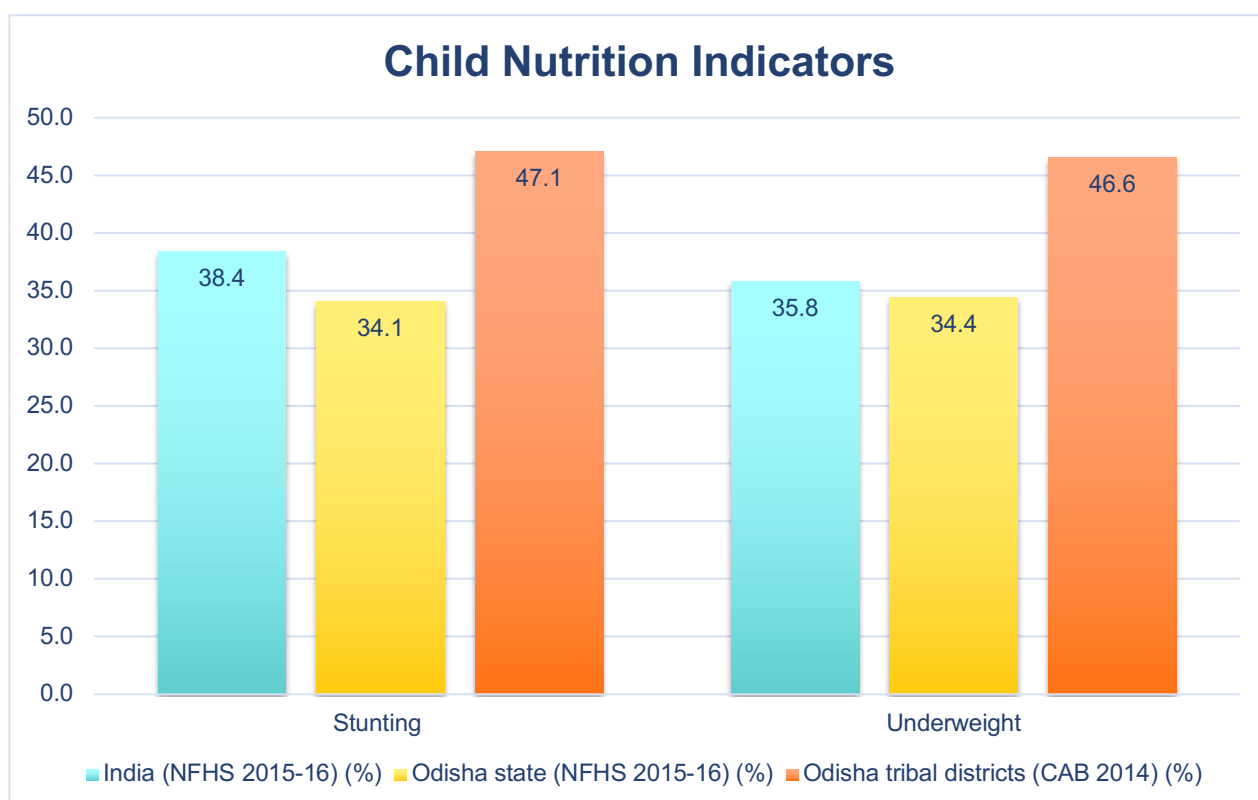
List of acronyms

AG	Adolescent Girls (10-18 years of age)
ANM	Auxiliary nurse midwife
ASHA	Accredited Social Health Activist
AWC	Anganwadi Centre
AWW	Anganwadi Worker
CDPO	Child Development Project Officer
CIFT	Central Institute of Fisheries Technology
DSWO	District Social Welfare Officer
GoI	Government of India
ICDS	Integrated Child Development Services
ONAP	Odisha Nutrition Action Plan
PLW	Pregnant and Lactating Women (19-49 years of age)
SHG	Self Health Group, Women's
SNP	Supplementary Nutrition Programme
WCD	Women and Child Development Department

1. Introduction

1.1 Malnutrition in Odisha tribal districts

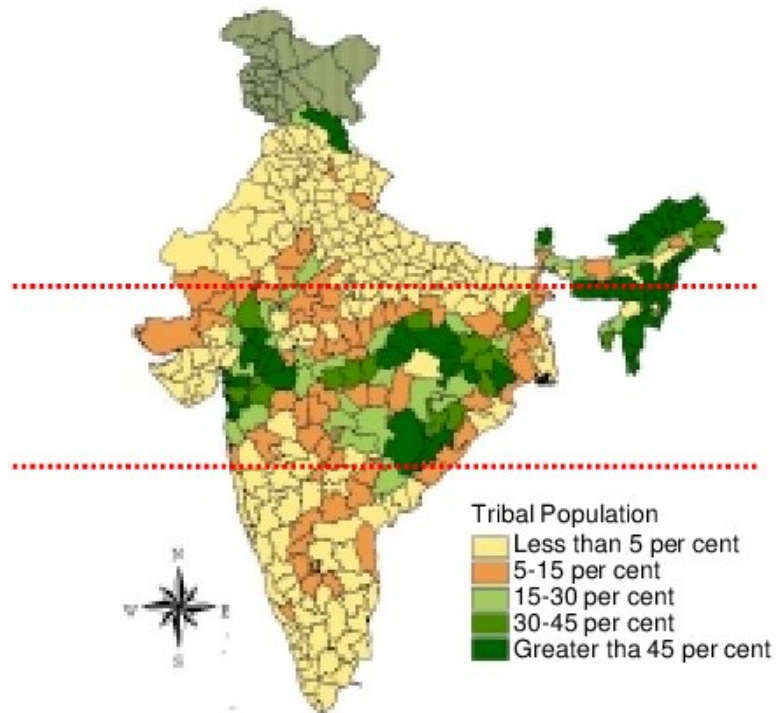
Malnutrition is a serious public health concern in India because it has the highest regional rate of stunting in the world (UNICEF, 2019). Compared with other socioeconomic classes, children belonging to scheduled castes and tribes or other lower socioeconomic classes have relatively high levels of malnutrition (Patra, 2018). Malnutrition is particularly high in women and children from tribal communities in rural areas dominated by agriculture livelihoods (Patra, 2018) (Appendix 1). Over 47% of children from tribal-dominated districts in Odisha are stunted (short height for age) which is higher than the national (38%) and state (34%) averages (Figure 1) (GoI, 2016; Patra, 2018) (National Family Health Survey (NFHS), 2015-16; Clinical, Anthropometric and Biochemical (CAB), 2014). Children in tribal communities are also significantly more likely to be underweight (CAB, 2014).



Source: National Family Health Survey (NFHS) 2015-16 and district-level Clinical, Anthropometric and Biochemical (CAB) 2014 (Patra, 2018).

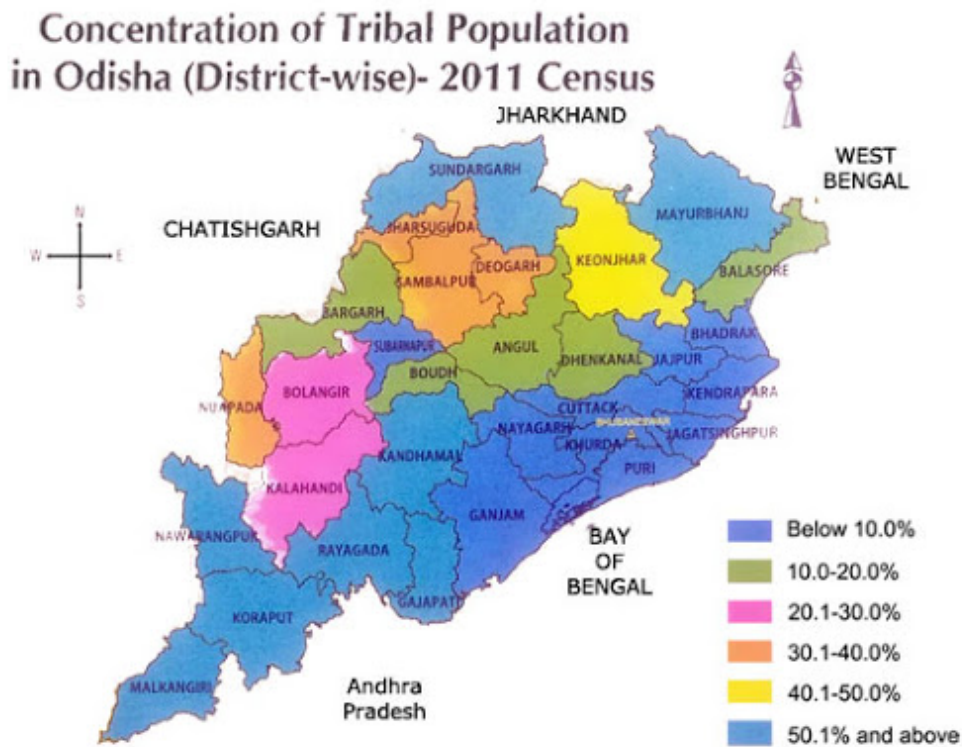
Figure 1. Prevalence of stunting and underweight is significantly higher in tribal-dominated districts of Odisha compared with India and Odisha state (see Appendix 1).

Odisha is a coastal state located in NE India (Figure 2). Compared to other states in India, Odisha is one of the least developed, particularly in rural areas, which has contributed to high levels of food insecurity and malnutrition. Over 60 indigenous tribes live in Odisha and they account for nearly a quarter (22%) of the state's population. The nine tribal dominated districts include 1. Gajapati, 2. Kandhamal, 3. Keonjhar, 4. Koraput, 5. Malkangiri, 6. Mayurbhanj, 7. Nabarangpur, 8. Rayagada, and 9. Sundargarh (Figure 3).



Source: Phansalkar et al. 2004.

Figure 2. Odisha state is located in NE India where socially disadvantaged indigenous tribal populations are concentrated.



Source: Scheduled Castes and Schedules Tribes Research and Training Institute, 2018. See Appendix 1.

Figure 3. Malnutrition is relatively high in tribal-dominated districts of Odisha state (light blue indicates districts with > 50% tribal population).

1.2 Benefits of eating fish

Fish, especially small fish eaten whole, are a highly nutritious animal-source food which contributes a wide range of micronutrients that benefit the health of women and children (HLPE, 2014; Kawarazuka & Béné, 2011). New evidence shows that fish consumption is associated with children having higher IQ points due to better brain development (Hibbeln et al., 2019) and lower rates of stunting due to better overall health and growth (Headey, Hirvonen, & Hoddinott, 2018) meaning that fish is a highly nutritious food for pregnant and lactating women and children. Furthermore, because fish have a lower environmental footprint compared to many other animal-source foods, experts also recommend fish as a sustainable food that is healthy for both the planet and human health (Troell, Jonell, & Crona, 2019). See Table 1 for a list of the nutrients and health benefits of eating small fish for women and children.



Small fish nutrients	Children (3-6-years)	Pregnant and lactating women Adolescent girls
Omega-3 fatty acids	<ul style="list-style-type: none"> • Brain growth • Eye health • Less asthma 	<ul style="list-style-type: none"> • Healthy pregnancy • Eye health • Healthy hormones • Heart health • Less diabetes • Healthy weight
B12	<ul style="list-style-type: none"> • Healthy red blood cells • Healthy nervous system 	<ul style="list-style-type: none"> • Healthy pregnancy • Healthy red blood cells • Healthy nervous system • Prevent birth defects
Iron	<ul style="list-style-type: none"> • Brain growth • Healthy immune system • Prevents iron-deficiency anaemia 	<ul style="list-style-type: none"> • Healthy immune system • Healthy pregnancy • Prevents iron-deficiency anaemia
Zinc	<ul style="list-style-type: none"> • Healthy growth • Healthy immune system • Faster recovery from diarrhea • Prevent stunting 	<ul style="list-style-type: none"> • Healthy growth • Healthy immune system • Faster recovery from diarrhea

Calcium	<ul style="list-style-type: none"> • Healthy bones/teeth • Healthy nervous system 	<ul style="list-style-type: none"> • Healthy pregnancy • Healthy bones/teeth • Healthy nervous system • Healthy heart
Iodine	<ul style="list-style-type: none"> • Brain growth • Thyroid health 	<ul style="list-style-type: none"> • Healthy pregnancy • Thyroid health
Protein	<ul style="list-style-type: none"> • Physical growth • Healthy hormones • Healthy organs • Healthy nervous system • Prevents wasting 	<ul style="list-style-type: none"> • Physical growth • Healthy hormones • Healthy organs • Healthy nervous system

Source: (HLPE, 2014; Kawarazuka & Béné, 2011).

Table 1. Small fish provide a nutritious food that benefits the diet and health of infants, children, adolescent girls and pregnant/lactating women.

1.3 Objectives of pilot programme adding fish to Odisha Supplementary Nutrition Programme

In 2016, the Odisha government launched the Odisha Nutrition Action Plan (ONAP), which outlines a multi-sectoral approach to reducing malnutrition. The ONAP places a special focus on reducing malnutrition amongst women and children from hard to reach tribal districts to reduce the high rates of stunting and underweight within these populations.

Fish are commonly consumed in Odisha, especially among tribal communities, making them a culturally appropriate animal-source food (Needham & Funge-Smith, 2014). Furthermore, the Odisha state government has programmes in place that support the nutrition of vulnerable women and children in rural areas through the delivery of Hot Cooked Meals and Take Home Rations via the statewide Supplementary Nutrition Programme. Food is distributed via rural childcare centres called Anganwadi Centres.

To assist in accelerating progress on reducing malnutrition in hard to reach tribal communities, USAID and WorldFish are collaborating with the Government of Odisha to pilot the inclusion of fish products in the Supplementary Nutrition Programme (Government of Odisha, 2018). Specifically, this involves the inclusion of fish powder in Hot Cooked Meals for 3-6-year old children and dried small fish in Take Home Rations for Pregnant and Lactating Women (PLW) and 11-18-year old Adolescent Girls (AG). The purpose of this study is to improve the dietary diversity and micronutrient intakes of women and children involved in the Supplementary Nutrition Programme and test the acceptability of dried fish products (eg. taste, ease-of-use) with tribal community beneficiaries and Angwand Centre workers. Methodology will be scaleable to other fish-eating communities within Odisha state. See Table 2 for full details.

	Hot Cooked Meal	Take Home Ration
Beneficiary	3-6-year old children	10-18-year old AG 19-49-year old PLW
Product	Fish powder	Dried small fish
Quantity entitled¹	15 g / child / day	25g / 10-15-year old AG / day 40g / 16-18-year old AG / day 40g / 19-49-year old PLW / day
Days entitled	5 days / week / child	3 days / week / person
Method of intake	Anganwadi Centre to add fish powder to children's daily curry as part of the Hot Cooked Meal.	Anganwadi Centre to distribute dried small fish to PLW and AG with Take Home Ration.
Outcomes	Enhanced dietary diversity Enhanced micronutrient intake Community need-based intervention Promotion of healthier eating habits Promotion of local and culturally appropriate foods	

¹See Appendix 3 for quantity calculations.

AG = Adolescent Girl; PLW = Pregnant and Lactating Women.

Table 2. Overview of inclusion of dried small fish in Supplementary Nutrition Programme via two main pathways: Hot Cooked Meal and Take Home Ration.

1.4 Development of a Standard Operating Procedure for implementation and evaluation of pilot inclusion of fish in the ICDS program

This Standard Operating Procedure (SOP) has been prepared in line with existing implementation guidelines for Odisha's Supplementary Nutrition Programme (Government of Odisha, 2018) and international criteria for sustainably improving the nutritional content of state delivered meals (FAO WFP, 2018):

This SOP is intended as a unifying document for use by the WorldFish Odisha team and collaborating stakeholders in piloting and evaluating the inclusion of dried small fish products in the Odisha State Supplementary Nutrition Programme.

Box 1. Fast Facts

Malnutrition in India and Odisha tribal districts:

- India has the highest regional rate of stunting in the world
- 47% of children from tribal-dominated districts in Odisha are stunted, higher than the national average (38%)
- Malnutrition is a key cause of stunting
- Odisha government recently launched the Odisha Nutrition Action Plan to accelerate progress on reducing malnutrition, especially for hard to reach tribal communities.

Importance of non-veg foods:

- Non-veg foods such as fish, eggs, and milk are a rich source of vitamins and minerals that children need to grow healthy
- Small fish (eaten whole) are a rich source of omega-3 fatty acids, vitamin B12, iron, calcium, zinc, iodine and protein
- These are essential nutrients that children need for proper physical growth, brain development and strong immune systems

Project:

- The goal of this pilot project is to integrate fish-based products into the diets of PLW, adolescent girls and children from tribal villages in Odisha state through India's national Supplementary Nutrition Programme.
- The project will:
 - Pilot fish in Hot Cooked Meals and Take Home Rations
 - Determine the nutritional potential of adding fish to meals
 - Test acceptability (eg. taste, ease-of-use) of products with beneficiaries and Anganwadi centre workers.

2. Orientation Procedures for Anganwadi Centre Workers and Nutrition Messaging

2.1 Nutrition training for Anganwadi Centres

Main person responsible: WorldFish Odisha (including WorldFish Technical Officers)

Background/rationale:

- The WorldFish Odisha staff will need to deliver an upfront training programme directly to Anganwadi Workers, Anganwadi helpers, ICDS-Supervisors, ANM, ASHA, Jaanch committee, mothers committee representatives, community leaders and ad-hoc visiting government officials regarding how fish products should be incorporated into HCM and THR and on the nutritional benefits of fish. The regular ICDS cascade training process will not take place within the timeframe of the pilot project.

2.1.1 Anganwadi Centre Workers

Background/rationale:

- The Anganwadi Centre is the main source of nutrition education and SNP food distribution to target villages. *The Angawadi Centre Workers have strong rapport with women and HHs in their communities; therefore, they are central to the successful uptake of fish within the SNP.*

Procedure:

- WorldFish Odisha staff will provide practical hands-on training to Anganwadi Centre Workers on:
 - 1) the health benefits of fish as part of a diversified diet
 - See *Appendix 2* for a full list of health messages
 - 2) how to include fish in the HCM
 - See *Section 3.4* for serving sizes, storage recommendations, revised menu and cooking process
 - 3) how to include fish in the THR
 - See *Section 4.4* for the packet sizes, instructions for use, and recommended recipes for PLW and AG
- The main education tools will be a laminated poster, flex, and hands-on practical demonstration. The WorldFish officers can also utilise the Tiki Mousi video (see below) to help reinforce the health benefits of fish intake. It is important that WorldFish officers take along samples of the fish powder and dried fish packets and walk the AWW through how to use the packets and correct serving sizes. The front-of-packet pictures can be used to reinforce the portion size messages and target consumer.
- Provide ongoing support to Anganwadi Centre Workers
 - Minimum twice monthly face-to-face (suggested interaction at product delivery during first week of the month and then a follow up visit two weeks later).

2.1.2 Village members

Background/rationale:

- Within the tribal villages, it is culturally common for elders and men to eat before women and children. Rations may be consumed by other household members, which impacts the availability of fish rations for PLW and adolescent girls. Therefore, it is important to provide nutrition education to the whole village, especially the elders and men who influence distribution of food within the household.

Procedure:

- WorldFish Odisha staff will provide village level education to raise community awareness on health benefits of fish intake for women, adolescent girls and children.
- The main education tool will be a laminated poster (*Appendix 2*) and hands-on practical demonstration. The WorldFish officers can also utilise the Tiki Mousi video to help reinforce the health benefits of fish intake. It is important that WorldFish officers take along samples of the fish powder and dried fish packets and walk village members through how to use the THR packets and correct serving sizes for PLW and adolescent girls. The front-of-packet pictures can be used to reinforce the target consumers and correct portion sizes.
- The WorldFish officers could also hold a practical cooking demonstration of an appropriate fish curry recipe using dried fish adapted to the local context of each village.

2.2 Front of packet picture-based instructions and nutrition messaging

Main person responsible: SHGs and WorldFish Odisha

Background/rationale: Majority of beneficiaries have low literacy and come from a variety of cultural and linguistic backgrounds. Picture-based instructions are known to transcend literacy, cultural and language barriers. WorldFish is already planning on packaging the fish products in packets. These packets will remain in the AWC and the beneficiary's homes while the product is being consumed. Therefore, picture-based instructions and nutrition messaging on the front-of-packet is a cost-efficient and effective method of communicating with beneficiaries. These pictures will help support beneficiaries and the AWC to utilise the products correctly. The state government of Odisha is supportive of adding picture-based instructions on all THRs, therefore this method also aligns with current state SNP objectives.

Format: Provide picture-based education on the front of THR dried fish package and on the front of fish powder packets for HCM.

Target audience: THR beneficiaries (PLW, adolescent girls) and AWC workers (3-6 year olds).

Procedure:

- The poster used in training AWW will be simplified to fit as a label on the fish-based product packets using information from *Appendix 2*.
- For the THR, two labels are required.
 - One of a PLW and a visual representation (eg. dried small fish) of how many fish she should consume per meal.
 - The second label should be of an adolescent girl and how many fish she should consume per meal.
- For the fish powder HCM, the packet should be of a 3-6-year old child and should include a pictorial example of how many grams or teaspoons of powder are required per child per meal.

2.3 Opportunity to institutionalize “fish for nutrition” messaging through ICDS Training Module

Main person responsible: WCD ICDS training programme and WorldFish Odisha

Background/rationale: As per letter from the state government of Odisha, WorldFish Odisha will provide training for ICDS workers on the inclusion of fish in the ICDS SNP programme. The ICDS operates under a cascade training system. It takes approximately 3-6 months for all workers to receive the cascade training, which means that ICDS staff and AWW will not be briefed on the WorldFish SOP in time to participate in the pilot. However, training ICDS workers is vital for institutionalizing the distribution of fish products and ensuring best practices are implemented.

Format: 1 h training module

Target audience: ICDS workers (state, sector and AWW levels)

Procedure:

WorldFish Project provide training to trainers



ICDS AWW training centre level (AWTC instructors) & MLTC (instructors)



17 training centres

- 8 government AWTC (run by Lady Supervisors)
- 8 semi-government council AWTC (run by 10 council instructors)
- 1 MLTC AWTC (run by CDPO)



ICDS AWTC instructors to then train the AWWs & MLTC will train the supervisors

2.4 Opportunity to expand nutritional messaging through Tiki Mausi Mascot Video

Main person responsible: UNICEF/WCD

Background/rationale: Each tribal village has a well-respected 'aunty' (Tiki Mausi) that acts as a source of wisdom for village members. UNICEF and the WCD has collaborated to create Tiki Mausi mascot videos to provide grassroots education at the village level. The Odisha Government has suggested the development of a fish-based diet video to accompany roll out of this pilot project. It is known that pilot programmes accompanied by community level promotion campaigns such as videos are more successful because the videos create a talking point for the community and improve uptake of the initiative.

Format: 1-2 minute video

Target audience: tribal community

Procedure:

- WorldFish HQ and WorldFish Odisha to work closely with UNICEF/WCD to create a 1-2 minute video.
- WorldFish HQ and WorldFish Odisha to provide a 1-page list of fish-based diet education points to UNICEF.
- UNICEF with help of WorldFish to then develop fish-based diet video
- WorldFish Odisha project with support of WCD staff to arrange for rollout to tribal villages.
- WorldFish Odisha team may also incorporate the Tiki Mausi video into their village member and Anganwadi Centre Worker training (see section 2.3).

3. Hot Cooked Meal

3.1 Source of fish powder

Main person responsible: CIFT and WorldFish Odisha

Background/rationale: Hygienically prepared fish powder to be sourced from CIFT located in Cochin, Kerala.

Procedure:

- WorldFish Odisha to notify CIFT of monthly quantities of fish powder required.
- CIFT to post monthly supply of fish powder direct to WorldFish Technical Officers – Nutrition for storage in the field. WorldFish Technical Officers have a central base that is closer to the villages than WF Odisha so are more able to do monthly deliveries to Anganwadi Centres.
- CIFT to send fish powder so that it arrives before the end of each month ready for delivery to Anganwadi Centres between 1st-5th of each month.

3.2 Training programme for Anganwadi Centre Workers and village members

Main person responsible: WorldFish Odisha (includes WorldFish Technical Officers-Nutrition) and ICDS trainers

Background/rationale: See *Section 2.1.1* and *Section 2.2.1* for details.

3.3 Transport of fish powder to Anganwadi Centre

Main person responsible: WorldFish Odisha

Background/rationale:

WorldFish Technical Officers – Nutrition obtain fish powder from CIFT to distribute among AWC. WorldFish Technical Officers should distribute fish powder, along with dried fish products, on the first week of each month in line with current WCD guidelines. WorldFish Technical Officers - Nutrition can also deliver onsite training and ongoing support during the process.

Quality check by Jaanch Committee

Each AWC coordinates with a local Jaanch Committee that is responsible for monitoring the quality of the foods procured, prepared and delivered through HCM and THR. The Jaanch Committee reports directly to the CDPO and DSWO, therefore it is important that WorldFish Odisha engage with each Jaanch Committee to ensure fish-based products meet quality standards upon delivery and that proper documentation of product quality is sent to the WCD. Each AWC has a designated date between 1st-5th of each month when dry goods are delivered from vendors. The Jaanch Committee convenes at the AWC to document product quality and compile a report for the WCD. It is important that WorldFish Odisha work closely with the AWC and Jaanch Committee to find a suitable delivery date. WorldFish Odisha should be mindful that AWCs have little to no storage and that WCD

guidelines stipulate that products are not allowed to be stored at AWCs any longer than one month.

Procedure:

- WorldFish Technical Officers – Nutrition obtain fish powder from CIFT.
- WorldFish Odisha to confirm best delivery date directly with Anganwadi Centre Worker. The delivery date will be between the 1st-5th of every month, depending on the AWC.
- WorldFish Technical Officers - Nutrition to deliver fish powder and dried fish to AWC during their standard delivery date between the 1st-5th of each month.
- WorldFish Odisha to ensure Jaanch Committee conducts quality inspection of fish powder upon delivery in alignment with WCD SNP guidelines.
- While delivering the products, WorldFish staff can also deliver onsite training and ongoing supporting to village members and AWW. See *Section 2.1.1* and *Section 2.2.1* for details.
- If there is surplus fish powder, it may be stored with WorldFish staff in the field to be used during next months' delivery. Fish powder should not be stored in the field longer than two months.
- Dried fish to be delivered at the same time as fish powder to reduce transport costs (*Section 4.3*).

It will be important to deliver fish products on the agreed upon date because a) quality reports by the Jaanch Committee and b) pick-ups by the THR women are often done on this day. A delivery delay could result in a breakdown in acceptability of the fish program. WorldFish Technical Officers – Nutrition could keep a surplus of fish products in their possession to mitigate the effects of a delayed delivery.

3.4 Inclusion of fish powder in Hot Cooked Meal

Main person responsible: Anganwadi Centre Worker and Assistant.

Procedure:

3.4.1 Storage

- Store fish powder in sealed containers in a dry, cool, and airy place.
- Only use fish powder that is dry and in good condition – the powder should have no visible contaminants like water, dirt, insects, rodents, mould etc.
- Do NOT use fish powder if packages are torn/open in any way or fish powder inside is visibly contaminated.
- If fish powder becomes contaminated, discard immediately.

3.4.2 Menu

- Add **15 g per child** of fish powder to the children's daily curry 5 times / week
- See Table 3.4.2 for revised menu.

SI No	Beneficiary	Diet type	Ingredients	Quantity entitled per day (in gm)	Calorie	Protein
Monday – Ghanta and Dalma						
1	Children (3-6 years)	HCM	Rice	80	276.8	5.44
			Dal (Arhar)	30	100.5	6.69
			Oil (Veg Oil)	3	54	0
			Potato	30	29.1	0.48
			Other Vegetables	20		
			Drumstick Leaves & saag	20	18.4	1.34
			Lemon	10 drops		
			Condiments			
			1gm Iodized / double fortified salt			
			Fish powder	15	TBC	TBC
			Sub-Total		478.8	13.95
Tuesday, Thursday – Bhata, Boiled Egg & Vegetable Curry						
2	Children (3-6 years)	HCM	Rice	80	276.8	5.12
			Oil (Veg Oil)	3	54	
			Potato & Vegetables (any 2)	45	43.65	0.72
			Onion	10	7.5	0.18
			Lemon	10 drops		
			Condiments			
			1 gm Iodized / double fortified salt			
			Egg		86.50	6.65
			Fish powder	15	TBC	TBC
			Sub-Total		468.45	12.67
Wednesday, Friday, Saturday – Bhata & Egg Curry						
3	Children (3-6 years)	HCM	Rice	80	276.8	5.12
			Oil (Veg Oil)	3	54	
			Potato & Vegetables (any 2)	45	43.65	0.72
			Onion	10	7.5	0.18
			Lemon	10 drops		
			Condiments			
			1 gm Iodized / double fortified salt			
			Egg		86.50	6.65
			Fish powder	15	TBC	TBC
			Sub-Total		468.45	12.67

Note: Besan Dhoka Curry may be prepared for children who do not eat eggs or fish, 58 gms of Besan is to be used per child for preparation of besan dhoka.

Source: Menu adapted from Revised Guidelines for Implementation of Morning Snacks and Hot Cooked Meals 2018 (Supplementary Nutrition Programme of Anganwadi Services of ICDS).

Table 3.4.2. Revised menu for adding fish powder to Hot Cook Meal (revisions in blue).

3.4.3 Cooking process

- See Table 3.4.3 for revised cooking process for Hot Cooked Meal

Rice

- Clean and wash rice.
- Put adequate clean water to cook (1 part rice, 2.5 part water).
- Cook it in clean water until it becomes soft and edible.

Dalma

- Clean Dal and wash it thoroughly with clean water, soak it for some time (10 minutes).
- Wash vegetables properly and then cut it in to medium size.
- Take oil as per the allotted amount and heat it. Add sarson / phutan, now add vegetables (seasonal vegetables) and potatoes and add soaked Dal. Add turmeric.
- Add fish powder. Add extra water to maintain Dal consistency, if required.
- Let it cook until it becomes soft.
- Add iodised / double fortified salt at the end.

Egg Curry

- Clean and boil eggs in clean water.
- Wash potatoes and other seasonal vegetables (pumpkin, tomato, etc.) properly to remove dirt.
- Heat oil, put phutan, add onion, garlic, and ginger and fry lightly. Add vegetables (potato, tomato, raw banana etc.). Mix it properly.
- Add fish powder.
- Add water to cook and cook until the vegetables are done and it has curry like consistency.
- Add boiled eggs and cook for 2-3 minutes.
- Add iodised/ double fortified salt at the end.

Vegetable Curry

- Clean and wash vegetables, (2 vegetables like papaya, pumpkin, brinjal, ridge gourd (janhi), radish, cabbage, cauliflower etc.) and potatoes thoroughly.
- Heat oil, add phutan, onion, garlic and ginger paste and fry lightly. Add the vegetables and fry it properly.
- Add fish powder.
- Add dry masala such as turmeric, coriander powder, cumin powder and add water.
- Add iodised/ double fortified salt at the end.

Besan Dhoka Curry

- **No changes required.**

Source: *Cooking Process adapted from Revised Guidelines for Implementation of Morning Snacks and Hot Cooked Meals 2018 (Supplementary Nutrition Programme of Anganwadi Services of ICDS).*

Table 3.4.3. Revised cooking process for Hot Cooked Meal (revisions in blue).

3.4.4 Serving

- Anganwadi Centre to use clean plates and utensils to serve food
- Ensure children wash their hands with soap before meals
- Ensure food is consumed within 2 hours of preparation (WHO, 2000, p. 2).

3.5 Evaluation

Main person responsible: Third Party

Background/rationale: The purpose of this study is to test the acceptability and feasibility of incorporating fish into the Odisha State SNP programme. Assessment of acceptability will be conducted through multiple stakeholders and methods to provide triangulation of results:

1. **Taste trial:** acceptability test of organoleptic qualities (eg. taste, texture, smell) amongst beneficiaries.
2. **Nutritional analysis:** of fish-based meals versus non-fish based HCMs to determine nutritional potential of the meals relative to RDAs.
3. **Ease-of-use assessment:** of fish-based products amongst beneficiaries and Anganwadi Centre Worker and assistant.
4. **Caregiver perceptions:** of their children receiving fish-based products through HCM.
5. **Plate waste:** independent data collector observations of plate waste from HCM.

Timeline - HCM	Baseline	Midline	Endline
Taste trial	•		•
Nutritional analysis		•	
Ease-of-use assessment			•
Caregiver perceptions			•
Plate waste	•		•

Table 3.5. Evaluation timeline for HCM.

3.5.1 Taste Trial

Background/rationale: Assess the sensory acceptability of Vegetable Curry (baseline control) versus Fish-Powder Vegetable Curry (endline intervention). The 5-point hedonic scale using 'smiley faces' is a standard tool used to determine food acceptability among non-literate consumers. The 'smiley face' images have been demonstrated to transcend cultural biases and language differences and have been successfully used in children between 3 to 10-years (Sigh et al., 2018).

Target group: 3-6-year old children

Sample size: 20% of HCM beneficiaries from each AWC (approx. 200 total)

Timeline:

- A baseline sensory scoring test will be conducted in AWCs before fish powder is incorporated into the HCM

- An endline sensory scoring test will be conducted in AWCs after fish powder is incorporated into the HCM

Method overview: Sensory scoring test of eight organoleptic properties of HCM with and without fish powder

Time required: 10 minutes per child

Procedure:

- Participation is voluntary and caregivers of the children should be informed that they may remove their child from the taste trial at any time without penalty to them or their child.
- Caregivers will be encouraged to be present with their child during the taste trial, if possible, to ensure the child is comfortable. However, caregivers will be instructed to not influence the child's answers in any way.
- The taste trial is to be conducted at the Anganwadi Centre during a standard lunchtime so that the sampled HCM represents local ingredients, cooking processes and environments as best as possible.
- There is no need to match the baseline and endline participants; therefore, different children can participate in each phase of the trial.
- Results should be collected anonymously with only the name of the Anganwadi Centre listed to avoid inadvertent identification of the children post study.
- Test should be conducted in the preferred language for the child.
- The child should be asked to taste the HCM a minimum of two times before completing the sensory scoring test.
- Each child should be led away from the group to complete the taste trial so that rankings are not influenced by their peers.
- See also *Section 4.5.1*.

Analysis plan:

- A score between 1-3 (very good to neutral) is the minimum acceptability level of organoleptic qualities.
- The baseline (Vegetable Curry) scores can be compared with the endline (Fish-Powder Vegetable Curry) to determine acceptability of the intervention HCM amongst the children.

Taste test survey forms:






Product	1 = Very good	2 = Good	3 = Neutral	4 = Bad	5 = Very bad
Vegetable Curry					
Appearance	<hr/>				
Colour	<hr/>				
Smell	<hr/>				
Looks appetising	<hr/>				
Taste	<hr/>				
Texture	<hr/>				
Easy to swallow	<hr/>				
Overall	<hr/>				

Table 3.5.1.a. Baseline Taste Trial of Vegetable Curry.






Product	1 = Very good	2 = Good	3 = Neutral	4 = Bad	5 = Very bad
Fish-Powder Vegetable Curry					
Appearance	<hr/>				
Colour	<hr/>				
Smell	<hr/>				
Looks appetising	<hr/>				
Taste	<hr/>				
Texture	<hr/>				
Easy to swallow	<hr/>				
Overall	<hr/>				

Table 3.5.1.b. Endline Taste Trial of Fish-Powder Vegetable Curry.

3.5.2 Nutritional Analysis

Background/rationale: undertake nutritional analysis of various HCMs to determine relative nutritional potential of vegetarian versus egg-based versus fish-based meals.

Participants: Nil

Sample size: as per laboratory protocol requirements

Method overview: Nutritional analysis of macro and micronutrient content of HCMs.

Timeline: Midline

Time required: as per laboratory protocol requirements

Procedure:

- Meals are to be prepared by Anganwadi Centre as per their usual practice so as to represent the usual ingredients, cooking process and environment.
- Exact sampling protocol to be determined by laboratory specific requirements
- See table 3.5.5. for meals and nutrients to be sampled.

Nutrients (per 100g)	Hot Cooked Meal	
	Vegetable curry with fish-powder and rice	Egg curry with rice Vegetarian Dalma
Energy		
Protein		
Fats		
Omega-3 fatty acids		
Trans fats		
Iron		
B12		
Calcium		
Zinc		
Iodine		
Vitamin A		

Table 3.5.5. Meals and nutrients to be sampled.

Analysis plan:

- Compare nutritional potential of the three meals.
- Compare the nutritional yield of each meal with recommended dietary allowances for 3-6 year old children according to the
 - Nutrient Requirements and Recommended Dietary Allowances for Indians (GoI, 2011).
 - World Health Organization.

3.5.3 Ease-of-use Assessment – Anganwadi Centre

Background/rationale: Assess stakeholder experience incorporating fish-based products into the HCM. See also *Section 4.5.2* for THR.

Target group: Anganwadi Centre Worker and assistant

Sample size: 50-55 (or final number of participating AWCs)

Timeline: Endline

Method overview: Semi-structured interview

Time required: 25 minutes per AWW

Procedure:

- Participation in the interview is voluntary; clearly explain to the Anganwadi Centre workers that they may decline to participate in the interview at any time.
- Interviews to be undertaken at endline of the project and at a mutually beneficial time between AWC and data collector.
- To enable independent data collector observations of HCM preparation and consumption, it is advised to schedule interviews during standard AWC operating hours.
- If possible, it is best to interview both the AWW and assistant together as both are involved in ingredient purchases and meal preparation.
- Questions are to be tested and adapted with AWWs at two centres before undertaking the interviews.
- All interviews are to be conducted in the preferred language of the AWWs.
- AWWs are to be interviewed in a quiet place away from beneficiaries
- Where possible, interview data is to be collected via digital methods (eg. ODK/-CommCare) to enable real-time quality check of data by WorldFish and to reduce errors associated with duplicate data entry.

Questions:

Please select the number that reflects your immediate response to each statement. Do not think too long about each statement. Number 1 equals “Strongly Disagree” and 5 equals “Strongly Agree”. If you do not know how to response, simply circle number 3 “Neutral”.

AWW Section 1: Fish Powder (HCM)	Strongly Agree		Neutral		Strongly Disagree
1. I found the fish powder easy to use.	1	2	3	4	5
2. I found the fish powder easy to store.	1	2	3	4	5
3. The fish powder was delivered on time each month.	1	2	3	4	5
4. I was supplied enough fish powder for my centre's needs each month.	1	2	3	4	5
5. The fish powder became contaminated (eg. mould, dirt, insects).	1	2	3	4	5
6. I felt confident knowing how much fish powder to add to the HCM.	1	2	3	4	5
7. The fish powder I was provided was culturally appropriate for my community.	1	2	3	4	5
8. I felt confident explaining the nutrition and health benefits of the fish powder to the children's caregiver.	1	2	3	4	5

Follow up questions:

9. If you found it hard to use the fish powder, please describe reasons.
10. If you found it hard to store the fish powder, please describe reasons.
11. If the fish powder became contaminated, please list contaminants and reasons.
12. If you did not feel confident adding the right amount of the fish powder to the HCM, please describe reasons (eg. lack of training, difficult to remember serving size, lack of time, too complicated, community resistance etc.)
13. If you did not feel confident explaining the nutrition and health benefits of the fish powder to the children's caregiver, please describe reasons.

3.5.4 Caregiver perceptions

Background/rationale: assess caregiver perceptions on inclusion of fish powder into children's HCM.

Participants: caregivers of 3-6-year old children receiving fish powder in HCMs

Sample size: 4 groups of 4-6 caregivers (16-24 caregivers total)

Method overview: focus group discussion

Timeline: Endline

Time required: 45-60 minutes

Procedure:

- Participation in the focus group discussion is voluntary; clearly explain to the caregivers that they may decline to participate in the focus group discussion at any time without any penalty to themselves or their child(ren).
- Clearly explain that there are no right or wrong answers; that the purpose of this focus group is to understand the different points of view of caregivers with children involved in the pilot study.

- Data collector to select four diverse villages from amongst the project area to represent a range of ethnicities, socioeconomic levels and religious beliefs.
- Focus group discussions to be undertaken at the endline of the project at a mutually beneficial time between the data collector and the village/caregivers.
- Questions are to be tested and culturally adapted before undertaking the focus group discussions.
- All interviews are to be undertaken in the preferred language of the participants.
- All interviews are to be undertaken in a neutral location (eg. the Anganwadi Centre or village meeting area) to limit discomfort to the participants.
- Refreshments may be provided if it is culturally appropriate.

Focus group discussion questions:

1. In your opinion, what is the best age to introduce non-veg food to your child?
 - a. Please describe the reasons for your answer.
2. How do you feel about the Anganwadi Centre adding fish powder to your child's curry?
 - a. Do you think it is a good idea or a bad idea? Please describe reasons for your answer.
3. Do you have any concerns about fish powder and its impact on your child? If so, please describe the reasons for your answer. Do you think other family members or community members have concerns about fish powder for small children?
4. Has your AWW explained to you the health and nutrition benefits of small fish for children 3-6 years old? If so, what do you understand to be the health and nutrition benefits of small fish for children?
5. Do you think the AWC should continue to provide fish powder in the HCM to your child? If not, why not and, if so, then should they do anything different in the future?

3.5.5 Plate Waste

Background/rationale: assess plate waste (or lack thereof) of HCM at participating Anganwadi Centres.

Participants: Nil

Sample size: 65 Anganwadi Centres (or final number of participating ANCs)

Method overview: independent data collector observations

Timeline: Baseline and Endline

Time required: 20 minutes

Procedure:

- The plate waste observations should be made during lunchtime after a HCM has been served. For the endline, the plate waste observations can occur after undertaking Ease-of-Use assessment surveys (see *Section 3.5.2*).
- The data collector should be making independent observations and not consulting the AWWs or assistants.
- Specifically, the data collector should make notes on the following points:
 - Is the Anganwadi Centre Worker/assistant measuring the fish powder

- accurately when adding to the HCM?
- How are the children responding to the curry (eg. are they eating it as normal or are there verbal or non-verbal indicators that they do not wish to consume the curry with the fish-powder)?
- Is there any plate waste at the end of the HCM? If so, what food is left (eg. rice, curry, eggs)?

4. Take Home Ration

4.1 Source of dried small fish

Main person responsible: Self Health Groups and WorldFish Odisha

Background/rationale: SHGs are the preferred supplier of products for SNP programme according to WCD guidelines. A key output of this project is to help establish SHGs in hygienic solar drying of small fish and connecting them with markets.

Procedure:

1. WorldFish Odisha to advise SHGs on amount of dried fish required per month.
2. SHGs are to package dried fish in monthly portion sizes for PLW and adolescent girls.
3. Packages are to include picture-based target consumer, portion size, and nutritional benefits (*Section 2.2*).
4. SHGs to deliver packaged dried fish to WorldFish Technical Officers – Nutrition for storage in the field and delivery to Anganwadi Centres. Dried fish should arrive before the end of each month ready for delivery to Anganwadi Centres between 1st-5th of each month.

4.2 Training programme for Anganwadi Centre Workers and Community members

Main person responsible: WorldFish Odisha (includes WorldFish Technical Officers-Nutrition) and ICDS trainers

Background/rationale: See *Section 2.1.1* and *Section 2.2.1* for details.

4.3 Transport of dried small fish to Anganwadi Centre

Main person responsible: WorldFish Odisha

Background/rationale: See *Section 3.3* for details on quality check process provided by Jaanch Committee.

Procedure:

1. WorldFish Odisha to confirm best delivery date directly with Anganwadi Centre Worker.
2. WorldFish Technical Officers - Nutrition to deliver fish powder (HCM) and dried fish (THR) to Anganwadi Centre during their standard delivery date between the 1st-5th of each month.
3. WorldFish Odisha to ensure Jaanch Committee conducts quality inspection of dried fish products upon delivery in alignment with WCD SNP guidelines.
4. While delivering the products, WorldFish staff can also deliver onsite training and ongoing supporting to village members and Anganwadi Centre Workers. See *Section 2.1.1* and *Section 2.2.1* for details.
5. If there is surplus dried fish products, it may be stored with WorldFish staff in the field to be used during next month's delivery. Dried fish products should not be stored in the field longer than two months.

6. Fish powder to be delivered at the same time as dried fish products to reduce transport costs (*Section 3.3*).

It will be important to deliver fish products on the agreed upon date because a) quality reports by the Jaanch Committee and b) pick-ups by the THR women are often done on this day. A delivery delay could result in a breakdown in acceptability of the fish program. WorldFish Technical Officers – Nutrition could keep a surplus of fish products in their possession to mitigate the effects of a delayed delivery.

4.4 Inclusion of dried small fish in Take Home Ration

Main person responsible: Anganwadi Centre Worker and Assistant

Background/rationale: Under the current SNP guidelines, the Anganwadi Centre and AWW are the main point of distribution of the THR. The THR are distributed during the first week of each month within 1-2 days of receiving the main THRs from the district SHG. For women who fail to pick up their THR, the AWW performs home visits to deliver the rations.

Procedure:

- AWW to ensure a month's worth of dried fish packets is distributed to:
 - 10-15-year old AG (entitled to 75g / week or 300g / month)
 - 16-18-year old AG (entitled to 120g/ week or 480g / month)
 - 19-49-year old PLW (entitled to 120g/ week or 480g / month)
- See Appendix 3 and 4.

4.5 Evaluation of Take Home Ration

Main person responsible: Third Party

Background/rationale: The purpose of this study is to test the acceptability and feasibility of incorporating fish into the Odisha state SNP programme. Assessment of acceptability will be conducted through multiple stakeholders and methods to provide triangulation of results:

1. **Taste trial:** acceptability test of organoleptic qualities (eg. taste, texture, smell) of dried small fish product amongst beneficiaries.
2. **Nutritional analysis:** of dried small fish product in THR to determine nutritional potential relative to RDAs for PLW/AG.
3. **Ease-of-use assessment – Anganwadi Centre:** of including the dried small fish product in the THR amongst the Anganwadi Centre Worker and assistant.
4. **Ease-of-use assessment – PLW/AG:** of dried small fish product in the THR amongst beneficiaries.

Timeline - THR	Baseline	Midline	Endline
1. Taste trial			•
2. Nutritional analysis		•	
3. Ease-of-use assessment – Anganwadi Centre			•
4. Ease-of-use assessment – PLW/AG			•

Table 4.5. Evaluation timeline for THR.

4.5.1 Taste Trial

Background/rationale: Assess the sensory acceptability of dried small fish product in the THR. The 5-point hedonic scale using ‘smiley faces’ is a standard tool used to determine food acceptability among non-literate consumers. The ‘smiley face’ images have been demonstrated to transcend cultural biases and language differences.

Target group: PLW and AG

Sample size: 20% of THR beneficiaries from each AWC (approx. 200 total)

Timeline: Endline

Method overview: Sensory scoring test

Time required: 10 minutes

Procedure:

- Participation is voluntary and participants should be informed they can withdraw from the taste trial at any time without any penalty.
- The tests should be conducted in a quiet place away from distractions. If the test is conducted at a woman’s home, it should be conducted outside the home and away from other family members.
- Results should be collected anonymously with only the name of the Anganwadi Centre listed to avoid inadvertent identification of the participants post study.
- Test should be conducted in the preferred language of the participant.
- The participant should be asked to taste the dried small fish THR a minimum of two times before completing the sensory scoring test.
- See also *Section 3.5.1*.

Analysis plan:

- A score between 1-3 (very good to neutral) is the minimum acceptability level of organoleptic qualities.

Questions:

- See Table 4.5.1 for sensory scoring test of eight organoleptic qualities of dried small fish THR






Product	1 = Very good	2 = Good	3 = Neutral	4 = Bad	5 = Very bad
Dried small fish (please tick)					
<input type="checkbox"/> Indian anchovy					
<input type="checkbox"/> Indian sardine					
<input type="checkbox"/> Lesser sardine					
Appearance					
Colour					
Smell					
Looks appetising					
Taste					
Texture					
Easy to swallow					
Overall					

Table 4.5.1. Taste trial of dried small fish THR.

4.5.2 Nutritional Analysis

Background/rationale: undertake nutritional analysis of dried small fish species to determine relative nutritional potential for PLW/AG.

Participants: Nil

Sample size: as per laboratory protocol requirements

Method overview: Nutritional analysis of macro and micronutrient content of dried small fish species.

Timeline: Midline

Time required: as per laboratory protocol requirements

Procedure:

- Dried small fish are to be prepared by WSHG as per their usual practice so that the sampled fish represent the standard product consumed as THR.
- Exact sampling protocol to be determined by laboratory specific requirements

- See table 3.5.5. for fish species and nutrients to be sampled.

Nutrients (per 100g)	Take Home Ration		
	Indian Anchovy (dried)	Indian Sardine (dried)	Lesser Sardine (dried)
Energy			
Protein			
Fats			
Omega-3 fatty acids			
Trans fats			
Iron			
B12			
Calcium			
Zinc			
Iodine			
Vitamin A			

Table 4.5.2. Dried small fish species and nutrients to be sampled.

Analysis plan:

- Compare nutritional potential of the three fish species.
- Compare the nutritional yield of each species with recommended dietary allowances for PLW and AGs according to:
 - Nutrient Requirements and Recommended Dietary Allowances for Indians
 - World Health Organization.

4.5.3 Ease-of-use Assessment – Anganwadi Centre

Background/rationale: Assess stakeholder experience incorporating fish-based products into the THR. See also *Section 3.5.3* for fish powder.

Target group: Anganwadi Centre Worker and assistant

Sample size: 60-65 (or final number of participating AWCs)

Timeline: Endline

Method overview: Semi-structured interview

Time required: 25 minutes

Procedure:

- Participation in the interview is voluntary; clearly explain to the Anganwadi Centre workers that they may decline to participate in the interview at any time.
- Interviews to be undertaken at endline of the project and at a mutually beneficial time between AWC and data collector.
- Questions are to be tested and adapted with two AWWs before undertaking the remaining interviews.
- All interviews are to be undertaken in the preferred language of the AWWs.
- AWWs are to be interviewed in a quiet place away from beneficiaries
- Where possible, interview data is to be collected via digital methods (eg. ODK/-CommCare) to enable real-time quality check of data by WorldFish and to reduce errors associated with duplicate data entry.

Questions:

Please select the number that reflects your immediate response to each statement. Do not think too long about each statement. Number 1 equals “Strongly Disagree” and 5 equals “Strongly Agree”. If you do not know how to response, simply circle number 3 “Neutral”.

AWW: Dried Fish (THR)	Strongly Agree		Neutral		Strongly Disagree
1. I found the dried fish easy to distribute to the PLW/AG.	1	2	3	4	5
2. I found the dried fish easy to store.	1	2	3	4	5
3. The dried fish became contaminated (eg. mould, dirt, insects).	1	2	3	4	5
4. The dried fish was delivered on time each month.	1	2	3	4	5
5. I was supplied with enough dried fish for my centre’s needs each month.	1	2	3	4	5
6. I felt confident adding the dried fish to the THR.	1	2	3	4	5
7. I felt confident explaining the nutrition and health benefits of the dried fish to the PLW/AG.	1	2	3	4	5
8. I felt confident explaining the portion size (how many dried small fish to eat) to the PLW/AG.	1	2	3	4	5
9. I felt confident explaining how to use the dried fish (eg. add to a fish curry) to the PLW/AG.	1	2	3	4	5
10. The dried fish I was provided was culturally appropriate for my community.	1	2	3	4	5

Follow up questions:

11. If you found it hard to distribute the dried fish in the THR, please describe reasons.
12. If you found it hard to store the dried fish, please describe reasons.
13. If the dried fish became contaminated, please list contaminants and reasons.
14. If you did not feel confident adding the dried fish to the THR, please describe reasons (eg. lack of training, difficult to remember serving size, lack of time, too complicated, community resistance etc.)
15. If you did not feel confident explaining the nutrition and health benefits of the dried fish to the PLW/AG, please describe reasons.
16. If you did not feel confident explaining the portion size and how to use the dried fish to the PLW/AG, please describe reasons.

4.5.4 Ease-of-use Assessment – PLW/AG

Background/rationale: Assess beneficiary experience using dried fish from THR.

Target group: PLW and AG

Sample size: 20% of THR beneficiaries from each AWC (approx. 200 total)

Timeline: Endline

Method overview: Semi-structured interview

Time required: 15 minutes

Procedure:

- Participation in the interview is voluntary; clearly explain to the beneficiary that they may decline to participate in the interview at any time.
- Interviews to be undertaken at endline of the project and at a mutually beneficial time between PLW/AG and data collector.
- Questions are to be tested and culturally adapted with at least five PLW/AG before undertaking the remaining interviews.
- All interviews are to be undertaken in the preferred language of the beneficiary.
- All interviews are to be undertaken in a neutral location (eg. the Anganwadi Centre or village meeting area) to limit discomfort to the participant.
- Optimal times to interview THR beneficiaries could be during THR pick-up days or during monthly health days at the Anganwadi Centre.
- Where possible, interview data is to be collected via digital methods (eg. ODK/-CommCare) to enable real-time quality check of data by WorldFish and to reduce errors associated with duplicate data entry.

Questions:

Please select the number that reflects your immediate response to each statement. Do not think too long about each statement. Number 1 equals “Strongly Disagree” and 5 equals “Strongly Agree”. If you do not know how to response, simply circle number 3 “Neutral”.

PLW/AG Dried Fish (THR)	Strongly Disagree		Neutral		Strongly Agree
1. I found the dried fish easy to use.	1	2	3	4	5
2. I found the dried fish easy to store.	1	2	3	4	5
3. The dried fish became contaminated (eg. mould, dirt, insects).	1	2	3	4	5
4. I felt confident adding the dried fish to my weekly meals.	1	2	3	4	5
5. I felt confident that the dried fish is safe and hygienic for me to eat.	1	2	3	4	5
6. I felt confident knowing how many dried fish to eat per meal.	1	2	3	4	5
7. I felt confident that dried fish is good for my health.	1	2	3	4	5

Follow up questions:

8. If you found it hard to use the dried fish, please describe reasons.
9. If you found it hard to store the dried fish, please describe reasons.
10. If the fish powder became contaminated, please list contaminants and reasons.
11. If you did not feel confident adding the dried fish to your meals, please describe reasons (eg. lack of training, difficult to remember serving size, lack of time, too complicated, family resistance etc.)
12. If you did not feel confident that the fish is safe or hygienic to eat, please describe reasons.
13. If you did not feel confident knowing how many dried fish to eat, please describe reasons.
14. If you did not feel confident that dried fish is good for your health, please describe reasons.

References

FAO WFP. 2018. *Home-Grown School Feeding. Resource Framework. Technical Document*. Rome: Food and Agriculture Organization of the United Nations, World Food Programme.

Gol. 2011. *Dietary Guidelines for Indians: A Manual*. <https://doi.org/10.16194/j.cnki.31-1059/g4.2011.07.016>

Gol. 2016. National Family Health Survey (NFHS-4) 2015-16 State Fact Sheet: Odisha. In *Ministry of Health and Family Welfare, Government of India*. Mumbai.

Government of Odisha. 2018. *Revised Guidelines for Implementation of Supplementary Nutrition Programme*. Bhubaneswar.

Headey D, Hirvonen K, and Hoddinott J. 2018. Animal sourced foods and child stunting. *American Journal of Agricultural Economics*, 100(5), 1302–1319. <https://doi.org/10.1093/ajae/aay053>

Hibbeln CJR, Spiller P, Brenna JT, Golding J, Holub BJ, Harris WS, ... Carlson SE. 2019. Relationships between seafood consumption during pregnancy and childhood and neurocognitive development: two systematic reviews. *Prostaglandins, Leukotrienes and Essential Fatty Acids*. <https://doi.org/10.1016/J.PLEFA.2019.10.002>

HLPE. 2014. Sustainable fisheries and aquaculture for food security and nutrition. *Fao*, (June).

Kawarazuka N and Béné C. 2011. The potential role of small fish species in improving micronutrient deficiencies in developing countries: building evidence. *Public Health Nutrition*, 14(11), 1927–1938. <https://doi.org/10.1017/S1368980011000814>

Needham S and Funge-Smith S. 2014. The consumption of fish and fish products in the Asia-Pacific region based on household surveys. In *Food and Agriculture Organisation of the United Nations*. <https://doi.org/10.1155/2012/353821>

Patra AK. 2018. Government Initiative to solve the Problem of Malnutrition in Odisha : An Assessment. *Journal of Economic & Social Development*, (1).

Sigh S, Roos N, Sok D, Borg B, Chamnan C, Laillou A, ... Wieringa FT. 2018. Development and Acceptability of Locally Made Fish-Based, Ready-to-Use Products for the Prevention and Treatment of Malnutrition in Cambodia. *Food and Nutrition Bulletin*, 39(3), 420–434. <https://doi.org/10.1177/0379572118788266>

Troell M, Jonell M and Crona B. 2019. *The role of seafood for sustainable and healthy diets The EAT-Lancet commission report through a blue lens*. (266), 25. Retrieved from http://www.beijer.kva.se/PDF/27575616_Disc266.pdf

Appendix 1. Nutrition Statistics

	Stunting	Under-weight	Adequate diet (6-23 months)	Child anaemia (6-59 months)	Woman anaemia (15-49 years)
India (%)	38.4	35.8	9.6	58.6	53.1
Odisha (%)	34.1	34.4	8.5	44.6	51.0
Tribal-dominated districts of Odisha					
Gajapati (%)	43.4	41.7	-	-	-
Kandhamal (%)	29.2	23.0	-	-	-
Keonjhar (%)	48.0	47.7	-	-	-
Koraput (%)	57.7	52.6	-	-	-
Malkangiri (%)	50.2	67.4	-	-	-
Mayurbhanj (%)	45.7	40.7	-	-	-
Nabarangpur (%)	52.8	52.8	-	-	-
Rayagada (%)	48.5	53.9	-	-	-
Sundargarh (%)	48.0	39.3	-	-	-
Odisha tribal districts (average %)	47.1	46.6	-	-	-

Source: National Family Health Survey (NFHS) 2015-16 and district-level Clinical, Anthropometric and Biochemical (CAB) 2014 (Patra, 2018).

Appendix 2. Health Benefits of Eating Fish



Small fish nutrients	Children (3-6-years)	Pregnant and lactating women Adolescent girls
Omega-3 fatty acids	<ul style="list-style-type: none"> • Brain growth • Eye health • Less asthma 	<ul style="list-style-type: none"> • Healthy pregnancy • Eye health • Healthy hormones • Heart health • Less diabetes • Healthy weight
B12	<ul style="list-style-type: none"> • Healthy red blood cells • Healthy nervous system 	<ul style="list-style-type: none"> • Healthy pregnancy • Healthy red blood cells • Healthy nervous system • Prevent birth defects
Iron	<ul style="list-style-type: none"> • Brain growth • Healthy immune system • Prevents iron-deficiency anaemia 	<ul style="list-style-type: none"> • Healthy immune system • Healthy pregnancy • Prevents iron-deficiency anaemia
Zinc	<ul style="list-style-type: none"> • Healthy growth • Healthy immune system • Faster recovery from diarrhea • Prevent stunting 	<ul style="list-style-type: none"> • Healthy growth • Healthy immune system • Faster recovery from diarrhea
Calcium	<ul style="list-style-type: none"> • Healthy bones/teeth • Healthy nervous system 	<ul style="list-style-type: none"> • Healthy pregnancy • Healthy bones/teeth • Healthy nervous system • Healthy heart
Iodine	<ul style="list-style-type: none"> • Brain growth • Thyroid health 	<ul style="list-style-type: none"> • Healthy pregnancy • Thyroid health
Protein	<ul style="list-style-type: none"> • Physical growth • Healthy hormones • Healthy organs • Healthy nervous system • Prevents wasting 	<ul style="list-style-type: none"> • Physical growth • Healthy hormones • Healthy organs • Healthy nervous system

Source: (HLPE, 2014; Kawarazuka & Béné, 2011).

Appendix 3. Quantity Calculations

Beneficiary	RDA Protein (g/day)	Pulses or meat (portion/day)	Raw fish (g/day)	Dry fish ¹ (g/day)
3-year old child	16.7	1.0	50	15
4-6-year old child	20.1	1.0	50	15
10-12-year old girl	40.4	2.0	100	25
13-15-year old girl	51.9	2.0	100	25
16-17-year old girl	55.5	2.5	125	31.25
Pregnant	82.2	3 +	150 +	37.5 +
Lactating 0-6 month	77.9	3 +	150 +	37.5 +
Lactating 6-12 month	70.2	3 +	150 +	37.5 +

Source: Government of India. 2011. *Dietary Guidelines for Indians*. Hyderabad: India. <https://www.nin.res.in/>. See also Appendix 8-12.

Calculation notes:

- 100-200g raw fish / week minimum (Dietary Guidelines for Indians, 2011, p. 51)
- 50g standard portion size of raw fish (Dietary Guidelines for Indians, 2011, p. 100)
- 50g serve of raw fish = 9g protein (Dietary Guidelines for Indians, 2011, p. 100)
- ¹Dried fish loses 75% of water weight during non-salted drying

Example Calculation:

- 1 serve pulses or meat / day = 50g raw protein / 3-6-year old child / day
- Dried fish loses 75% of water weight during non-salted drying

$50\text{g} \times 0.25 = 12.5\text{g fish powder} / 3\text{-}6\text{-year old child} / \text{day, which is rounded up to } 15\text{ g}$

Dried small fish notes:

- Dried small fish species in this study:
 - Indian Anchovy
 - Indian Sardine
 - Lesser Sardine
- These species all vary in size – therefore, require serving sizes based on grams and then handful examples for each three species.
- For example:
 - 40g dried anchovies = approx. 20 small fish
 - 40g dried lesser sardines = approx. 4 small fish

Appendix 4. Information Sheet for Anganwadi Centre

How to add fish powder to Hot Cooked Meal and dried small fish to Take Home Ration.

Beneficiary and fish entitlements

	Hot Cooked Meal	Take Home Ration
Beneficiary	3-6-year old children	10-18-year old AG 19-49-year old PLW
Product	Fish powder	Dried small fish
Quantity entitled¹	15g / child / day	25g /10-15-year old AG / day 40g /16-18-year old AG / day 40g /19-49-year old PLW / day
Days entitled	5 days / week / child	3 days / week / person
Method of intake	Anganwadi Centre to add fish powder to children's daily curry as part of the Hot Cooked Meal.	Anganwadi Centre to distribute dried small fish to AG and PLW with Take Home Ration.

AG = Adolescent Girl; PLW = Pregnant and Lactating Women.

Storage

- Store fish powder in sealed containers in a dry, cool, and airy place.
- Only use fish powder that is dry and in good condition – the powder should have no visible contaminants like water, dirt, insects, rodents, mould etc.
- Do NOT use fish powder if packages are torn/open in any way or fish powder inside is visibly contaminated.
- If fish powder becomes contaminated, discard immediately.

Menu

SI No	Beneficiary	Diet type	Ingredients	Quantity entitled per day (in gm)	Calorie	Protein
Monday – Ghanta and Dalma						
1	Children (3-6 years)	HCM	Rice	80	276.8	5.44
			Dal (Arhar)	30	100.5	6.69
			Oil (Veg Oil)	3	54	0
			Potato	30	29.1	0.48
			Other Vegetables	20		
			Drumstick Leaves & saag	20	18.4	1.34
			Lemon	10 drops		
			Condiments			
			1gm Iodized / double fortified salt			
			Fish powder	15	TBC	TBC
			Sub-Total		478.8	13.95
Tuesday, Thursday – Bhata, Boiled Egg & Vegetable Curry						
2	Children (3-6 years)	HCM	Rice	80	276.8	5.12
			Oil (Veg Oil)	3	54	
			Potato & Vegetables (any 2)	45	43.65	0.72
			Onion	10	7.5	0.18
			Lemon	10 drops		
			Condiments			
			1 gm Iodized / double fortified salt			
			Egg		86.50	6.65
			Fish powder	15	TBC	TBC
			Sub-Total		468.45	12.67
Wednesday, Friday, Saturday – Bhata & Egg Curry						
3	Children (3-6 years)	HCM	Rice	80	276.8	5.12
			Oil (Veg Oil)	3	54	
			Potato & Vegetables (any 2)	45	43.65	0.72
			Onion	10	7.5	0.18
			Lemon	10 drops		
			Condiments			
			1 gm Iodized / double fortified salt			
			Egg		86.50	6.65
			Fish powder	15	TBC	TBC
			Sub-Total		468.45	12.67

Note: Besan Dhoka Curry may be prepared for children who do not eat eggs or fish, 58 gms of Besan is to be used per child for preparation of besan dhoka.

Cooking Process

Rice

- Clean and wash rice.
- Put adequate clean water to cook (1 part rice, 2.5 part water).
- Cook it in clean water until it becomes soft and edible.

Dalma

- Clean Dal and wash it thoroughly with clean water, soak it for some time (10 minutes).
- Wash vegetables properly and then cut it in to medium size.
- Take oil as per the allotted amount and heat it. Add sarson / phutan, now add vegetables (seasonal vegetables) and potatoes and add soaked Dal. Add turmeric.
- Add fish powder. Add extra water to maintain Dal consistency, if required.
- Let it cook until it becomes soft.
- Add iodised / double fortified salt at the end.

Egg Curry

- Clean and boil eggs in clean water.
- Wash potatoes and other seasonal vegetables (pumpkin, tomato, etc.) properly to remove dirt.
- Heat oil, put panch phutan, add onion, garlic, and ginger and fry lightly. Add vegetables (potato, tomato, raw banana etc.). Mix it properly.
- Add fish powder.
- Add water to cook and cook until the vegetables are done and it has curry like consistency.
- Add boiled eggs and cook for 2-3 minutes.
- Add iodised/ double fortified salt at the end.

Vegetable Curry

- Clean and wash vegetables, (2 vegetables like papaya, pumpkin, brinjal, ridge gourd (janhi), radish, cabbage, cauliflower etc.) and potatoes thoroughly.
- Heat oil, add phutan, onion, garlic and ginger paste and fry lightly. Add the vegetables and fry it properly.
- Add fish powder.
- Add dry masala such as turmeric, coriander powder, cumin powder and add water.
- Add iodised/ double fortified salt at the end.

Besan Dhoka Curry

- No changes.

Serving

- Anganwadi Centre to use clean plates and utensils to serve food
- Ensure children wash their hands with soap before meals
- Ensure food is consumed within 2 hours of preparation

Appendix 5. Implementation Checklist

1) Details of staff member

- Staff name and institution: _____

2) Details of Anganwadi Centre

- Project number: _____
- Village name: _____
- AWW name: _____
- AWW phone: _____
- Number of children aged 3-6 years old: _____
- Number of adolescent girls aged 11-18 years old: _____
- Number of PLW: _____
- Date of THR delivery/JAANCH quality inspection: _____

3) Amount of product required per month

Fish Powder

- Number of children aged 3-6-years x 15g x 20 days¹ = _____grams of fish powder / month

Dried Fish

- Number of adolescent girls aged 10-15 years old x 25g x 16 days² = _____grams of fish / month
- Number of adolescent girls aged 16-18 years old + number of PLW x 40g x 12 days² = _____grams of fish / month
- Total _____grams of dried fish / month

4) Training of Anganwadi Centre Worker

- Provided baseline training to AWW
 - Yes, date: _____
 - No, details: _____
 - Pending, date: _____
- Provided Information Sheet (Appendix 4) to AWW
 - Yes, date: _____
 - No, details: _____
 - Pending, date: _____

5) Delivery of fish product

Fish powder delivered to AWC (HCM):

- Month 1, date: _____
- Month 2, date: _____
- Month 3, date: _____
- Month 4, date: _____
- Month 5, date: _____
- Month 6, date: _____

Dried fish delivered to AWC (THR):

- Month 1, date: _____
- Month 2, date: _____
- Month 3, date: _____
- Month 4, date: _____
- Month 5, date: _____
- Month 6, date: _____

¹5 days week x 4 weeks = 20 days / month; ²3 days week x 4 weeks = 12 days / month

Appendix 6. Evaluation Checklist

Hot Cooked Meal

	Sample			Timeline	
	Target	n	Baseline	Midline	Endline
1 Taste trial	3-6-yr olds	~300	<input type="checkbox"/> Date: ____		<input type="checkbox"/> Date: ____
2 Nutritional analysis	HCM <input type="checkbox"/> Fish-powder curry <input type="checkbox"/> Egg vegetable curry <input type="checkbox"/> Vegetarian Dalma	As per lab		<input type="checkbox"/> Date: ____ <input type="checkbox"/> Date: ____ <input type="checkbox"/> Date: ____	
3 Ease-of-use assessment	AWW	60-65			<input type="checkbox"/> Date: ____
4 Caregiver perceptions	PLW/AG	4 FGDs			<input type="checkbox"/> Date: ____
5 Plate waste	AWC	60-65	<input type="checkbox"/> Date: ____		<input type="checkbox"/> Date: ____






Take Home Ration






	Sample			Timeline	
	Target	n	Baseline	Midline	Endline
6 Taste trial	PLW/AG	~200			<input type="checkbox"/> Date: ____
7 Nutritional analysis	THR (dried) <input type="checkbox"/> Indian Anchovy <input type="checkbox"/> Indian Sardine <input type="checkbox"/> Lesser Sardine	As per lab		<input type="checkbox"/> Date: ____ <input type="checkbox"/> Date: ____ <input type="checkbox"/> Date: ____	
8 Ease-of-use assessment	AWW	60-65			<input type="checkbox"/> Date: ____
9 Ease-of-use assessment	PLW/AG	~200			<input type="checkbox"/> Date: ____

Appendix 7. Evaluation Templates - HCM

Hot Cooked Meal

1) Taste Trial

Vegetable Curry HCM.					
Product	1 = Very good	2 = Good	3 = Neutral	4 = Bad	5 = Very bad
Vegetable Curry					
Appearance					
Colour					
Smell					
Looks appetising					
Taste					
Texture					
Easy to swallow					
Overall					

Fish-Powder Vegetable Curry HCM.					
Product	1 = Very good	2 = Good	3 = Neutral	4 = Bad	5 = Very bad
Fish-Powder Vegetable Curry					
Appearance					
Colour					
Smell					
Looks appetising					
Taste					
Texture					
Easy to swallow					
Overall					

2) Nutritional Analysis

Nutrients (per 100g)	Hot Cooked Meal		
	Vegetable curry with fish-powder and rice	Egg curry with rice	Vegetarian Dalma
Energy			
Protein			
Fats			
Omega-3 fatty acids			
Trans fats			
Iron			
B12			
Calcium			
Zinc			
Iodine			
Vitamin A			

3) Ease-of-Use Assessment

AWW Section 1: Fish Powder (HCM)	Strongly Agree		Neutral		Strongly Disagree
1. I found the fish powder easy to use.	1	2	3	4	5
2. I found the fish powder easy to store.	1	2	3	4	5
3. The fish powder was delivered on time each month.	1	2	3	4	5
4. I was supplied enough fish powder for my centre's needs each month.	1	2	3	4	5
5. The fish powder became contaminated (eg. mould, dirt, insects).	1	2	3	4	5
6. I felt confident knowing how much fish powder to add to the HCM.	1	2	3	4	5
7. The fish powder I was provided was culturally appropriate for my community.	1	2	3	4	5
8. I felt confident explaining the nutrition and health benefits of the fish powder to the children's caregiver.	1	2	3	4	5

Follow up questions:

9. If you found it hard to use the fish powder, please describe reasons.
10. If you found it hard to store the fish powder, please describe reasons.
11. If the fish powder became contaminated, please list contaminants and reasons.
12. If you did not feel confident adding the right amount of the fish powder to the HCM, please describe reasons (eg. lack of training, difficult to remember serving size, lack of time, too complicated, community resistance etc.)
13. If you did not feel confident explaining the nutrition and health benefits of the fish powder to the children's caregiver, please describe reasons.

4) Caregiver Perceptions

Focus group discussion questions:

1. In your opinion, what is the best age to introduce non-veg food to your child?
 - a. Please describe the reasons for your answer.
2. How do you feel about the Anganwadi Centre adding fish powder to your child's curry?
 - a. Do you think it is a good idea or a bad idea? Please describe reasons for your answer.
3. Do you have any concerns about fish powder and its impact on your child? If so, please describe the reasons for your answer. Do you think other family members or community members have concerns about fish powder for small children?
4. Has your AWW explained to you the health and nutrition benefits of small fish for children 3-6 years old? If so, what do you understand to be the health and nutrition benefits of small fish for children?
5. Do you think the AWC should continue to provide fish powder in the HCM to your child? If not, why not and, if so, then should they do anything different in the future?

5) Plate Waste





Data collector notes on the following points:

- Is the Anganwadi Centre Worker/assistant measuring the fish powder accurately when adding to the HCM?
- How are the children responding to the curry (eg. are they eating it as normal or are there non-verbal indicators that they do not wish to consume the curry with the fish-powder)?
- Is there any plate waste at the end of the HCM? If so, what food is left (eg. rice, curry, eggs)?

Appendix 8. Evaluation Templates - THR

Take Home Ration

6) Taste Trial

Dried small fish THR.					
Product	1 = Very good	2 = Good	3 = Neutral	4 = Bad	5 = Very bad
Dried small fish (please tick) <input type="checkbox"/> Indian anchovy <input type="checkbox"/> Indian sardine <input type="checkbox"/> Lesser sardine					
Appearance					
Colour					
Smell					
Looks appetising					
Taste					
Texture					
Easy to swallow					
Overall					

7) Nutritional Analysis

Nutrients (per 100g)	Take Home Ration		
	Indian Anchovy (dried)	Indian Sardine (dried)	Lesser Sardine (dried)
Energy			
Protein			
Fats			
Omega-3 fatty acids			
Trans fats			
Iron			
B12			
Calcium			
Zinc			
Iodine			
Vitamin A			

8) Ease-of-Use Assessment – AWW

AWW: Dried Fish (THR)	Strongly Agree		Neutral		Strongly Disagree
1. I found the dried fish easy to distribute to the PLW/AG.	1	2	3	4	5
2. I found the dried fish easy to store.	1	2	3	4	5
3. The dried fish became contaminated (eg. mould, dirt, insects).	1	2	3	4	5
4. The dried fish was delivered on time each month.	1	2	3	4	5
5. I was supplied with enough dried fish for my centre's needs each month.	1	2	3	4	5
6. I felt confident adding the dried fish to the THR.	1	2	3	4	5
7. I felt confident explaining the nutrition and health benefits of the dried fish to the PLW/AG.	1	2	3	4	5
8. I felt confident explaining the portion size (how many dried small fish to eat) to the PLW/AG.	1	2	3	4	5
9. I felt confident explaining how to use the dried fish (eg. add to a fish curry) to the PLW/AG.	1	2	3	4	5
10. The dried fish I was provided was culturally appropriate for my community.	1	2	3	4	5

Follow up questions:

11. If you found it hard to distribute the dried fish in the THR, please describe reasons.
12. If you found it hard to store the dried fish, please describe reasons.
13. If the dried fish became contaminated, please list contaminants and reasons.
14. If you did not feel confident adding the dried fish to the THR, please describe reasons (eg. lack of training, difficult to remember serving size, lack of time, too complicated, community resistance etc.)
15. If you did not feel confident explaining the nutrition and health benefits of the dried fish to the PLW/AG, please describe reasons.
16. If you did not feel confident explaining the portion size and how to use the dried fish to the PLW/AG, please describe reasons.

9) Ease-of-Use Assessment – PLW/AG

PLW/AG Dried Fish (THR)	Strongly Disagree		Neutral		Strongly Agree
1. I found the dried fish easy to use.	1	2	3	4	5
2. I found the dried fish easy to store.	1	2	3	4	5
3. The dried fish became contaminated (eg. mould, dirt, insects).	1	2	3	4	5
4. I felt confident adding the dried fish to my weekly meals.	1	2	3	4	5
5. I felt confident that the dried fish is safe and hygienic for me to eat.	1	2	3	4	5
6. I felt confident knowing how many dried fish to eat per meal.	1	2	3	4	5
7. I felt confident that dried fish is good for my health.	1	2	3	4	5

Follow up questions:

8. If you found it hard to use the dried fish, please describe reasons.
9. If you found it hard to store the dried fish, please describe reasons.
10. If the fish powder became contaminated, please list contaminants and reasons.
11. If you did not feel confident adding the dried fish to your meals, please describe reasons (eg. lack of training, difficult to remember serving size, lack of time, too complicated, family resistance etc.)
12. If you did not feel confident that the fish is safe or hygienic to eat, please describe reasons.
13. If you did not feel confident knowing how many dried fish to eat, please describe reasons.
14. If you did not feel confident that dried fish is good for your health, please describe reasons.

Appendix 9. Balanced Diet for Infants, Children and Adolescents

(Number of Portions)

Food groups	g/ portion	Infants 6-12 months	Years								
			1 - 3	4 - 6	7 - 9	10 – 12		13 – 15		16 - 18	
						Girls	Boys	Girls	Boys	Girls	Boys
Cereals & millets	30	0.5	2	4	6	8	10	11	14	11	15
Pulses	30	0.25	1	1.0	2	2	2	2	2.5	2.5	3
Milk (ml) & milk products	100	4a	5	5	5	5	5	5	5	5	5
Roots & tubers	100	0.5	0.5	1	1	1	1	1	1.5	2	2
Green leafy vegetables	100	0.25	0.5	0.5	1	1	1	1	1	1	1
Other vegetables	100	0.25	0.5	1	1	2	2	2	2	2	2
Fruits	100	1	1	1	1	1	1	1	1	1	1
Sugar	5	2	3	4	4	6	6	5	4	5	6
Fat/ oil (visible)	5	4	5	5	6	7	7	8	9	7	10

Notes on fish intake:

- Recommends 100-200g fish / week minimum for fish related health benefits (p. 51).
- One portion of pulse may be exchanged with one portion (50g) of fish/egg/meat.

Source: Government of India. 2011. Dietary Guidelines for Indians. Hyderabad: India. <https://www.nin.res.in/>

Appendix 10. Balanced Diet for Adults

(Number of portions)

	Type of work						
	g/portion	Sedentary		Moderate		Heavy	
		Man	Woman	Man	Woman	Man	Woman
Cereals & millets	30	12.5	9	15	11	20	16
Pulses	30	2.5	2	3	2.5	4	3
Milk & milk products	100 ml	3	3	3	3	3	3
Roots & tubers	100	2	2	2	2	2	2
Green leafy vegetables	100	1	1	1	1	1	1
Other vegetables	100	2	2	2	2	2	2
Fruits	100	1	1	1	1	1	1
Sugar	5	4	4	6	6	11	9
Fat	5	5	4	6	5	8	6

Notes on fish intake:

- Recommends 100-200g fish / week minimum for fish related health benefits (p. 51).
- One portion of pulse may be exchanged with one portion (50g) of fish/egg/meat.

Source: Government of India. 2011. Dietary Guidelines for Indians. Hyderabad: India. <https://www.nin.res.in/>

Appendix 11. Portion Sizes and Menu Plan

Portion Size of Foods (raw) and Nutrients

	g/Portion	Energy (Kcal)	Protein (g)	Carbohydrate (g)	Fat (g)
Cereals & millets	30	100	3.0	20	0.8
Pulses	30	100	6.0	15	0.7
Egg	50	85	7.0	-	7.0
Meat/chicken/ fish	50	100	9.0	-	7.0
Milk (ml) [®] & milk products	100	70	3.0	5	3.0
Roots & Tubers	100	80	1.3	18	-
Green leafy vegetables	100	46	3.6	-	0.4
Other vegetables	100	28	1.7	-	0.2
Fruits	100	40	-	10	-
Sugar	5	20	-	5	-
Fat & Oils (visible)	5	45	-	-	5.0

Notes on fish intake:

- Recommends 100-200g fish / week minimum for fish related health benefits (p. 51).
- One portion of pulse may be exchanged with one portion (50g) of fish/egg/meat.

Source: Government of India. 2011. *Dietary Guidelines for Indians*. Hyderabad: India. <https://www.nin.res.in/>

Appendix 12. Recommended Dietary Allowances

(Macronutrients and Minerals)

Group	Particulars	Body wt. kg	Net Energy Kcal/d	Protein g/d	Visible Fat g/day	Calcium mg/d	Iron mg/d
Man	Sedentary work	60	2320	60	25	600	17
	Moderate work		2730		30		
	Heavy work		3490		40		
Woman	Sedentary work	55	1900	55	20	600	21
	Moderate work		2230		25		
	Heavy work		2850		30		
	Pregnant woman		+350	82.2	30	1200	3 5
	Lactation 0-6 months		+600	77.9	30	1200	25
	6-12 months		+520	70.2	30		
Infants	0-6 months	5.4	92 Kcal/kg/d	1.16 g/kg/d	–	500	--
	6-12 months	8.4	80 Kcal/kg/d	1.69 g/kg/f	19		46 µg/ kg/day
Children	1-3 years	12.9	1060	16.7	27	600	09
	4-6 years	18	1350	20.1	25		13
	7-9 years	25.1	1690	29.5	30		16
Boys	10-12 years	34.3	2190	39.9	35	800	21
Girls	10-12 years	35.0	2010	40.4	35	800	27
Boys	13-15 years	47.6	2750	54.3	45	800	32
Girls	13-15 years	46.6	2330	51.9	40	800	27
Boys	16-17 years	55.4	3020	61.5	50	800	28
Girls	16-17 years	52.1	2440	55.5	35	800	26

Source: Government of India. 2011. Dietary Guidelines for Indians. Hyderabad:India. <https://www.nin.res.in/>

(Vitamins)

Group	Particulars	Vit. A µg/d		Thiamin mg/d	Riboflavin mg/d	Niacin equivalent mg/d	Pyridoxin mg/d	Ascorbic acid mg/d	Dietary folate µg/d	Vit. B ₁₂ µg/d	Magnesium mg/d	Zinc mg/d			
		Retinol	β-carotene												
Man	Sedentary work	600	4800	1.2	1.4	16	2.0	40	200	1	340	12			
	Moderate work			1.4	1.6	18									
	Heavy work			1.7	2.1	21									
Woman	Sedentary work	600	4800	1	1.1	12	2.0	40	200	1	310	10			
	Moderate work			1.1	1.3	14									
	Heavy work			1.4	1.7	16									
	Pregnant woman			+0.2	+0.3	+2							2.5	1.2	12
	Lactation			+0.3	+0.4	+4							2.5	1.5	
	0-6 months			+0.2	+0.3	+3							2.5		
Infants	0-6 months	--	--	0.2	0.3	710µg/kg	0.1	25	25	0.2	30	--			
	6-12 months	350	2800	0.3	0.4	650µg/kg	0.4	25	25	0.2	45	--			
Children	1-3 years	400	3200	0.5	0.6	8	0.9	40	80	80	50	5			
	4-6 years			0.7	0.8	11	0.9						100	70	
	7-9 years			0.8	1.0	13	1.6						120	100	8
Boys	10-12 years	600	4800	1.1	1.3	15	1.6	40	140	0.2-	120	9			
Girls	10-12 years			1.0	1.2	13	1.6						160	9	
	Boys			1.4	1.6	16	2.0								165
Girls	13-15 years			1.2	1.4	14	2.0						210	11	
	Boys			1.5	1.8	17	2.0								195
Girls	16-17 years			1.0	1.2	14	2.0						235	12	

Source: Government of India. 2011. Dietary Guidelines for Indians. Hyderabad: India. <https://www.nin.res.in/>

Appendix 13. Nutritional Value of Common Foods

(Per 100g of edible portion)

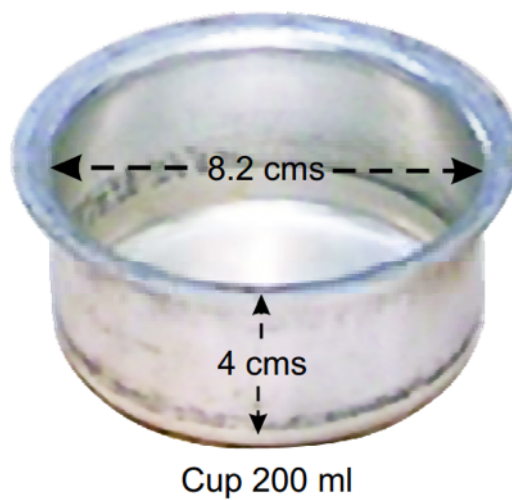
S.NO.	Name of foodstuff	Protein (g)	Energy (Cal.)	Iron (mg.)	Carotene/Vit. A (µg.)
1	2	3	4	5	6
Cereals & Millets					
1.	Bajra	11.6	361	5.0	132
2.	Barley	11.5	336	3.0	10
3.	Jowar	10.4	349	5.8	47
4.	Maize dry	11.1	342	2.0	90
5.	Ragi	7.3	328	6.4	42
6.	Rice, raw, milled	6.8	345	3.1	0
7.	Wheat (whole)	11.8	346	4.9	64
Pulses and legumes					
8.	Bengal gram (whole)	17.1	360	10.2	189
9.	Green gram (whole)	24.0	334	7.3	94
10.	Lentil	25.1	343	4.8	270
11.	Redgram dal	22.3	335	5.8	132
12.	Soyabean	43.2	432	11.5	426
Leafy vegetables					
13.	Bathua leaves	3.7	30	4.2	1740
14.	Cabbage	1.8	27	0.8	120
15.	Coriander leaves	3.3	44	18.5	6918
16.	Spinach	2.0	26	10.9	5580
17.	Amaranth leave	4.0	45	3.5	5520
18.	Fenugreek leaves	4.4	49	1.9	2340
19.	Radish leaves	3.9	38	18.0	5742

Roots and tubers					
20.	Carrot	0.9	48	2.2	1890
21.	Onion, big	1.2	50	0.7	0
22.	Potato	1.6	97	0.7	24
23.	Sweet Potato	1.2	120	0.8	6
Other vegetables					
24.	Cauliflower	2.6	30	1.5	30
25.	Pumpkin	1.4	25	0.7	50
Fats & edible oils					
26.	Hydrogenated oil (fortified)	0	900	0	750*
27.	Cooking oil (groundnut, gingerly, mustard, coconut, etc.)	0	900	0	0
MILK & MILKPRODUCTS					
28.	Milk (buffalos)	4.3	117	0.2	48*
29.	Milk (cow's)	3.2	67	0.2	53*
30.	Curds (cow milk)	3.1	60	0.2	31*
31.	Butter milk	0.8	15	0.1	-
32.	Skimmed milk liquid	2.5	29	0.2	-
33.	Channa (cow milk)	18.3	265	-	110*
34.	Skimmed milk powder	38.0	357	1.4	-
35.	Channa (Buffalo milk)	13.4	292	-	-
MISCELLANEOUS					
36.	Bread	7.8	245	1.1	-
37.	Sugar	0.1	398	0.155	-
38.	Jaggery	0.4	383	2.64	-

*Vitamin A : Retinol µg

Source: Government of India. 2004. Indian Food Composition Database, <http://www.ifct2017.com/frame.php?page=home>

Appendix 14. Serving Size Spoons and Cup



Source: Government of India. 2011. *Dietary Guidelines for Indians*. Hyderabad:India. <https://www.nin.res.in/>

About WorldFish

WorldFish is an international, not-for-profit research organization that works to reduce hunger and poverty by improving fisheries and aquaculture. It collaborates with numerous international, regional and national partners to deliver transformational impacts to millions of people who depend on fish for food, nutrition and income in the developing world. Headquartered in Penang, Malaysia and with regional offices across Africa, Asia and the Pacific, WorldFish is a member of CGIAR, the world's largest global partnership on agriculture research and innovation for a food secure future.

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