Food and Agriculture Organization of the United Nations

© shutterstock

SMALL FISH, HUGE IMPACT

Following trials in Myanmar, a powder made from small indigenous fish species has been declared a nutritious and safe food for infants – helping to tackle issues such as malnutrition and stunting.

Myanmar produced 3.16 million tonnes of aquatic produce in 2018 – of which 1.14 million tonnes, 1.13 million tonnes and 0.89 million tonnes came from marine capture, aquaculture and inland capture fisheries respectively (FAO, 2020). Fish are a major source of animal protein in the national diet, although there is significant geographic variation in fish consumption, with much lower rates in the central dry zone and inland upland areas (Belton *et al.*, 2015).

Salting and drying is the most common method of processing and extending the shelf-life of fish, making them available for home consumption in the dry season, and allowing transportation to areas where fish are in short supply. However, poor food safety practices and small-scale homestead fish-drying practices, which include drying them on the ground, exposes the fish to contamination by flies, cockroaches, mice, rats, cats and dogs. Contamination can expose household members to food-borne disease risks, with possible long-term health consequences.

According to the 2017–2018 Myanmar micronutrient and food consumption survey conducted by the Myanmar Department of Public Health, 35 percent, 27 percent and 19 percent of children aged between 6 and 59 months are anaemic, stunted and underweight respectively. Pregnant and lactating women as well as children suffer from multiple micronutrient deficiencies. Moreover, animal source foods are typically only introduced to infants older than 12 months, which likely delays both the physical and cognitive development of infants, with life-long consequences (WHO, 2020).

Fish are an important source of highly bioavailable protein and micronutrients that are needed for the growth and development of children, particularly those aged five or under. Small indigenous fish species (SIS),[1] which are commonly eaten whole with their heads on, are more micronutrient-rich than larger fish species that are more likely to be eaten as fillets and steaks with the bones removed.

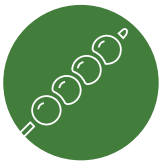
[1] SIS are small-sized, self-replicating fish species living in rice paddy systems, streams and rivers as well as in aquaculture ponds. SIS are not juveniles of larger fish species.

WorldFish under MYSAP programme[2] piloted and promoted low-cost, portable fish driers, designed to reduce contamination risks during fish drying, and the production of dried SIS powder. After food safety testing, dried SIS powder was then fed to children over six months of age. The promotion of SIS powder also addressed the fear of mothers that their children could choke on fish bones, which was identified as the main disincentive for mothers to feed more fish to their children under five years of age (Rizaldo and Weatherson, 2019).

In addition, to widely promote the production of dried SIS powder, WorldFish collaborated with a private food company in Myanmar to develop five local food products (CGIAR, 2020):

fish noodle soup

nutritious fish cookies



fish chickpea balls

complementary food mixture for infants and young children

rice–fish porridge

The five products were evaluated by multiple people and analysed by the Food Industries Development Supporting Laboratory in Yangon. Results showed that the products were safe to eat and a good source of carbohydrates, protein, fat, zinc and iron. Market analysis is currently ongoing to confirm the marketing viability of the products at a profit and to ensure wide availability for consumers.

TECHNIQUE AND APPROACH USED

The portable fish drier was piloted specifically to reduce contamination of drying produce, to promote the production of powdered SIS, to establish the earlier introduction of animal-sourced food for infants and to enhance the nutritional value of family meals. The innovation was tested with 60 collaborating households, each with a child under five years of age, from May to August 2020. This took place in 20 households each from Kale and Shwebo townships in the Sagaing Region and 20 households from Kengtung Township in Shan State.

To ensure that there were no food safety issues, staff from three subcontracted implementing partner NGOs – in Kale Township, Shwebo Township and Kengtung Township – made regular visits to oversee and to mentor groups of five households, testing the fish driers and powdered SIS production.

In addition, a handbook was developed in local language with clear instructions on how to hygienically prepare and dry the SIS. Concomitantly it indicated how to produce and store the powdered SIS in a food-safe manner and gave specific instructions on the introduction of complementary food for infants from 6 to 24 months of age, approved by nutritionists and medical staff of Save the Children. The instructions were in line with the WHO guidelines on infant and young child feeding (WHO, 2020).

[2] The Myanmar Sustainable Aquaculture Programme (MYSAP) was funded by the European Union and the German Federal Ministry for Economic Cooperation and Development. It was implemented by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH and the Department of Fisheries. WorldFish Myanmar realized MYSAP's inland component under a GIZ grant agreement. The work on fish agri-food systems (FISH) was undertaken as part of the agri-food systems CGIAR research programme.

SCOPE AND SCALE OF APPLICATION

WorldFish has promoted the production of SIS powder as a complementary food for children in the critical first 1 000 days of life – from conception until the child's second birthday – to achieve better nutrition in Bangladesh, Cambodia, Myanmar and Timor-Leste. The approach requires minimal technical input and low investment costs, so the innovation can be used in most locations to combat malnutrition and to mitigate undernutrition and micronutrient deficiencies. Small-scale fish drying and powdered SIS production also offer the potential for upscaling and commercialization, employment and income generation.

© shutterstock

Multifunction grinder used to produce SIS powder

After 60 seconds of grinding, the dried SIS becomes a fine powder with no visible bones.

ACCESSIBILITY

Low-cost, portable fish drier made from blue nylon netting, stainless steel wire and string with a zip

The low-cost, portable drier comprises fine blue nylon netting, stainless steel wire frames covered in fish netting to provide the multiple drying shelves and is sealed with a zip.

Once sun-dried, the SIS are ground up using an electric multifunction grinder available in local rural markets in Myanmar. The grinder can be powered by battery or by solar energy where no mains electricity is available.

OUTCOME AND BENEFITS

Each potential contamination event during the drying of fish increases the likelihood of a food safety issue developing. The low-cost, portable fish drier keeps the fish covered while drying them, thereby reducing the contamination risk and the pilot test demonstrated improved safety.

Powdered SIS samples collected from 60 collaborating households involved in the trial were subjected to proximate analysis (measurement of moisture, crude protein, fat, ash and salt levels) and tested for the different food safety parameters[3] at the Department of Fisheries, Quality Control and Research Section, Analytical Laboratory in Yangon.

The samples from the three locations were found to meet all food safety parameters tested against national standards for aquatic products in Myanmar. The dried SIS powder had a crude protein content of between 51.4 percent and 54.9 percent, the moisture content was between 9.6 percent and 11.3 percent, and the salt content was relatively low, ranging from 2.3 percent and 3.7 percent across the three townships. The dried SIS powder was food-safe as a complementary food, to be mixed with rice porridge and mashed up vegetables, for infants of six months onwards.

Feeding the dried SIS powder would be helpful for increasing protein, with the analysis showing that all items tested fall within the acceptable ranges. This powder would be a wonderful nutrient and flavour enhancer. The salt content was also low, so this complements our typically high sodium Myanmar diet.

By promoting the preparation and use of powdered SIS, WorldFish hopes to stimulate the earlier introduction of animal-sourced food for infants in Myanmar, with positive consequences on child growth and development. In addition, by preparing and safely storing powdered SIS ahead of time, mothers (and caregivers) can save time and energy. Moreover, they can enhance the nutritional value of family meals by adding the powdered SIS to soups, curries and vegetable dishes and ensure regular animal-sourced food consumption by family members.

The addition of dried SIS powder enhances the nutritional value of infant, child and adult meals because eating fish increases the intake of nutrients – including calcium, iron, zinc, vitamin A, vitamin B12, essential fatty acids and protein – which are required for proper child growth and brain development. SIS powder is also rich in minerals such as phosphorus and potassium. In addition, by including fish in a meal, the bioavailability of nutrients from plant-sourced foods is increased, because fish help the body utilize more of the nutrients, which would not be as well absorbed when eaten with a meal without fish (Thilsted and Wahab, 2014).

The 60 collaborating households that field-tested the low-cost portable drier gave positive feedback on how the drier increased their supply of safe and good quality dried fish, which their family members enjoyed eating, and it also extended the shelf-life, so fish were available throughout the dry season (Nway *et al.*, 2021).

Finally, during the Covid-19 pandemic – when travel within Myanmar was severely restricted – fish drying and powdered SIS production reduced the need for collaborating households to visit local markets to buy fish for home consumption.

[3] Total plate count of coliforms – *Escherichia coli, Staphylococcus aureus, Salmonella, Vibrio cholerae, Listeria monocytogenes, Vibrio parahaemolyticus, Shigella, Enterobacteriaceae*; yeasts; moulds; aflatoxin B1; histamine; dichlorodiphenyltrichloroethane (DDT); heptachlor; dieldrin; cadmium; mercury; and lead.

REFERENCES

Belton, B., Hein, A., Htoo, K., Kham, L.S., Nischan, U., Reardon, T. & Boughton, D. 2015. *Aquaculture in transition: Value chain transformation, fish and food security in Myanmar.* International Development Working Paper 139. Michigan State University, USA.

CGIAR. 2020. Dried small fish powder provides opportunity for child health in Myanmar. In: *WorldFish.* Penang, Malaysia. Cited 25 October 2021. www.worldfishcenter.org/publication/dried-small-fish-powder-provides-opportunity-child-health-myanmar

FAO. 2020. The State of World Fisheries and Aquaculture 2020. Sustainability in action. Rome. https://doi.org/10.4060/ca9229en

Nway, H.M., Htoo, K.K., Griffiths, D., Rizaldo, Q. & Khaing, W.W. 2021. *Report on piloting a low-cost portable fish drier and food safety test results of powdered dried fish*. MYSAP Inland.

Rizaldo, Q. & Weatherson, J. 2019. *Barrier analysis study in Shwebo Township, Sagaing Region, Myanmar.* MYSAP Inland.

Thilsted, S.H. & Wahab, M.A. eds. 2014. Proceedings of the regional workshop on Production and conservation of nutrient-rich small fish (SIS) in ponds and wetlands for nutrition security and livelihoods in South Asia, 1–2 March 2014. Dhaka, Bangladesh.

WHO (World Health Organization). 2020. Infant and young child feeding. In: *World Health Organization Newsroom.* Geneva. Cited 25 October 2021. www.who.int/news-room/fact-sheets/detail/infant-and-young-child-feeding

ACKNOWLEDGEMENTS

This brief was prepared by Don Griffiths (FAO consultant) and Quennie Rizaldo (WorldFish Myanmar).

Required citation: FAO. 2022. ***Small fish, huge impact***. Bangkok.

FAO Regional Office for Asia and the Pacific
FAO-RAP@fao.org
www.fao.org/asiapacific/en/

Food and Agriculture Organization of the United Nations
Bangkok, Thailand

Some rights reserved. This work is available under a CC BY-NC-SA 3.0 IGO licence

© FAO, 2022
CC0111EN/1/05.22