**FAQs for SQ-LNS**

**April 21, 2023**

1. What are small-quantity lipid-based nutrient supplements (SQ-LNS)?
   * SQ-LNS are food-based supplements that are designed for the prevention of malnutrition in settings where vulnerable populations are likely to have nutrient gaps in their typical diets and multiple micronutrient deficiencies.
   * SQ-LNS provide multiple micronutrients embedded in a small amount of food (~20 g/d, ~100-120 kcal/d) that also provides energy, protein, and essential fatty acids.
   * The composition of SQ-LNS can vary but usually includes vegetable oil (e.g., canola/rapeseed or soybean oil, which are rich in omega-3 fatty acids), legume (e.g., peanut, chickpea, lentil, and/or soy), milk powder and a small amount of sugar for palatability. The formulation usually contains the recommended daily amounts of the essential fatty acids, alpha-linolenic acid and linoleic acid.
   * In addition, the usual formulation of SQ-LNS is fortified with 22 vitamins and minerals, including micronutrients (such as vitamin A, B vitamins, iron, etc.) as well as macrominerals (calcium, potassium, phosphorus and magnesium). SQ-LNS for children generally contain the daily recommended intake of each micronutrient, and lower amounts of the macrominerals.
   * There are technical specifications used by the World Food Program (WFP) for SQ-LNS titled “World Food Programme Technical Specifications for Lipid-Based Nutrient Supplement – Small Quantity”.
   * SQ-LNS are considered a type of home fortification (<https://hftag.org/page.asp?content_id=33983&s=hftag>), because like multiple micronutrient powders (MNPs), they can be mixed with foods prepared for infants and young children in the home to enrich nutrient content. Unlike MNPs, SQ-LNS can also be eaten as is, if that is preferred by the child or caregiver. Thus, they can also be considered a type of fortified complementary food (Joint FAO/WHO Codex Alimentarius Comission 1991).
2. What problems is this intervention aimed at?
   * Millions of infants and young children in low- and middle-income countries are vulnerable to undernutrition and impaired neurobehavioral development (Black et al. 2013)
     + 22% (149 million) of children under 5 y of age are stunted (UNICEF et al. 2021)
     + 6.7% (45 million) of children under 5 y of age are wasted (UNICEF et al. 2021)
     + 43% (250 million) of children under 5 y of age are at risk of not fulfilling their developmental potential (Black et al. 2017)
     + 40% of children (269 million) of children 6-59 months of age are anemic (World Health Organization 2021)
   * Child mortality is directly related to poor nutrition: 45% of deaths among children under 5 y are linked to undernutrition (Black et al. 2013)
   * At 6-23 months of age, undernutrition is linked to the poor nutritional quality of complementary food diets. In low-income populations, many households cannot afford the cost of a nutritionally adequate diet for their young children (United Nations Children's Fund 2021). Children at this age need nutrient-rich complementary foods, but some of the key types of foods, such as animal-source foods, may be prohibitively expensive. Fortified products such as SQ-LNS should never replace a diverse complementary food diet, but they can help meet the needs for certain limiting nutrients (such as iron and zinc) and thus lower the cost of a nutritionally adequate diet (World Food Programme 2022).
   * SQ-LNS are effective in the prevention of stunting, wasting, micronutrient deficiencies and developmental delay in nutritionally vulnerable populations (see FAQ #5). Evidence from a meta-analysis suggests that they can also reduce child mortality between 6 and 24 months of age (Stewart et al. 2020).
   * SQ-LNS were recommended in the Lancet 2021 series on Maternal and Child Undernutrition for optimizing health and growth in children (Keats et al. 2021).
3. How do SQ-LNS differ from ready-to-use supplemental food (RUSF) and ready-to-use therapeutic food (RUTF)?

* SQ-LNS are part of a larger suite of lipid-based nutrient supplements that also includes medium-quantity (MQ-LNS, typically 250-499 kcal/d) and large-quantity LNS (LQ-LNS, typically > 500 kcal/d).
* SQ-LNS for children were designed for the prevention of malnutrition among children 6-24 months of age, by filling nutrient gaps common in complementary feeding diets. The daily dose is usually ~20 g/d (100-120 kcal/d).
* MQ-LNS have generally been used for prevention of seasonal wasting and/or prevention of undernutrition in food-insecure populations, though some researchers have used them for treatment of moderate acute malnutrition. The World Food Programme currently provides 50 g/d (255 kcal/d) of MQ-LNS, but other programs or researchers may use different amounts.
* RUSF is intended for the treatment of moderate acute malnutrition. The quantity provided may vary. The World Food Programme provides 100 g/d (510 kcal/d) of RUSF, but other programs may provide smaller amounts.
* RUTF is used for the treatment of severe acute malnutrition, with a daily dose of > 500 kcal/d usually based on body weight and treatment goal.
* Various quantities of LNS (including SQ-LNS, MQ-LNS and LQ-LNS) have also been used for pregnant and lactating women (PLW). These products differ in nutrient content from LNS designed for children, as they are tailored to meet the nutrient needs during pregnancy and lactation.
* The interagency specifications (adopted by ACF, IRC, MSF, UNICEF, USAID and WFP) for SQ-LNS, MQ-LNS, LNS-PLW and RUSF can be found on WFP’s website: <https://foodqualityandsafety.wfp.org/specifications> as well as on those of the other agencies.

1. What is the rationale for the daily ration of SQ-LNS?
   * The quantity of food in SQ-LNS designed for infants and young children is small for several reasons.
     + First, it is important to avoid displacing breast milk and locally available nutrient-rich foods. The energy needed from complementary foods, assuming average breast-milk intakes, is only ∼200 kcal at 6–8 months, ∼300 at 9–11 months, and ∼550 kcal at 12–23 months of age. The proportions of these energy needs provided by SQ-LNS are approximately one-half at 6–8 months, one-third at 9–11 months, and one-fifth at 12–23 months, leaving room for other complementary foods in the diet.
     + Second, the small quantity of the daily ration of SQ-LNS makes it likely that the child can consume the entire ration in one day, thereby receiving the intended doses of the micronutrients. With a larger quantity, such as medium-quantity (MQ) LNS [typically 250—499 kcal/day (Arimond et al. 2015)], a substantial amount may be left unconsumed (Maleta et al. 2015, Hemsworth et al. 2016), particularly by infants 6–12 months of age. In Malawi, for example, when MQ-LNS providing 241 kcal/day was provided and the caregiver reported LNS consumption on the day of dietary assessment, average intake was only ~100 kcal/day at ~9 months of age (Maleta et al. 2015), meaning that those infants received less than half of the intended amounts of the vitamins and minerals.
     + Third, the daily ration of SQ-LNS can easily be mixed with other foods or consumed as is, allowing for flexibility in feeding practices.
     + Last, the cost of production and transport of LNS, and the feasibility of distribution via platforms such as community health workers, is related to the quantity per recipient, so SQ-LNS is a lower-cost option than MQ-LNS.
2. What are the benefits of using SQ-LNS?
   * A recent individual participant data (IPD) meta-analysis of 14 randomized controlled trials of SQ-LNS provided to children 6-24 months of age (n > 37,000 children) in low- and middle-income countries indicated beneficial effects of SQ-LNS on the prevention of stunting, wasting, developmental delay, anemia and micronutrient deficiencies (Dewey et al. 2021). These benefits were relatively consistent across study contexts (region, stunting prevalence, anemia prevalence and malaria burden) and study design (duration of supplementation, delivery platform, etc.). Children who received SQ-LNS had a:

* 12-14% lower prevalence of stunting, wasting and underweight (Dewey et al. 2021).
* 31% lower prevalence of severe wasting and 17% lower prevalence of severe stunting (Dewey et al. 2022)
* 16% lower prevalence of anemia, 56% lower prevalence of iron deficiency, and 64% lower prevalence of iron-deficiency anemia (Wessells et al. 2021).
* 16-19% lower likelihood of scoring in the lowest decile for language, socio-emotional, and motor development (Prado et al. 2021).
* Evidence from a meta-analysis also suggests that LNS (SQ- and MQ-LNS trials combined) can reduce child mortality by ~27% between 6 and 24 months of age (Stewart et al. 2020).
* The 14 randomized controlled trials included in the IPD meta-analysis of SQ-LNS were conducted in 9 different countries in Asia, sub-Saharan Africa and Latin American & the Caribbean, and were completed between 2007 and 2019. None of these 14 trials was funded by industry (Dewey et al. 2021), and only one of them received “in-kind” support in the form of donated SQ-LNS from a company.

1. How do the effects of SQ-LNS on child growth, development, anemia and micronutrient status and mortality compare to those of other interventions for this age group?
   * MNPs reduce the prevalence of anemia, iron deficiency and iron deficiency anemia, with effects similar in magnitude to those observed with SQ-LNS (16-18% relative reduction in anemia; 50-56% relative reduction in iron deficiency; 55-64% relative reduction in iron deficiency anemia) (Suchdev et al. 2020, Tam et al. 2020). However, beneficial effects of MNPs on growth, development and mortality have not been reported in meta-analyses.
   * Educational interventions (e.g., social and behavior change communication (SBCC) for infant and young child feeding (IYCF)) alone can improve IYCF practices, but there is insufficient evidence of effects on growth, development, anemia, or micronutrient status (Arikpo et al. 2018) & no meta-analyses have reported mortality effects.
   * In the 14 trials included in the SQ-LNS meta-analyses (see FAQ #5), SQ-LNS distribution was always accompanied by messages to reinforce recommended IYCF practices. Seven trials provided minimal SBCC on IYCF other than reinforcing the normal IYCF messages already promoted in that setting, and seven trials provided expanded SBCC on IYCF that went beyond the usual messaging, either in just the SQ-LNS intervention arms (4 trials) or in all arms including the non-SQ-LNS control arm (3 trials). Effects of SQ-LNS on stunting, wasting and anemia were evident irrespective of the degree of IYCF messaging provided (Dewey et al. 2021).
   * In the three randomized controlled trials that directly compared SQ-LNS + enhanced IYCF education with an enhanced IYCF education comparison arm, two (in Bangladesh and Mali) found that the addition of SQ-LNS improved growth, hemoglobin and motor development (Dewey et al. 2021).
   * There is very little evidence from randomized trials of the impact of providing unfortified but nutrient-rich complementary foods. In a recent review of provision of complementary foods (Tong et al. 2022), only 3 studies were cited in the category of “local foods”, which varied widely in the type of food offered (caterpillar cereal, egg, or dry milk + cooking oil) and impact on growth, with no significant effects overall.
   * Caregiving interventions that promote responsive care and early learning opportunities have larger effects on cognitive, language, motor, and social-emotional development (Jeong et al. 2021) compared to SQ-LNS. However, such interventions do not improve linear growth (Prado et al. 2019) and we are not aware of meta-analyses reporting effects on mortality or anemia.
2. How can SQ-LNS fit within other approaches for preventing malnutrition among young children? Should SQ-LNS be packaged with other types of interventions?

• The SQ-LNS product by itself is not a stand-alone intervention; SQ-LNS should always be accompanied by messaging to reinforce infant and young child feeding (IYCF) recommendations, including a diverse diet with healthy foods from the key food groups. SQ-LNS were designed to play a protective role when access to nutrient-rich foods is limited for economic or other reasons.

* Provision of SQ-LNS may increase attendance at health clinics or community social and behavior change communication (SBCC) sessions (Matias et al. 2017, Becquey et al. 2019, Huybregts et al. 2019). Evidence from Bangladesh suggests that community health workers are more likely to conduct home visits when they provide supplements (Matias et al. 2017).
* Greater impact may be obtained by co-packaging SQ-LNS with interventions that alleviate constraints on response, such as:
  + Prevention & control of pre-and postnatal infection and inflammation
  + Improved maternal nutrition and prevention of fetal growth restriction
  + Care for women & children, including access to health care, maternal mental health promotion
  + Early child development interventions that promote responsive caregiving

1. At what age and for how long should SQ-LNS be consumed?
   * SQ-LNS were designed to be provided during the complementary feeding period (6-24 months of age) when nutrient density requirements are high, and diets are likely to be deficient in multiple micronutrients and possibly essential fatty acids.
   * The majority of randomized controlled trials have begun supplementation at 6 months of age, so the “optimal” age for consumption of SQ-LNS is unknown (Dewey et al. 2021). However, these is some evidence that the benefits are greatest when SQ-LNS begins at 6 months of age. For example, in the MAHAY (Madagascar) trial, children were enrolled and began consuming SQ-LNS between 6-11 months. The investigators reported significant effects on stunting only among children who started SQ-LNS at 6 months (Galasso et al. 2019).
   * Iron requirements (mg/day) are higher for infants 6 – 12 months of age (compared to young children 12 – 24 months of age) and intake of iron-rich foods is likely to be lower at younger ages. Therefore, providing SQ-LNS during the key interval of 6-12 months may be most effective for preventing iron deficiency.
     + The majority of randomized controlled trials have provided SQ-LNS for 12 months or more. In the recent meta-analysis, there were no additional benefits in growth outcomes (such as stunting) or development when the supplementation period was greater than 12 months. A longer duration of supplementation was linked to greater effects on anemia and iron status, but significant effects were observed even when duration of supplementation was < 12 months (Dewey et al. 2021).
     + The evidence to date thus supports an intervention period of 12 months, ideally from 6 to 18 months of age.
2. Should there be targeting of SQ-LNS to certain populations or subgroups?
   * Targeting to high-risk regions or communities (e.g., high prevalence of stunting, anemia, wasting, mortality) may be appropriate to limit costs and maximize coverage of the most vulnerable children.
3. Are there any risks associated with SQ-LNS consumption?
   * Is there a potential negative effect of SQ-LNS on morbidity (e.g., caused by iron supplementation)?
     + Trials in Bangladesh (RDNS), Ghana, Kenya, Madagascar, Malawi and Zimbabwe have reported no differences in fever or suspected malarial morbidity between SQ-LNS and control groups, and little or no difference in diarrhea (Adu-Afarwuah et al. 2007, Ashorn et al. 2015, Bendabenda et al. 2016, Null et al. 2018, Galasso et al. 2019, Humphrey et al. 2019, Prendergast et al. 2019, Ullah et al. 2019, Adu-Afarwuah et al. 2020).
     + Two trials in Bangladesh reported beneficial effects of SQ-LNS on diarrheal prevalence (Luby et al. 2018) and duration of pneumonia, diarrhea, and dysentery (Christian et al. 2015).
   * Is there the potential for excess intake of vitamins or minerals?
     + SQ-LNS for children do not provide more than the recommended daily intake of micronutrients. Children should not be provided with both SQ-LNS and MNPs, as this could result in excessive intakes of certain nutrients such as vitamin A.
   * What about peanut allergy?
     + Current recommendations are to introduce peanut in the first year of life (<http://www.annallergy.org/article/S1081-1206(16)31164-4/fulltext>), thus SQ-LNS interventions may be protective against peanut allergy.
   * What about ingredients added during processing?
     + Because SQ-LNS includes polyunsaturated vegetable oils and high concentrations of certain nutrients that can cause oxidation of those oils (such as iron), certain ingredients may be added during processing to prevent spoilage and ensure an adequate shelf life, such as small amounts of fully hydrogenated vegetable oil. Fully hydrogenated vegetable oil does not lead to creation of trans fat (the type of harmful fat that can be created when using partially hydrogenated fats); partially hydrogenated fats are prohibited in products for infants and young children, but fully hydrogenated fats are not (Joint FAO/WHO Codex Alimentarius Comission 1981). To prevent separation of the oil in SQ-LNS, an emulsifier (such as vegetable lecithin) may be added, which is also safe for infants and young children (Joint FAO/WHO Codex Alimentarius Comission 1981).
4. How does SQ-LNS affect breastfeeding and complementary feeding practices?
   * As explained in FAQ #7, SQ-LNS should always be accompanied by messaging to reinforce infant and young child feeding (IYCF) recommendations, including a diverse diet with healthy foods from the key food groups.
   * No adverse effects of SQ-LNS on breast milk intake or infant feeding practices have been observed in any of the trials that reported on these outcomes (Kumwenda et al. 2014, Arimond et al. 2017, Lesorogol et al. 2018, Byrd et al. 2019, Jannat et al. 2019).
   * In some settings, provision of SQ-LNS had positive effects on feeding frequency and consumption of animal-source foods (Arimond et al. 2017).
5. Do SQ-LNS have any effects on child overweight or long-term food preferences?
   * In the 14 trials included in the recent individual participant data meta-analysis, the prevalence of child overweight at endline (WLZ > 2) was 0%–4.6%, which was too low to calculate differences in child overweight due to SQ-LNS. The prevalence of WLZ > 1 was 0.6% - 18%, and in only 5 of the 14 trials was the prevalence >10% even though the prevalence in a normal healthy population should be ~16% (Dewey et al. 2021).
   * No short- or long-term adverse effects of SQ-LNS on child fatness or high BMI have been observed in individual trials (Kumordzie et al. 2019, Shaikh et al. 2020, Abbeddou et al. 2022). In Bangladesh and Burkina Faso, the SQ-LNS groups had greater increases in fat-free mass, consistent with improved linear growth and no increase in the risk of excess adiposity (Shaikh et al. 2020, Abbeddou et al. 2022).
   * In follow-up studies at 3-6 years of age in Bangladesh and Ghana, children in the SQ-LNS group had no greater preference for, or consumption of, sweet foods & beverages or high-fat foods than children in the control group (Dewey et al. 2017, Okronipa et al. 2019, Okronipa et al. 2020).
6. What information is available on acceptability and compliance with SQ-LNS?
   * Numerous acceptability trials of SQ-LNS have demonstrated high acceptability among children and their caregivers (Adu-Afarwuah et al. 2008, Adu-Afarwuah et al. 2011, Hess et al. 2011, Phuka et al. 2011, Ashorn et al. 2015).
   * Caregivers indicate that they value the convenience of a pre-prepared product that does not need refrigeration and saves time because it does not require cooking or fetching water.
   * When delivery issues are not a problem, average compliance has been quite high (70-100%) in most trials and programs (Dewey et al. 2021).
   * More research on compliance is needed in highly food insecure settings or in the context of humanitarian assistance, where the potential for intra-household sharing is high. SQ-LNS may need to be delivered with other interventions aimed at addressing the food and nutrient requirements of other household members (USAID Advancing Nutrition 2022).
7. What are the costs of SQ-LNS interventions?
   * The estimated price per sachet is ~0.07-0.08 USD. In February 2023 the cost of one carton (600 sachets) of SQ-LNS was 45.70 USD, equivalent to 0.076 USD per sachet. For a 12-month supply, the cost at that price would be ~28 USD per child. See UNICEF supply catalogue for up to date prices: <https://supply.unicef.org/s0000323.html>
   * Non-product costs can vary widely due to differences in program design and delivery platform (e.g., mode and frequency of distribution of SQ-LNS, costs shared with other program components such as personnel time and overhead), costs required for set-up, and overage (buffer) estimates used for planning. In the early stages of program implementation, cost per child may be higher than is the case after the program has been operating for some time, due to fixed start-up costs and lags in building up coverage.
   * Information from several case studies on SQ-LNS costs (in 2021 USD) is provided in the table below.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Country** | **Uganda**1 | **Madagascar**2 | **Mali**3 | | **Burkina Faso**4 | | **Bangladesh**5 |
| Target age range | 6-18 mo | 6-18 mo | 6-23 mo | | 6-23 mo | | 6-18 mo7 |
| Average # recipients/y | 1,118,3406 | 3,250 | 14,550 | | 2,283 | | 465 |
| Delivery platform | CHW program | CHW program | CHW program | | Health centers | | CHW program |
| Mode & frequency of distribution | To households every 3 mo | To communities every week | To participants at monthly meetings | | To participants at monthly well-baby visits | | To households every month |
| Intended duration of supplementation per child | 12 mo | 12 mo | Up to 18 mo | | Up to 18 mo | | 12 mo8 |
| Actual coverage | Assumed 100% | Ever: 95%  Previous month: 89% | Average: 60%; Plateau: ~68% | | Average : 37%; Plateau: ~51% | | 97% |
| Other program services | Health services, BCC | Health and nutrition services, BCC | Screening & referral for acute malnutrition; BCC | | Screening & referral for acute malnutrition; BCC | | Health services, BCC |
| Shared costs | Based on share of staff time spent on SQ-LNS delivery |  | Based on share of staff time spent on each activity related to SQ-LNS delivery | | Based on share of staff time spent on each activity related to SQ-LNS delivery | | Only included costs directly associated with delivery of SQ-LNS and related information to participants |
| Costing approach | Ingredients, activity-based | Product cost, + sensitivity analysis for programmatic costs8 | Ingredients, activity-based | | Ingredients, activity-based | | Ingredients, activity-based |
| Costing perspective | Societal | Government | Societal | | Societal | | NGO/ Government |
| **Annual costs (2021 US dollars per child)**: |  |  | Observed costs9 | Modeled costs10 | Observed costs9 | Modeled costs10 |  |
| Product only (SQ-LNS) | 23 | 47 | 32 | 32 | 46 | 46 | 34 |
| Total product procurement | 35 | 50 | 45 | 45 | 49 | 49 | 39 |
| Total non-product program costs | 20 |  | 11 | 8 | 47 | 22 | 10 |
| Total costs | 55 | 508 | 56 | 53 | 96 | 71 | 48 |

BCC, behavior change communication; CHW, community health worker

1Adams, K, S Vosti, C Arnold, R Engle-Stone, E Prado, C Stewart, K Wessells and K Dewey (2022). The cost-effectiveness of small-quantity lipid-based nutrient supplements for prevention of child death and malnutrition and promotion of healthy development: modeling results for Uganda. medRxiv 2022.05.27.22275713; doi: https://doi.org/10.1101/2022.05.27.22275713.

2Integration of nutrition counseling, nutrition supplementation and parenting support into Madagascar’s national nutrition program: The Mahay cluster-randomized effectiveness trial, Endline Impact Evaluation Report, Strategic Impact Evaluation Fund

3 Huybregts, L., le Port, A., Becquey, E., Zongrone, A., Barba, F. M., Rawat, R., Leroy, J. L., & Ruel, M. T. (2019). Impact on child acute malnutrition of integrating small-quantity lipid-based nutrient supplements into community-level screening for acute malnutrition: A cluster-randomized controlled trial in Mali. *PLoS Medicine*, *16*(8). <https://doi.org/10.1371/journal.pmed.1002892>. Costing study publication in progress.

4Becquey, E., Huybregts, L., Zongrone, A., le Port, A., Leroy, J. L., Rawat, R., Touré, M., & Ruel, M. T. (2019). Impact on child acute malnutrition of integrating a preventive nutrition package into facility-based screening for acute malnutrition during well-baby consultation: A cluster-randomized controlled trial in Burkina Faso. *PLoS Medicine*, *16*(8). <https://doi.org/10.1371/journal.pmed.1002877>. Costing study publication in progress.

5Humber J, Vosti SA, Cummins J, Mridha MK, Matias SL, Dewey KG. 2017. The Rang-Din Nutrition Study in Rural Bangladesh: The Costs and Cost-Effectiveness of Programmatic Interventions to Improve Linear Growth at Birth and 18 Months, and the Costs of These Interventions at 24 Months. Washington, DC: FHI 360/FANTA.

6Hypothetical, for modeling

7For cost analysis; actual project provided supplements beginning at 6 mo of age and continuing until 23 mo of age

8Programmatic costs (not included in the analysis) would include salary for CHWs, materials for site, NGO supervision, training ($3.33 per child per year, with an average site having 200 children 0-24 mo). Imputing 15% of the total cost to SQ-LNS would imply an annual programmatic cost that is attributed to SQ-LNS of $0.5 per child per year.

9Observed costs are the costs that correspond to the observed level of SQ-LNS distribution coverage (37% in Burkina Faso and 60% in Mali)

10Modeled costs assume that the SQ-LNS distribution coverage was 100%. For this purpose, variable costs were increased to the amount needed to cover all eligible children, whereas fixed costs were divided by the number of eligible children. Costs of overhead, indirects, startup, annualized capital, community sensitization, and capacity building were considered fixed. Costs of product, shipping, handling, storage, and beneficiary costs were considered variable.

* + - Product cost ranged from 23 to 47 USD per child per 12 months of supplementation
    - Total product procurement cost (including shipping and handling, customs, storage), ranged from 35 to 50 USD per child per 12 months of supplementation
    - Non-product costs ranged from 8 to 22 USD per child per 12 months of supplementation, but can increase up to 47 USD if program coverage is below 40%
    - Total costs ranged from 48 to 71 USD per child per 12 months of supplementation, but can increase up to 96 USD if program coverage is below 40%
    - The median share of product costs over total costs was 60%, ranging from 42% to 93%.
  + Information on cost-efficiency and cost-effectiveness from 4 case studies was presented at a World Bank webinar on May 6, 2022, which can be viewed by going to this link: <https://www.worldbank.org/en/events/2022/05/04/effectiveness-and-cost-effectiveness-of-small-quantity-lipid-based-nutrient-supplements>
    - In one of those case studies, a modeling framework was developed to estimate the cost-effectiveness of SQ-LNS, and the framework was applied in the context of rural Uganda (Adams et al. 2022). In that analysis, the estimated cost per disability adjusted life year (DALY) averted is $242, which is considered “very cost effective” relative to the Uganda per capita GDP of $822 and more cost-effective than MNP or the provision of complementary food in Uganda.
  + Beneficiary households may be able to bear some of the cost. Household willingness to pay (WTP) for SQ-LN has been investigated in several studies in low- and middle-income countries (Tripp et al. 2011, Segre et al. 2015, Adams et al. 2018, Cummins et al. 2018). Across countries and methods of eliciting WTP (including hypothetical [money did not change hands] and experimental [money changed hands]), average WTP for SQ-LNS in most settings was above the current product price of 0.06 USD per sachet. However, in many settings, it is likely that the unsubsidized price of SQ-LNS would be unaffordable for a substantial proportion of households. Moreover, charging fees or demanding cost-sharing may reduce take-up among households who are most-at-need (<https://www.povertyactionlab.org/policy-insight/impact-price-take-and-use-preventive-health-products>), thereby reducing the cost-effectiveness of the intervention.

1. Can SQ-LNS be locally produced?
   * Local production of SQ-LNS is feasible, although it may not reduce the cost (Segre et al. 2017). Local manufacturers face multiple challenges including taxes on imported ingredients, high interest rates, long cash conversion cycles, technical requirements (e.g., incorporation of the micronutrient pre-mix into the product, and strong quality control to ensure safety, reduce the risk of aflatoxin contamination and achieve an adequate shelf life), limited access to quality testing laboratories, and limited benefits to local economies.
   * Local production facilities currently exist as part of the PlumpyField network in seven countries in Africa (Burkina Faso, Ethiopia, Guinea, Madagascar, Niger, Nigeria, and Sudan), as well as in India & Haiti (https://www.plumpyfield.com/).
   * Additional local production facilities exist for MQ- and LQ-LNS in Kenya (Insta Products) and South Africa (Diva Nutritional Products), among others.
   * Project Peanut Butter supports local production of RUTF in several countries, including Sierra Leone, Malawi, Kenya, the Philippines, and Sudan (https://www.projectpeanutbutter.org/).
2. What operational guidance is currently available?
   * Two documents provide operational guidance about SQ-LNS:

1. USAID Advancing Nutrition's [technical brief](https://www.advancingnutrition.org/resources/lipid-based-nutrient-supplements-evidence-and-program-guidance) titled "Lipid-Based Nutrient Supplements: Evidence and Program Guidance." Published November 2021.

2. UNICEF's [brief guidance note](https://www.unicef.org/documents/nutrition/SQLNS-Guidance) titled "Small Supplements for the Prevention of Malnutrition in Early Childhood (Small Quantity Lipid Nutrient Supplements)" Version 1.0. Published February 2023.

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