# Acceptability and Utilization of a Medium-Quantity Lipid-Based Nutrient Supplement Formulated for Pregnant Women in Rural Niger

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## 1. BACKGROUND

- Sub-optimal dietary intake during pregnancy can contribute to adverse pregnancy outcomes and poor child development[1,2,3].
- Iron-folic acid (IFA) is recommended during pregnancy. Evidence suggests that multiple micronutrients (MMN) with energy and protein may better improve birth outcomes[4,5].
- Lipid-based nutrient supplements (LNS), a nutritional product with both energy and micronutrients, are a promising new strategy to meet nutritional needs in pregnancy[6].
- While evidence suggests that a 20-g LNS formulation was acceptable to pregnant women in Malawi and Ghana[7,8] no study has yet assessed acceptability and utilization of a 40-g LNS formulation among pregnant women.

## 2. OBJECTIVE

- To assess acceptability and utilization of a 40-g LNS (EPI-E) formulation with among pregnant women in rural Niger.

## 3. HYPOTHESIS

- Epi-E will be both acceptable and appropriately utilized among pregnant women in this setting.

## 4. MATERIALS & METHODS

### 4.1 Parent Trial

- This study is part of a nutrition-immunogenicity sub-study to test whether daily prenatal supplementation with LNS or MMN, compared to IFA, improves immune response to 3 doses of oral rotavirus vaccine.

### 4.2 Epi-E Formulation

- Developed with Nutriset SAS (Malaunay, France) to meet nutritional needs of pregnant women in Niger.
- 40-g dose with nearly 2 times the RDA of micronutrients for pregnant women.

### 4.3 Recruitment & Inclusion Criteria

- Recruitment occurred in Madarounfa, Niger at one health center in June (Ramadan) and September (non-Ramadan) 2014 among women presenting for routine antenatal care.
- Inclusion criteria: ≥18 years of age and pregnant.
- Exclusion criteria: intolerance to milk/peanuts; clinical status requiring inpatient referral.

### 4.4 Design & Procedures

- Data collection occurred at two time points: June (Ramadan) and September (non-Ramadan) using a two-part, multi-methods design with 26 – 28 women.
  - **Part I** included two 50-g test meals at the health center (10-g EpiE + 40-g maize porridge).
  - **Part II** included a 14-day home trial where women were given a two-week supply of Epi-E for home use.
- Open- and close-ended questions assessed organoleptic properties, acceptability, utilization, and willingness to pay.

## 5. RESULTS

### 5.1 Participant Characteristics (Table 1)

- Mean (SD) age was 29.5 (7.5) years in June (Ramadan) and 27.9 (7.9) in September (non-Ramadan).
- Mean >5.0 previous pregnancies in both time periods.
- Few illness episodes reported in 24 hours before any test meal.
- All participants reported normal appetites before meals.

**Table 1**. Baseline characteristics and health of participants by day of test meal

| | June 2014 (Ramadan) | | September 2014 (non-Ramadan) | |
|---|---|---|---|---|
| Test day, (n) | Day 1 (26) | Day 2 (26) | Day 1 (28) | Day 2 (27) |
| Participant characteristics | | | | |
| Age, Mean (SD) | 29.5 (7.5) | | 27.9 (7.8) | 27.7 (7.8) |
| Previous pregnancies, Mean (SD) | 5.5 (2.9) | | 5.3 (3.2) | 5.2 (3.1) |
| Reported Illness in previous 24 hours, n (%) | | | | |
| Runny nose | 0 (0.0) | 0 (0.0) | 1 (3.6) | 1 (3.7) |
| Cough | 4 (15.4) | 3 (11.5) | 3 (10.7) | 1 (3.7) |
| Difficulty breathing | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) |
| Diarrhea | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) |
| Fever | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) |
| Vomiting/nausea | 1 (3.8) | 0 (0.0) | 0 (0.0) | 0 (0.0) |
| Ear infection | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) |
| Other* | 0 (0.0) | 0 (0.0) | 2 (7.1) | 0 (0.0) |
| Normal appetite on test day, n (%) | 26 (100.0) | 26 (100.0) | 28 (100.0) | 27 (100.0) |

**Other* illnesses reported on Day 1 (September 2014) were anemia (*n* = 1) and cold (*n* = 1)

### 5.2 Test Meal Results (Table 2)

- Very high acceptability with no important variation between periods (Ramadan vs non-Ramadan).
- >90% of the 50-g test meal consumed in under two minutes.
- Epi-E was rated highly (median '5 = like a lot') in terms of overall liking, color, taste, and smell.

**Table 2.** Consumption behaviors and attitudes toward Epi-E from test meal

| | June 2014 (Ramadan) | | September 2014 (non-Ramadan) | |
|---|---|---|---|---|
| No. of participants, (n) | Day 1 (26) | Day 2 (26) | Day 1 (28) | Day 2 (27) |
| Consumption of 50g Epi-E/maize porridge mixture | | | | |
| Grams of serving consumed, Mean (SD) | 48.56 (1.50) | 47.60 (2.18) | 45.64 (1.83) | 45.78 (1.99) |
| Average amount consumed of total serving, (%) | 97.12 | 95.20 | 91.28 | 91.56 |
| Time (min) taken to consume, Mean (SD) | 1.73 (0.96) | 1.08 (0.39) | 1.54 (0.88) | 1.00 (0.68) |
| Hedonic scale scores of Epi-E, median (min, max)* | | | | |
| Overall liking | 5 (5, 5) | 5 (5, 5) | 5 (4, 5) | 5 (5, 5) |
| Color | 5 (5, 5) | 5 (5, 5) | 5 (4, 5) | 5 (5, 5) |
| Taste | 5 (5, 5) | 5 (5, 5) | 5 (4, 5) | 5 (5, 5) |
| Smell | 5 (5, 5) | 5 (5, 5) | 5 (4, 5) | 5 (5, 5) |
| Interviewer perceptions, n (%) | | | | |
| Interviewer believes participant liked Epi-E | 26 (100.0) | 26 (100.0) | 27 (96.42) | 27 (100.0) |

*Response values ranged from 1 (Dislike a lot) to 5 (Like a lot)

### 5.3 Home-Feeding Trial Results (Tables 3 – 4)

- Only two reported side effects (fever, change in urine color).
- No sachet went unused; none was traded/sold.
- Preference for consumption directly from sachet rather than as a mixture, due to "*convenience*" and "*flavor.*"
- During Ramadan, Epi-E was eaten in morning and evening, whereas consumed in morning or midday during Ramadan.
- All women reported positive feelings toward Epi-E, claiming "*have begun to feel energy*" and "*gained strength.*"
- Nearly all women said they would purchase Epi-E if sold and would be willing to pay more for it than for both their prescribed micronutrient and for their favorite snack food.

**Table 3**. Ep-E consumption during 2-week home trial

| | June 2014 (Ramadan) | September 2014 (non-Ramadan) |
|---|---|---|
| No. of participants, (n) | 25 | 23 |
| Sachet utilization at home | | |
| No. sachets received at start of trial period, (n) | 16 | 14 |
| No. of total sachets consumed by participant, Mean (SD) | 14.0 (0.3) | 14.0 (0.2) |
| No. of sachets consumed by participant per day, Mean (SD) | 1.7 (0.5) | 1.1 (0.3) |
| No. sachets consumed by others, Mean (SD) | 2.0 (0.3) | 0.0 (0.2) |
| Any sachets sold or traded, n (%) | 0 (0.0) | 0 (0.0) |
| Usual amount of Epi-E eaten each time consumed, n (%) | | |
| Half sachet | 18 (72.0) | 2 (8.7) |
| Full sachet | 7 (28.0) | 20 (87.0) |
| More than a full sachet | 0 (0.0) | 1 (4.3) |
| Time(s) of day consumed Epi-E*, n (%) | | |
| Morning | 21 (84.0) | 18 (60.0) |
| Midday or Afternoon | 2 (8.0) | 12 (40.0) |
| Dinner or Evening | 19 (76.0) | 0 (0.0) |
| How usually consumed Epi-E, n (%) | | |
| Mixed with food | 1 (4.0) | 0 (0.0) |
| Directly from sachet | 24 (96.0) | 23 (100.0) |

*Times of day consumed Epi-E' was calculated as the sum of total reported feeding episodes.

**Table 4**. Participant perceptions after 2-wk home trial

| | September 2014 (non-Ramadan) |
|---|---|
| No. of participants, (n) | 23 |
| Hedonic scale scores of Epi-E*, median (min, max) | |
| Overall liking | 5 (5, 5) |
| Color | 5 (5, 5) |
| Taste | 5 (5, 5) |
| Smell | 5 (5, 5) |
| Interviewer's perception, n (%) | |
| Interviewer believes participant was enthusiastic about Epi-E | 23 (100.0) |
| Willingness to eat Epi-E again, n (%) | 23 (100.0) |
| Willingness to purchase Epi-E, n (%) | 22 (95.70) |
| Willingness to pay for Epi-E, Mean (SD) | |
| Amount willing to pay per daily sachet of Epi-E* | $0.31 (0.29) |
| Amount last paid for daily prenatal micronutrient | $0.05 (0.05) |
| Amount last paid for 1 serving of favorite snack food | $0.31 (0.19) |
| Willing to pay more for Epi-E than prenatal micronutrient, n (%) | 23 (100.0) |
| Willing to pay more for Epi-E than favorite snack, n (%) | 15 (65.21) |

*All monetary values reported in USD and based on mid-market exchange rate (1 USD = 516.95 CFA Franc) during month of study (September 2014) www.xe.com

## 6. CONCLUSIONS

- First study to assess acceptability and utilization of a 40-g LNS formulation among pregnant women in Niger.
- Despite its novel formulation with nearly 2 times the typical micronutrient profile, acceptability was high.
- Given the positive results, Epi-E has been introduced in a larger ongoing clinical effectiveness trial.

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