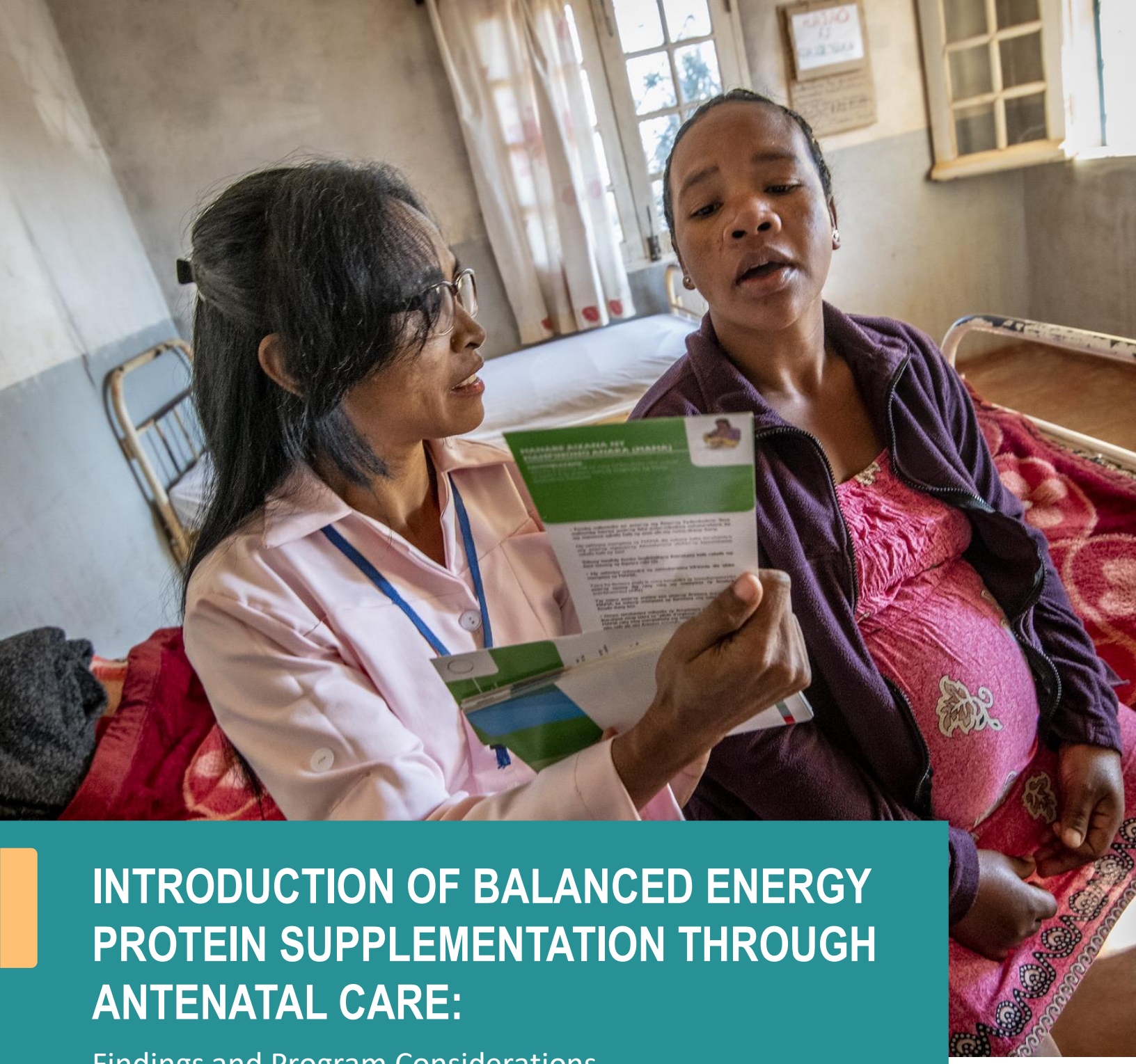


INTRODUCTION OF BALANCED ENERGY PROTEIN SUPPLEMENTATION THROUGH ANTENATAL CARE:

Findings and Program Considerations

MOMENTUM Country and Global Leadership

USAID FROM THE AMERICAN PEOPLE

MOMENTUM A Global Partnership for Health and Resilience

MARCH 2024

MOMENTUM works alongside governments, local and international private and civil society organizations, and other stakeholders to accelerate improvements in maternal, newborn, and child health services. Building on existing evidence and experience implementing global health programs and interventions, we help foster new ideas, partnerships, and approaches and strengthen the resiliency of health systems.

This report is made possible by the generous support of the American people through the U.S. Agency for International Development (USAID) under the terms of the Cooperative Agreement #7200AA20CA00002, led by Jhpiego and partners. The contents are the responsibility of MOMENTUM Country and Global Leadership and do not necessarily reflect the views of USAID or the United States Government.

Cover photo: Karen Kasmauski/MCSP.

Suggested Citation

MOMENTUM Country and Global Leadership, Kavle Consulting, LLC. 2024. *Introduction of Balanced Energy Protein Supplementation through Antenatal Care: Findings and program considerations*. Washington, DC: USAID MOMENTUM.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS

MOMENTUM Country and Global Leadership is part of a suite of innovative awards funded by the U.S. Agency for International Development (USAID) to holistically improve voluntary family planning and maternal and child health in partner countries around the world. The project focuses on technical and capacity development assistance to ministries of health and other country partners to improve outcomes.

MOMENTUM Country and Global Leadership would like to acknowledge Kavle Consulting, LLC as an author and for their technical contributions to this report and to acknowledge and thank all respondents.

ABBREVIATIONS

ANC	Antenatal care
BEP	Balanced energy protein
BMI	Body mass index
CMAM	Community management of acute malnutrition
GWG	Gestational weight gain
IFA	Iron and folic acid
IMAM	Integrated management of acute malnutrition
LBW	Low birth weight
LMIC	Low- and middle-income country
MMS	Multiple micronutrient supplement
MUAC	Mid-upper arm circumference
PRN	Program in Nutrition Rehabilitation, Mozambique
RCT	Randomized control trial
SGA	Small for gestational age
UNICEF	United Nations Children's Fund
WFP	World Food Program
WHO	World Health Organization

INTRODUCTION

During pregnancy, the increased demand for energy, essential amino acids (i.e., protein), and micronutrients is required for optimal fetal growth and development. Yet in nutritionally vulnerable populations, underweight women (body mass index < 18.5 kg/m^2) are often at risk for delivering preterm, low birthweight and/or small for gestational age (SGA) infants.[1,2] A recent UNICEF report projected a 25% increase (5.5 to 6.9 million) in the number of acutely malnourished pregnant and breastfeeding women in countries due to the current food and nutrition crisis.[3] Evidence shows that prenatal balanced energy protein (BEP) supplementation to underweight pregnant women led to a reduction in the risks of stillbirth and SGA.[4–7,8] The World Health Organization (WHO) recommends BEP—defined as a nutritious context-specific supplement consisting of less than 25% of total kilocalories from protein[9,10] —in settings where prevalence of underweight among pregnant women is $\geq$ 20% to reduce the risk of stillbirths and SGA.[10] While some countries have a low national prevalence of underweight pregnant women, countries may consider adopting the BEP recommendation, as part of antenatal care service delivery, in specific areas of the country with high prevalence (> 20%) of maternal underweight. Scaling up prenatal interventions, like BEP supplementation for underweight women, to 90% coverage can yield significant gains in educational attainment (i.e., 0.53 million school years) and lifetime income (i.e., $1.34 billion).[11]

OBJECTIVES

This is a non-exhaustive landscape analysis and was not meant to be comprehensive. The landscape analysis identifies key areas of focus, including the enabling environment, aspects of service readiness, provider capacity, compliance, generation of demand, supply chain, and monitoring. It also identified potential areas of further exploration around BEP service delivery through facility and community antenatal care (ANC). The primary objectives of this landscape analysis are: 1) to provide an understanding of barriers, enablers, and challenges in the implementation of BEP recommendations through national policies, guidelines, and ANC platforms within development contexts and 2) to generate recommendations to guide country programs.

METHODS

We conducted a compilation of evidence and key informant interviews from country stakeholders (n= 7) and global stakeholders (n= 6) to inform this landscape analysis. Country selection was based on U.S. Agency for International Development (USAID)-funded programming on maternal health and/or inclusion of aspects of BEP implementation within development and/or emergency contexts in Colombia, Ethiopia, Ghana, Malawi, Mozambique, and Nepal. To ensure a systems-lens, key informants included professionals working across various sectors (e.g., maternal health, nutrition) from government, program/project implementers, multi-lateral organizations, including UNICEF, WHO, World Food Program (WFP), and donors, such as USAID. In-depth key informant interviews were conducted remotely in English using Microsoft Teams. Interviews were guided by an in-depth interview guide (see Appendix 1) developed in conjunction with Kavle Consulting and USAID MOMENTUM Country and Global Leadership teams. Interviews were recorded and transcripts of interviews produced alongside detailed notes taken during interviews. Themes and subthemes were identified and analyzed using Dedoose qualitative software.

WHO RECOMMENDS BEP DURING PREGNANCY WHERE PREVALENCE OF MATERNAL UNDERWEIGHT IS HIGH

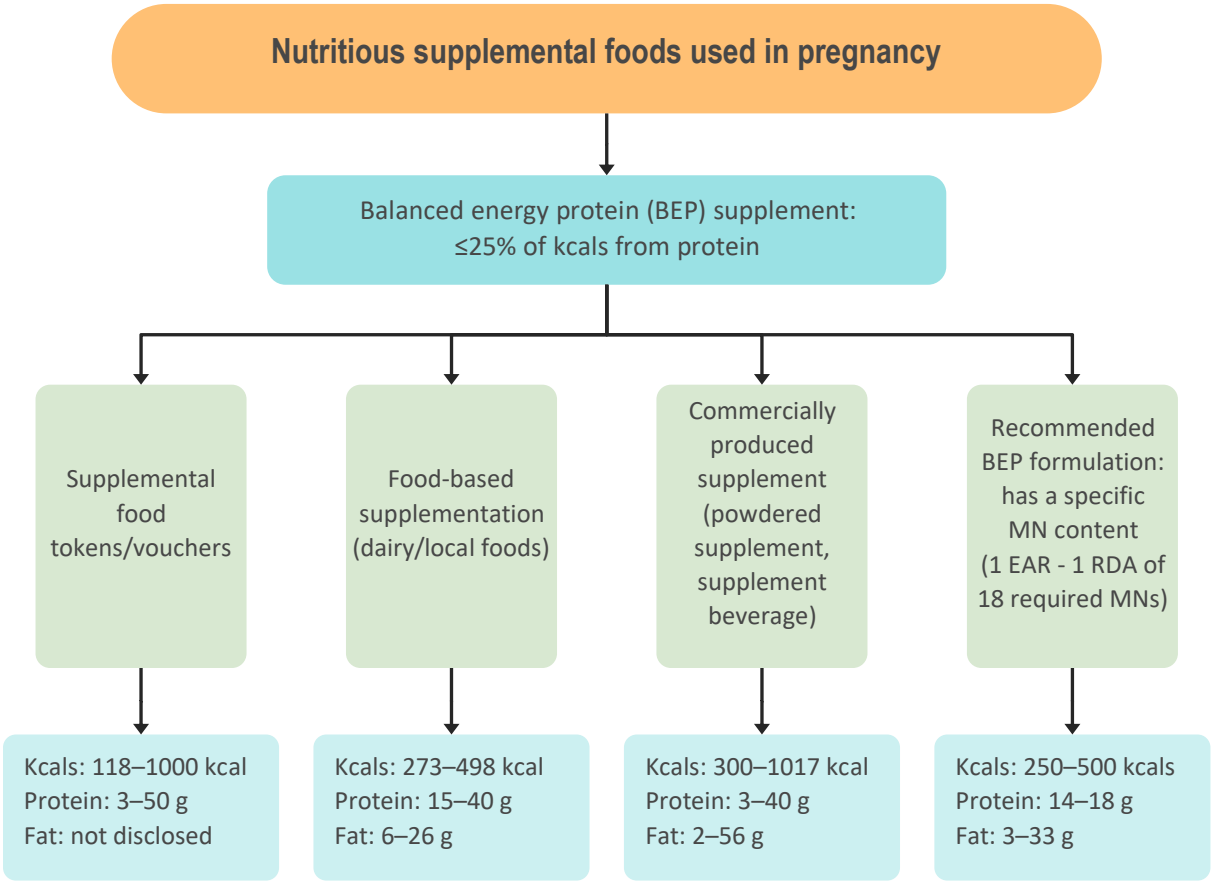
As part of the ANC package, in 2016, the WHO recommended BEP supplementation in countries with a high prevalence (≥ 20%) of underweight pregnant women to decrease the risk of stillbirth and SGA newborns. BEP supplementation is a food or a supplement product that should fulfill a minimum nutrition profile in which protein accounts for less than 25% of the total energy content. A 2017 Bill & Melinda Gates Foundation expert consultation proposed guidelines for the composition of BEP products, which included 250–500 kcals of energy, 14–18 grams of protein, and 3–33 grams of fat, reinforcing the recommended definition of BEP where less than 25% of energy comes from protein.[12] The Bill & Melinda Gates Foundation consultative meeting sought to address and harmonize nutrition BEP content given the wide variation in energy, protein, and fat content in formulations of BEP fortified nutritious supplements examined via research studies/trials, inclusive of beverages, biscuits, or powders (see Figure 1).[13] BEP varies in its formulation and by country context (see Box 1, Figure 1, and Appendix 3). Ongoing intervention studies are testing a variety of BEP products with nutrition content recommended in the 2016 WHO ANC guidance (see Appendix 3 for the variety of BEP products tested or used).

BEP supplementation: A food or supplement product designed to meet a minimum nutrition profile or composition: protein should account for less than 25% of the total energy content. It should provide 250–500 kilocalories of energy, 14–18 grams of protein, and 3–33 grams of fat.

Box 1. Types of BEP nutritious supplements

- Powdered supplements (i.e., milk)
- Fortified biscuits or fortified spread (i.e., containing peanut butter, soy flour, vegetable oil, sugar, and multiple micronutrient)
- Fortified spread, corn-soy blend supplement
- Supplemental foods, such as traditional foods (i.e., rice-milk porridge, half-pint milk, cheese, and eggs) and local food supplements (i.e., low-bulk porridge containing dried skim milk, maize flour and added vitamins and minerals)
- Supplemental beverages (i.e., chocolate-flavored liquid supplement).

FIGURE 1: TYPES OF BEP SUPPLEMENTS USED IN PREGNANCY



MN: micronutrient EAR: estimated average requirement RDA: recommended daily allowance

Adapted from: Ciulei, M. A., et al. Nutritious Supplemental Foods for Pregnant Women from Food Insecure Settings: Types, Nutritional Composition, and Relationships to Health Outcomes. *Current Developments in Nutrition*, *7*(6), 100094. (2023).

SUMMARY OF EVIDENCE

EVIDENCE FOR IMPROVED BIRTH OUTCOMES AND BEP DURING PREGNANCY

Overall, compiled evidence reveals that BEP supplementation during pregnancy improved birth outcomes, such as SGA, birthweight, and reductions in risk of stillbirth (see Table 1).[4,6,7,14–17] Early systematic reviews and meta-analyses showed that provision of BEP supplementation during pregnancy compared to a control group (i.e., standard of care) improved mean birthweight and reduced the risk of SGA and low birthweight (LBW) by 34% and 32%, respectively.[8] A 2015 Cochrane review, which formed the basis of the WHO ANC 2016 guidelines, revealed moderate evidence of reduction in SGA and stillbirth infants, with little to no effect on neonatal death or preterm birth.[4]

A few recent trials and systematic reviews support evidence of Improved birth outcomes and maternal outcomes, including gestational weight gain, but not maternal anemia. A 2015 systematic review also revealed a significant increase in pregnancy weight gain in the BEP intervention group as compared to those

in the control group (seven randomized controlled trials, n = 2,367; difference [d] = 0.20; 95% confidence interval [CI]: 0.03–0.38; P = 0.02), yet no significant effect was found in birth length, head circumference, and longer-term child growth.[17]

A subsequent 2018 systematic review on community-based supplementary feeding showed that use of various BEP nutritious supplements (i.e., groundnut-rice flour biscuits, sesame cake and jaggery, and a fortified peanut butter–soy flour supplement) had a positive impact on risk of stillbirth, child length, and gestational weight gain.[5] Furthermore, a 2021 systematic review that incorporated the latest evidence from randomized control trials and non-randomized trials to assess the long-term effects of maternal nutritional supplementation revealed that BEP supplementation reduced SGA, increased birthweight, and reduced the rate of stillbirths in low- and middle-income countries (LMICs).[7] A recent 2022 randomized controlled efficacy trial conducted in rural Burkina Faso showed that BEP supplementation significantly improved birth weight (50.1 g; 95% CI: 8.11, 92.0; P = 0.019) and reduced SGA by 3.1% among mothers with adequate nutritional status.[14]

BEP SUPPLEMENTATION IMPROVED PREGNANCY WEIGHT GAIN BUT NOT MATERNAL ANEMIA STATUS

A systematic review compiling data from Burkina Faso, Thailand, Colombia, India, Gambia, India, Tanzania, Taiwan, South Africa, U.S., U.K., Indonesia, South Africa, and China showed that weekly gestational weight gain (GWG) increased, but not significantly (mean +18.63 kg).[4] A randomized control trial in Burkina Faso also revealed a higher (+0.28 kg) but non-significant GWG in the intervention group (daily BEP + iron and folic acid [IFA] supplements) compared to a control group who were given IFA supplements and non-significant difference in maternal hemoglobin concentration (0.02 g/dL; 95% CI: −0.09, 0.14 g/dL; P = 0.701), anemia (1.01 percentage point [pp]; 95% CI: −3.60, 5.60 pp; P = 0.665), or severe anemia prevalence (0.12 pp; 95% CI: −0.11, 0.35 pp; P = 0.319) at third ANC visit.[11]

CHALLENGES WITH BEP SUPPLEMENTATION DATA

There is a variability of BEP formulations and composition that have been tested in research studies and trials, which has added confusion around the definition of BEP. Another challenge is that currently there is no consensus on the best time to start BEP supplementation during pregnancy to optimize fetal growth.

TABLE 1. STUDIES ON BEP SUPPLEMENTATION: SUMMARY OF MATERNAL AND NEWBORN OUTCOMES (SEE APPENDIX 3)

Author, date	Countries	Methods	Gestational weight gain	Small for gestational age	Birthweight/ low birthweight	Stillbirth	Head circumference
Imdad & Bhutta, 2011[6]	U.S., U.K., Taiwan, Gambia, South Africa	Systematic review, comprising 11 randomized controlled trials (RCTs) and quasi-RCTs to review the effect of BEP supplementation during pregnancy on birth outcomes.	N/A	Risk ratio (RR) 0.66 (95% CI: 0.49–0.89)	+73.78 grams; (95% CI: 30.42–117.15 grams) Underweight women: mean birthweight +100.86 grams (95% CI: 56.15–145.58) LBW: RR: 0.68; 95% CI: 0.51–0.92	N/A	N/A
Imdad & Bhutta, 2012 [8]	U.S., Taiwan, Gambia, South Africa, Colombia, India, England, Scotland, Chile	Meta-analysis: 16 intervention studies; RCTs and quasi-RCTs on effects of BEP supplementation during pregnancy on birth outcomes.	N/A	RR 0.66; 95% CI: 0.49, 0.89	RR 0.68; 95% CI: 0.51, 0.92	RR 0.62; 95% CI: 0.40, 0.98	N/A
Liberato, Singh & Mulholland, 2013[16]	Gambia, Taiwan, India, East Java, Bangladesh, South Africa, Panama, U.K., U.S.	Systematic review: 20 studies examining pregnant women receiving protein and/or energy during pregnancy to assess fetal growth measures.	N/A	N/A	Higher birth weight (at least 94 g) even in women with a BMI of 21 kg/m^2	N/A	N/A

Author, date	Countries	Methods	Gestational weight gain	Small for gestational age	Birthweight/ low birthweight	Stillbirth	Head circumference
Ota et al., 2015[4]	Burkina Faso, Chile, Thailand, U.S., U.K., China, Gambia, Panama, Ghana, India, Indonesia, Tanzania, South Africa, Taiwan	Systematic review: 17 RCTs, involving n=9,030 pregnant women to assess the effects of education during pregnancy to increase energy and protein intake on energy and protein intake, or of actual energy and protein supplementation, and the effect on maternal and infant health outcomes.	Weekly GWG not significantly increased (mean difference [MD] 18.63; 95% CI: 1.81 to 39.07)	Significant reduction in the risk of SGA (RR 0.79; 95% CI: 0.69 to 0.90, I^2 = 16%)	Mean birthweight significantly increased (MD +40.96 g; 95% CI: 4.66 to 77.26)	RR 0.60, 95% CI 0.39 to 0.94	N/A
Stevens et al., 2015[17]	Gambia, Indonesia, Thailand, Burkina Faso, Colombia, India, Taiwan	Systematic review comprising of seven RCTs, n= 2,367, between 1970–2015.	N/A	N/A	Significantly improved (d = 0.20; 95% CI: 0.03–0.38, P= 0.02)	N/A	Small non-significant effect on birth head circumference (RCT = 3; d = 0.17; 95% CI: −0.07–0.41; P = 0.17)
Visser et al., 2018[5]	South Africa, Kenya, Taiwan, Central African Republic, Malawi, Bangladesh, Tanzania, Indonesia, Jamaica	Eight systematic reviews (with last search dates between May 2006 and February 2016) evaluated interventions in pregnant women, children under five years from LMICs, disadvantaged infants and young children (three months to five years), children with moderate acute malnutrition, disadvantaged school children, HIV-positive adults and children, adults and children with active tuberculosis (with or without HIV), and older people with Alzheimer's disease.	N/A	RR 0.79; 95% CI: 0.69 to 0.90	N/A	RR 0.60; 95% CI: 0.39 to 0.94	N/A

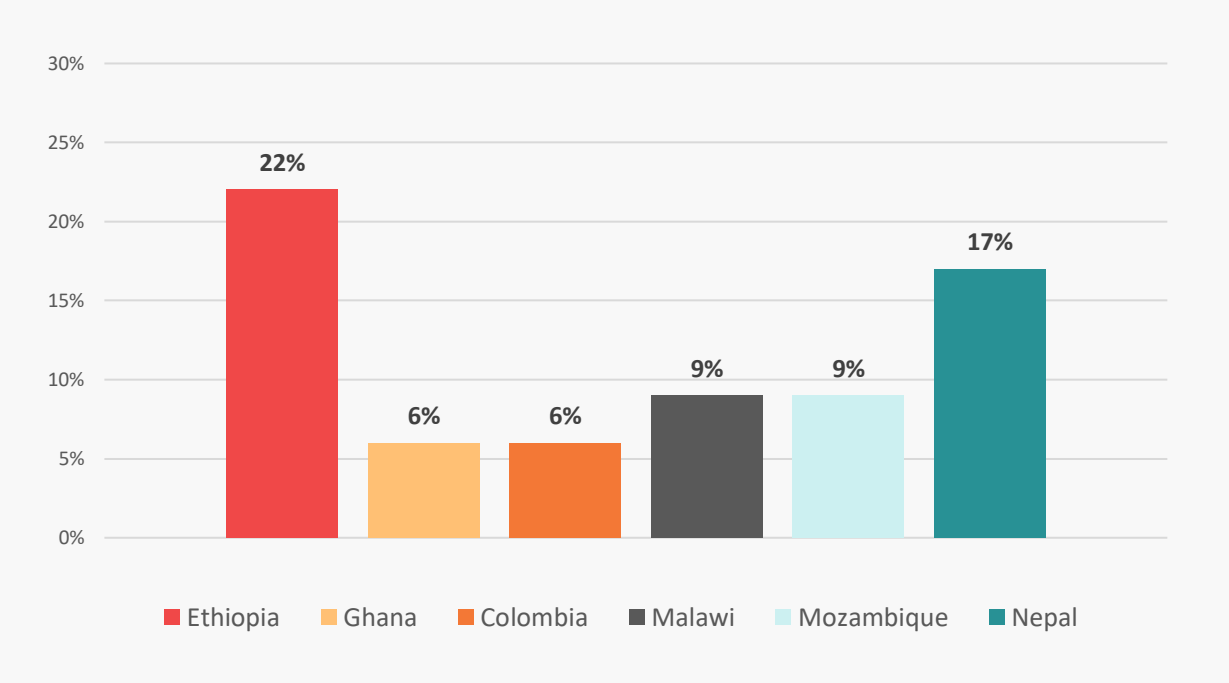
Author, date	Countries	Methods	Gestational weight gain	Small for gestational age	Birthweight/ low birthweight	Stillbirth	Head circumference
Lassi et al., 2021[7]	South Africa, Gambia, India, Thailand, Iran, Colombia	Eight RCTs and quasi-experimental trials to evaluate the impact of nutritional interventions (BEP, food distribution programs, and dietary interventions) to prevent maternal obesity compared to control or standard of care, healthy pregnant women, any age living in LMICs n = 2,190	N/A	SGA (RR 0.71; 95% CI: 0.54–0.94)	Birth weight + 107.28 g (MD); 95% CI: 68.51–146.04	RR 0.39; 95% CI: 0.19–0.80	N/A
de Kok et al., 2022[14]	Rural Burkina Faso	Randomized controlled efficacy trial (Micronutriments pour la Santé de la Mère et de l'Enfant [MISAME]-III) in six health center catchment areas, pregnant women, aged 15 to 40 years, randomly assigned to receive either fortified BEP supplements and IFA (intervention) or IFA (control).	N/A	Mean 3.1 percentage points (pp) reduction in SGA with a 95% CI of −7.39 to 1.16 (P = 0.151)	+50.1 g birthweight, 8.11 to 92.0, (P = 0.019) and decreased LBW prevalence (−3.95 pp, −6.83 to −1.06, P = 0.007)	N/A	N/A
Hanley-Cook et al., 2022[15]	Burkina Faso	Community-based, non-blinded, individually randomized 2 × 2 factorial RCT to assess the efficacy of a micronutrient-fortified BEP supplement on the secondary outcomes of anemia, GWG, GWG rate, and GWG about the Institute of Medicine's recommendations, as compared with an IFA tablet.	Higher, non-significant, GWG (0.28 kg; 95% CI: −0.05, 0.58 kg; P = 0.099)	N/A	N/A	N/A	N/A

PREVALENCE OF UNDERWEIGHT, WOMEN OF REPRODUCTIVE AGE ACROSS SIX COUNTRIES

Figure 2 shows the prevalence of underweight (defined as body mass index [BMI] less than 18.5 kg/m^2) in women of reproductive age (15–49 years), according to available Demographic and Health Survey data, [18,19] [20][21][22][23] given lack of national data on underweight during pregnancy. Prevalence of underweight among women of reproductive age ranges from 6% to 22% in six countries that participated in this landscape analysis. Two countries, Ethiopia and Nepal, hold the highest prevalence of underweight among women of reproductive age at 22% and 17%, respectively. Malawi and Mozambique both report similar prevalence of 9%, while Ghana and Colombia follow with a 6% prevalence of underweight. While some countries have a low prevalence of underweight among women of reproductive age (i.e., ranging from 6%–22%) at national level, these rates may vary at a subnational level. Additionally, adolescent women aged 15–19 are disproportionately affected by high rates of underweight, which may necessitate BEP provision as part of ANC in selected areas. For example, in Ghana's Greater Accra region, the prevalence of underweight among adolescent women is 23%. In Nepal, 22% of rural women aged 20–49 in Madesh province are underweight, and in five out of the seven provinces, more than 20% of adolescent women aged 15-19 are underweight. Similarly, in Ethiopia, the underweight rate among women aged 15–49 exceeds 20% in nine out of the 11 regions.

An Important caveat Is the lack of available data on underweight among pregnant women to Inform BEP programming.

FIGURE 2. PREVALENCE OF UNDERWEIGHT (BMI < 18.5 KG/M^2) AMONG WOMEN OF REPRODUCTIVE AGE (15–49 YRS) IN SELECTED COUNTRIES



ENABLING ENVIRONMENT

AWARENESS OF BEP RECOMMENDATIONS WITHIN WHO ANC GUIDELINES IS LOW

Most country stakeholders are generally aware of the WHO 2016 ANC guidelines. Yet, nearly all country stakeholders stated they were unfamiliar with BEP recommendations as part of the WHO 2016 ANC guidelines (see Table 2). A country stakeholder shared his general awareness of BEP and recent guidelines updates below:

> *I'm aware [of the WHO 2016 guideline] not line by line, but we used to refer [to] that document when we were, you know, trying to pilot some new initiatives … like calcium supplementation… I am aware of BEP for selected setups [underweight pregnant women]. Usually what guides Ethiopian practice, including training, mentoring, is the national guideline. I know they revised it [ANC guidelines] recently based on the recommendation of the WHO…. I know they did [add] some details.* **— Country expert, Ethiopia**

All country stakeholders expressed a conflicting understanding of the definition of BEP, which was often equated with lipid-based nutrient supplements or Plumpy'Nut. Stakeholders had a tendency to discuss supplementary foods within the context of child wasting programs instead of through the lens of maternal nutrition and health service delivery. This may stem from a lack of knowledge or experience with provision of BEP supplementation during pregnancy or for breastfeeding women. While global stakeholders had an understanding of "what BEP is," they similarly shared that definitions are unclear. Specifically, a standard definition of BEP is not provided in the recommendation delineated in the WHO 2016 ANC guidelines.

The commonly accepted definition for BEP, based on clinical trial evidence, Is a type of nutritious supplementary food consisting of less than 25% of total kilocalories from protein. The Bill & Melinda Gates Foundation's expert consultation, which specifies the use of a BEP product fortified with micronutrients, is used by the WFP, a global supplier of BEP products.

> *[For the BEP definition], we're referring to WHO-total energy less than 25% is protein … but we're using supplements fortified with micronutrients…. The WHO in 2016 doesn't refer to micronutrients, but our BEP that we give to pregnant women and breastfeeding women are also fortified.... I know that since 2017, the Bill & Melinda Gates Foundation, they've provided a document that specifies the nutrient requirements…. So, we've followed the WHO BEP definition, but we also fortify it as well.* **— Multilateral organization expert**

A global stakeholder also talked about the lack of clarity and specificity in the recommendations for undernourished populations, specifically regarding BEP supplementation for underweight pregnant women, as a key challenge for implementing partners.

I think where most of us as partners face a challenge is the very word "undernourished populations." Although the recommendation gives some guidance in terms of what that means, it still needs to be spelled out or refined for operational context.

— Multilateral organization expert

BEP IS NOT INCLUDED IN MOST COUNTRY ANC GUIDELINES

According to country and global stakeholders, a key weakness of the enabling environment is the lack of BEP guidance within country ANC guidelines (see Table 2). BEP indicators, targets, and timeframes for achieving targets are absent from most country policies and strategies, which points to a lack of focus and/or prioritization of BEP in country guidance documents.

In addition, while some countries are not yet implementing BEP supplementation as part of ANC service delivery, several countries have conducted pilots or implemented BEP as part of emergency programming. A stakeholder from Colombia discussed the importance of addressing maternal underweight amid the migration crisis, as BEP is currently being provided via a parallel system for emergencies. Malawi integrated BEP into ANC guidelines "to align to the emerging issues with the WHO [2016 ANC guidelines] as part of the key interventions and the nutrition for pregnant women." Further, while the BEP recommendations have not yet been operationalized in ANC services, Malawi is piloting BEP provision in the southern region of the country. Similarly, Ethiopia aligned their guidelines with WHO, trained health providers, and is providing supplementary food to underweight women through the integrated management of acute malnutrition (IMAM) program in emergency areas through WFP. Yet, the protein content in the supplementary food for pregnant women is 25.5% of the total energy, which does not qualify as BEP according to WHO recommendations. Mozambique is in the process of updating their ANC guidelines to align with WHO, while BEP is not explicitly mentioned, this provides an opportunity to include BEP supplementation. BEP is being implemented in the northern provinces of Mozambique as part of emergency programming under the government's Program in Nutrition Rehabilitation (PRN) with support from WFP.

Most stakeholders noted that BEP supplementation is often provided through separate, vertical supplementary feeding programs, such as community management of acute malnutrition (CMAM) and IMAM, and during emergency contexts, rather than via routine ANC care, due to absence or lack of clarity within country government policies and/or guidelines.

IMAM is integrated into the health service package and managed by extension workers who are recruited by the health system … it is for children, pregnant women, and lactating women [to] support treatment in the emergency contexts. **— Country expert, Ethiopia**

TABLE 2: BEP SUPPLEMENTATION IN POLICIES, GUIDELINES, AND PROGRAMS, BY COUNTRY

Country	Awareness of BEP in WHO ANC guidelines	Inclusion of BEP in the country ANC guidelines	Alignment of ANC guidelines with WHO	Integration of BEP into ANC package	Delivery of BEP through other programs (CMAM, IMAM)	Status of BEP implementation
Colombia	X				X (CMAM)	Not implemented via ANC. Implemented as part of emergency CMAM programming.
Ethiopia*	X		X		X (CMAM; select districts)	Not implemented as part of ANC. Implemented through the IMAM program as part of emergency programming.
Ghana	X					Not implemented in the country's health system.
Malawi	X	X	X		X (CMAM; select areas)	Not implemented as Ministry of Health recently updated ANC guidelines. Piloting BEP in the southern region.
Mozam-bique	X				X (PRN; select districts)	Not implemented as part of ANC. Implemented in the northern regions as part of emergency programming.
Nepal	X		X			Not implemented. Discussion on BEP implementation occurring at national level by partners.

*BEP is not explicitly mentioned in the guidelines, but some supplementary foods qualify as BEP

SOME COUNTRIES VIEW MATERNAL UNDERWEIGHT AS A KEY PRIORITY

Almost all countries acknowledged that ensuring pregnant women receive the recommended ANC is a key priority. Some key informants also mentioned that anemia and pre-eclampsia are "nutritional concerns during pregnancy" and "major contributors of maternal mortality." Ethiopia, Malawi, Mozambique, and Colombia talked about the importance of addressing underweight during pregnancy.

> *The first [priority] is ensuring adherence to the recommended antenatal care in terms of coverage with an equity lens, of course. The next priority is quality of antenatal care and service delivery, and that includes delivery and postnatal care. As a nutrition community we have priorities…. For instance, low birth weight and maternal underweight, which is really very common, we have all the documents, the priorities, the policy backup to consider BEP supplementation during pregnancy.* **— Country expert, Ethiopia**

Both anemia and pre-eclampsia are key issues. The government has prioritized provision of nutrition, counseling, and education to women for them to be able to understand the food that they are eating to ensure that we address issues to do with anemia and pre-eclampsia. So, these are priorities in terms of nutrition related issues among women. So, since [a partner] phased out the support [for underweight pregnant women], it now has become difficult as the government has not really received any support from another partner. So that remains a gap.

— Country expert, Malawi

SERVICE READINESS

ANC, AS A PLATFORM, HAS POTENTIAL FOR BEP PROVISION

Provision of BEP supplementation was noted to be primarily concentrated within humanitarian/emergency settings and vertical programming. In a few countries, such as Pakistan and India, BEP supplementation was either being piloted or considered for integration into ANC by the government. Some stakeholders also mentioned efforts to align ANC guidelines with WHO recommendations. Mozambique is considering potential revisions and placing significance on monitoring and evaluating programs for their effectiveness and efficiency. Mozambique has placed considerable emphasis on underweight women as a country priority via PRN. According to one global stakeholder, the ANC platform is often used to identify pregnant women at risk for underweight in humanitarian settings.

We have one book for registering women for ANC and women are screened during the facility ANC consultation [via mid-upper arm circumference (MUAC)]. Women who are treated for acute malnutrition via the PRN program are registered in the PRN book and followed during their postnatal visits for treatment. We have separate books for ANC and PRN and women are often registered in either or both books... which means a lot of documentation by providers, which is confusing [and complicated] for providers. ANC and PRN are considered separate, parallel programs and these indicators for BEP are not [currently] in the ANC book or the ANC guidelines. They [the MOH] plan to revise the ANC guidelines next month and I don't know if the nutrition program has the opportunity to integrate [BEP]. This year we updated the postnatal guidelines with baby-friendly initiatives and maternal depression. We do not have technical personnel who are nutritionists in health clinics, but we have nurses, so it is an opportunity to include BEP in ANC and build their capacity. **— Country expert, Mozambique**

When I say antenatal care from the emergency side of things ... humanitarian emergencies [may not] necessarily be acute and could be protracted with operations that have been going on for a few years. Typically for our programs that target pregnant women and where we provide BEP supplementation whether they're underweight or at risk of being underweight … it is through the antenatal care platform that we tend to, more often than not, work with the ministries of health or through the cluster to implement those programs—whether through a health center, health post or an outreach clinic. That's because that's where it's easiest to identify and access pregnant women. It's also because, for BEP supplementation for pregnant women, we want to couple that activity with health. **— Multilateral organization expert**

BEP IS OFTEN NOT PART OF ANC SERVICES, EVEN IF MATERNAL UNDERWEIGHT IS A PRIORITY

Provision of BEP as a component of ANC is largely missing in developmental contexts—even in settings where maternal underweight is a country priority. Out of six countries selected for this landscape analysis, only Malawi has integrated BEP into ANC guidelines, yet BEP supplementation has not been operationalized through ANC services. Withdrawal of partner support was a hindrance to implementation during ANC.

We haven't as a country operationalized it [BEP supplementation] yet, but it is part of the guidelines for ANC in Malawi…. But there are opportunities … for example, in our guidelines for the community-based management of acute malnutrition. **— Country expert, Malawi**

PROVIDER CAPACITY FOR BEP PROVISION IS WEAK

Most stakeholders expressed a glaring need for provider capacity training and job aids in the introduction of BEP as part of ANC. Global stakeholders discussed the need for pre-service training to support quality counselling, as they felt maternal nutrition has been neglected across service delivery. Some stakeholders also mentioned the need for task shifting among health care providers to community providers, while also balancing provider workload, job descriptions, and the complexities of commodity logistics. The presence of an extensive and active community health workforce was also considered an enabling factor to scale up screening and referrals of pregnant women to health facilities for further interventions. As relayed by a global stakeholder regarding training and quality of services:

[It's important to] ensure that there are capacity building activities as well as proper training... provide or support quality counseling and that the product is part of a larger program and shouldn't be conceived as a program in itself. In health systems, in these smaller rural areas… once you provide a food product, you're going to have a huge pull factor and it is essential to maintain the quality of other services because you're having to manage this large programming.... So adequate staffing capacity and proper storage logistics are also crucial, particularly in harsher environments where the products have a shorter shelf life. **— Donor organization representative**

If the government still decides to integrate such an initiative, then it needs to start with at least simultaneous integration into the medical and nursing schools.... I think it needs to start with or be simultaneously introduced into the pre-service programs as a permanent thing so that everybody coming out of school, every new graduate, whether it's a nurse, whether it's a physician, whether it's a midwife ... they need to know that so that it's truly integrated into the system. **— Global expert**

CREATING DEMAND FOR BEP IS NEEDED THROUGH SOCIAL BEHAVIOR CHANGE COMMUNICATION AND COMMUNITY ENGAGEMENT

Country stakeholders highlighted the need to account for cultural and religious diversity, stating that strategies must acknowledge these complexities and should be backed by strong counselling sessions for women and engagement with community leaders. They proposed the use of platforms such as pregnant women's groups (i.e., Ethiopia), group ANC (i.e., Ghana, Ethiopia), and mother-to-mother support groups (i.e., Ghana) to promote acceptance. Some country and global stakeholders also emphasized the need to combine social behavior change communication with social marketing to promote BEP uptake. They discussed the need to develop effective strategies for identifying and engaging women in ANC, not only for BEP but also for improving the use of other health care services for women.

You need to understand the cultural and social norms that people have and why.... So you need to be very open to co-create the strategy … because if you don't have the vision of the communities and the social norms and the context, it won't be possible to include interventions that you would like to include in the ANC services.... To have a successful intervention with [pregnant and lactating women] you have to work with them as a peer.

— Country expert, Colombia

*I would believe that beyond the routine social behavior change communication that we do in our health sector, there must be an element of combining with social marketing to understand the product itself. How are we going to make that product [BEP] more attractive [and] where is it going to be placed? For example, in health facilities? ... And also consider the pricing, is it going to be offered for free like other supplements or are people going to buy from their own pockets? How much will that be?***— Country expert, Malawi**

CHALLENGES EXIST WITH BEP SUPPLIES

Most country stakeholders emphasized that the primary challenge with BEP is the creation of a parallel supply chain for CMAM/ IMAM programs targeting pregnant women. Stockouts were common, with only one country (Colombia) having an adequate supply of nutrition commodities. As relayed by a country stakeholder in Ethiopia, regarding challenges with supplies:

Another component is the supply chain. We don't have any efficient and effective system [in terms of] penetration from the level of decentralization. So you may be forced to create a parallel system during the testing process [for introduction of BEP].… Currently, we have parallel systems in the supply chain. For some nutrition commodities, for instance, they are basically provided through the government … so health extension workers and facilities regularly request for commodities ... but local stockouts are common. **— Country expert, Ethiopia**

All stakeholders agreed a successful supply chain is dependent on availability of funding, while some global stakeholders mentioned "they don't have a role to provide BEP supplies" and "are not in a place to provide guidance on supply." A few stakeholders stressed the importance of ensuring inclusion of BEP supplement in the essential supply list for prioritization and expressed concerns on whether the supplements (depending on the formulation) should be considered as food or medicine, as countries hold different views. BEP is also considered "bulky," which causes difficulties for inclusion in the government's supply chain, as noted by a country stakeholder (Malawi).

There have to be processes in terms of how we can integrate that particular product [BEP] into the existing supply chain and management systems within the Ministry of Health. [Depending on the formula] … it is difficult to integrate bulky nutrition commodities within the Ministry of Health supply chain because, for example, for corn soya blend the packaging is bulky and equally the vegetable oil.... Because BEP will be recognized as food, there has to be a lot of engagement and consultations in terms of how that can get into the essential supplies list for the Ministry of Health. **— Country expert, Malawi**

CONSIDERATIONS FOR INTRODUCTION OF BEP: THE NEED TO ADDRESS KEY ISSUES

NEED FOR STANDARDIZED DEFINITION OF BEP

Many stakeholders, at both the country and global levels, expressed confusion around the various definitions of supplementary foods and balanced energy protein supplementation, stating concerns such as "I am not clear on the definition of BEP," "there are so many fortified products," "BEP is meeting 20% of calories for protein," and "are we speaking of prevention or treatment?" One global stakeholder lamented that advocacy with country governments would be a challenge, given the wide range of fortified products and their lack of familiarity with the term "balanced energy protein supplementation."

LOCAL EVIDENCE IS NEEDED FOR BEP INTRODUCTION

Country stakeholders agreed that the introduction of BEP requires context relevance and highlighted the need for generating local evidence to place BEP supplementation recommendations within their context and adapt the guidelines to the country's context. As relayed by a country stakeholder:

In introducing anything, even though we know that it is a recommendation by WHO, it is something we would usually want to have our local evidence on so we can situate it within our context and adapt those guidelines to suit the context ... in country. **— Country expert, Ghana**

Lack of evidence on the introduction of BEP was cited as a challenge due to outdated data on underweight among pregnant women. Other challenges noted were the lack of data, including cost-effectiveness data, to inform on roll-out and introduction of BEP. A USAID global stakeholder relayed the need for data on cost effectiveness of integration of BEP into the package of interventions for women and the challenge of working at country level:

We appreciate that cost can be a challenge on some of these [projects]…. This is an opportunity to work with donor funds to better understand this and we expect some cost effectiveness work or operational research to go alongside with the programming … to actually use donor funds, run a program, and then really try and understand the costs associated with it, to set the stage for dialogue with a government, should they wish to scale it up or take it in different places in the country. **— Donor organization**

ASSESSING SERVICE DELIVERY READINESS PRIOR TO BEP IMPLEMENTATION THROUGH THE ANC PLATFORM

The potential impact of introducing BEP supplementation through ANC on health providers' workload needs to be ascertained prior to program implementation. Some stakeholders stated that while ANC is a potential platform for BEP provision, it may negatively affect the quality of services provided by health care providers. As discussed by a country stakeholder:

Any new intervention will also come with additional commodities and that will require additional recording and reporting. If there is going to be [a] stock out, they need to request [supplies] in a timely manner. Fulfilling these responsibilities will result in an additional workload and additional accountability, and that may have some effect on their performance.

— Country expert, Nepal

Ensuring adequate numbers and distribution of health workers in relation to the population of women that seek ANC services must also be considered during the introduction of BEP. Some stakeholders discussed that a limited health care workforce is a barrier to introducing BEP supplementation through the ANC platform. As relayed by a key stakeholder, limited health workers in settings that attend to high volumes of patients leaves little room for task shifting:

In some peripheral level health facilities, there might be very limited health workers, and there might be no one to share the task, so that is one aspect that we need to think of. The other thing that we need to consider is the distribution of health workers and population. But in many cases, actually, there might not be anyone to shift the tasks to. **— Country expert, Nepal**

In addressing provider capacity, a few stakeholders discussed delivery mechanisms for reaching vulnerable populations in areas with limited access to health services. They emphasized the need to explore whether BEP supplementation should be administered within health facilities or via community channels, considering the diverse roles of potential providers and the optimal frequency of distributing the BEP supplements (monthly or every two months).

Many BEP supplementation recipients are in contexts with disrupted access [to health services]. Deciding who provides supplementation, whether it's a community health worker, nurse, or ANC provider, depends on the ANC setting. **— Multilateral organization expert**

ENABLING POLICY AND GOVERNMENT COMMITMENT

SUPPORTIVE, EVIDENCE-BASED POLICIES FOR BEP SUPPLEMENTATION ARE NEEDED

Both global and country stakeholders mentioned the need for a supportive policy environment for introduction of BEP supplements as part of the ANC package. A global stakeholder stated that the inclusion of BEP supplementation in government policies and guidelines, backed by evidence, is a key enabling factor for BEP introduction as part of ANC, alongside ensuring evidence translation and capacity building for BEP at the country level:

I would say the first enabler is, in order to have that activity [BEP supplementation] in government policy, protocols, or guidance, it needs to be at country level. Another enabler is that it's as clear as it can be and based on the latest evidence and that, within the health system, all health system staff are fully aware and trained on it. **— Multilateral organization expert**

ACCEPTANCE OF BEP IS NEEDED BY GOVERNMENTS AND COMMUNITIES

Most country stakeholders in Mozambique and Malawi expressed concern about the acceptance of BEP supplementation by the Ministry of Health, which highlighted the need for on-the-ground assessments to better understand the context, especially around local production versus or global procurement as relayed below.

I think the main problem will be the acceptance of the Ministry of Health... We are trying to move in a different direction ... not including more commodities in the country besides the ones that are already being used... It would be really important for you to come to see the conditions of the provinces ... provide the guidelines and show the evidence that has [already] been generated in other countries.... When we started the blanket supplementary feeding, it was not a program of the Ministry of Health ... it only started to be implemented when this crisis of internally displaced persons started. **— Multilateral organization expert**

CONSIDER ACCEPTABILITY, LOGISTICS, AND COST OF BEP SUPPLEMENTS

Global and country stakeholders shared that a better understanding of the need for and logistics of BEP—such as cultural and client's acceptability, accessibility, and affordability—is crucial to ensure effective introduction and compliance of BEP through ANC. Respondents from Malawi and Ethiopia raised concerns around acceptability of the BEP supplements, especially around the formulation to be used at country level.

The success of integration into ANC services for programs like BEP requires a deep understanding of the cultural, nutritional, and logistical landscape. Before introducing a new supplement, it's essential to assess women's attitudes and knowledge about supplements in general. Additionally, factors like accessibility, affordability, and potential allergens should be thoroughly examined … especially in relation to the population's needs, which should guide decision-making. It's not enough to focus solely on protein quantity; the nutritional quality and bioavailability of the supplement matter significantly. We should explore locally available and culturally accepted protein [and energy] sources and consider alternatives that align with available resources.

— Donor organization representative

CONSIDER COST AND LOCAL PRODUCTION FOR BEP SUPPLEMENTS: Some stakeholders discussed the positive aspects and drawbacks of local manufacturing, including lack of acceptability by country governments and additional costs of creation of locally made products. Most stakeholders mentioned that local manufacturing could ease storage and transportation concerns, particularly for blended products. Yet, other costs may entail importing ingredients and local production may not necessarily translate into greater affordability and availability of local supplementary food. Comprehensive testing and evaluation of the local production approach is required prior to investing in this endeavor. Cost of BEP needs to be addressed as discussed by a global stakeholder below:

Funding is the main issue … these products tend to be expensive and quite often you will find that a [nutrition] treatment for acutely malnourished woman might be more than the health service allocation per person for a year. Nutrition products tend to be bulky, so it's very difficult to store them and transport them and then monitor their usage.

— Multilateral organization expert

COMPLIANCE WITH AND SHARING OF BEP: Poor counselling was also mentioned as a possible barrier, as the level of counselling during ANC is often low and does not address all issues, such as adherence to nutrition commodities. All country stakeholders and some global stakeholders revealed sharing as a key concern in BEP supplementation where mothers are often required to share commodities with the family, which increases demand for food in households, as relayed by the following stakeholders:

> *I think what's difficult is when you give it to pregnant women, the main issue isn't that they wouldn't want to eat it. It's that there's too much competition within the house and the feeling it needs to go to the children, or … if it tastes good. If it's a good product and they can see it works, then more competition comes in the household because there's not much and there isn't enough understanding about pregnant women needing to be supported and nourished.*
>
> **— Donor organization**

> *In my experience when it comes to provision of nutrition supplements, if it has anything to do with food, definitely you can't run away from sharing.*
>
> **— Country expert, Ghana**

In a formative study conducted in 2022, participants suggested that it could be difficult to eat the supplements in front of children, who might expect pregnant women to share it.[24] To ensure reduced sharing of supplements in the pilot trial, the researchers tried advising that the supplements were for pregnant women only and also labelled the supplements with a picture of pregnant and lactating women. Country and global stakeholders also discussed taking into account the aspect of sharing when distributing nutrition commodities, labelling them as medicine, and counselling mothers would help to address this issue. In Ethiopia, sharing and selling supplementary foods are common, as described below.

> *For acute malnutrition management [and management of underweight pregnant women], it's one of the most effective programs we have, and the cure rate is [good] and very affordable, [though we have] challenges. We did have evidence that sharing [was] happening when I was supporting an HIV nutrition project—we targeted adults and provided therapeutic and supplementary foods. It's a challenge for adults and children and they may not like the taste, and they get bored with the monotonous type [of food. Sharing is common and selling is also very common.* **— Country expert, Ethiopia**

While elaborating on factors that may hinder compliance to BEP as part of the ANC services, one global stakeholder suggested that continued adherence to BEP supplements would depend on its perceived value by the pregnant women, community, and ANC service providers. Acceptability in terms of overall sensory characteristics has also been identified as a key determinant of compliance to BEP supplements among pregnant women.[24] In Nepal, pregnant women's responses to supplements' taste, texture, smell, and appearance were key predictors of acceptability and adherence.[24] In this study, BEP supplements, in the form of salty, spicy seasoned pillows (samosas), were positively associated with local foods, particularly Indian crisps and snacks, and had a high acceptability rate (70%) among pregnant women.

SUPPLY AND LOGISTICS OF BEP: Most country stakeholders emphasized that the creation of a parallel supply chain within CMAM/IMAM programs targeting pregnant women is a challenge. Ensuring inclusion of BEP supplements in the essential medicine or nutrition supplies list for prioritization within country governments' supply chains and clarification on how BEP supplements should be classified as food or medicine is needed, according to country stakeholders' perspectives.

MONITORING OF BEP VIA ROUTINE HEALTH SYSTEMS IS WEAK

In countries where there is limited data on prevalence of underweight among pregnant and lactating women and BEP supplementation, most stakeholders underscored the need to identify appropriate data sources from national to subnational levels. A stakeholder from Malawi discussed the need for data collection and reporting, below.

> *In terms of data collection, we need to make sure we have data collection tools at the point of delivery, like registers and reporting forms. We must establish a robust data management and monitoring system for BEP.… This includes a clear reporting flow from the community to the facility, then to the district level, and finally to the national DHIS2. It's important to ensure that the indicators for BEP are integrated into the district health information system.*
>
> **— Country expert, Malawi**

Most stakeholders mentioned consideration of data collection methods, including determining how, how often, and through which mechanisms data should be collected, such as surveys or integrated routine health information systems. While none of the countries interviewed had BEP indicators, there was a consensus from all country stakeholders on the need to establish effective data collection approaches. This involves adapting existing data collection tools to include BEP indicators to monitor the distribution, receipt, and impact of the program. Another stakeholder discussed existing ANC data in the health information system.

> *Currently, we capture antenatal care information in our health information system. We also have registers where we capture data on different components of antenatal care, including counseling and iron and folic acid receipt.… If we were to introduce BEP supplementation, we would need to integrate data on BEP into our existing registers and reporting system.*
>
> **— Country expert, Ghana**

Additionally, some stakeholders briefly mentioned the need for post-distribution monitoring indicators, such as product reach for assessing the success and impact of the BEP supplementation.

RESEARCH ON BEP SUPPLEMENTATION CAN PROVIDE INSIGHT

The Maternal BEP Studies Harmonization Initiative is an ongoing meta-analysis that aims to harmonize outcomes analyzed in maternal BEP supplementation studies during pregnancy and lactation for maternal health and growth for infants, Seven studies from Burkina Faso, Ethiopia, India, Nepal, and Pakistan are included in the initiative.[25] The prioritized outcomes during the harmonization process are shown in Table 3.

TABLE 3: MATERNAL AND INFANT OUTCOMES PRIORITIZED FOR HARMONIZATION PROCESS

	Pregnancy and birth outcomes (affected by BEP during pregnancy)	Postpartum and birth outcomes (affected by BEP during pregnancy and/or lactation)
Common or continuous outcomes	• Infant size at birth (weight, length, SGA, short for gestational age) • Maternal GWG • Maternal postpartum BMI and MUAC • Maternal anemia and IDA in the third trimester • Maternal inflammation in the third trimester	• Infant anthropometry at 6 months of age • Infant growth velocity, birth to 6 months of age • Maternal postpartum BMI, MUAC • Maternal postpartum anemia and IDA • Maternal postpartum inflammation
Rare outcomes	• Maternal mortality • Stillbirth • Preterm birth • Gestational hypertension/ preeclampsia	• Perinatal, neonatal, and infant mortality

BMI: body mass index. IDA: iron deficiency anemia. MUAC: mid-upper arm circumference

To address harmonization and effectiveness of BEP alongside other interventions, several effectiveness trials in Bangladesh, Burkina Faso, Nepal, and Pakistan tested the Bill & Melinda Gates Foundation-recommended BEP formulation (see Appendix 2) with the impact on maternal and infant health outcomes.

In Bangladesh, a cluster-randomized effectiveness trial is evaluating the effect of fortified BEP supplementation versus control (multiple micronutrient supplement [MMS]) without targeting and with targeting (either by low pre-pregnancy BMI or low pre-pregnancy BMI and inadequate GWG) on birth weight and adverse birth outcomes of LBW (LBW < 2500 g) and SGA. [26]

The cluster-randomized, open labeled effectiveness trial had four arms:

- A daily BEP supplement from enrollment until birth
- A daily BEP supplement from enrollment until birth if women have low pre-pregnancy BMI with the rest receiving an MMS supplement
- A daily BEP supplement from enrollment until birth if women have low pre-pregnancy BMI with the rest receiving an MMS supplement or switched to a BEP supplement based on inadequate GWG
- Comparison of all groups to women receiving MMS daily

In Nepal, the efficacy of a balanced protein energy supplement for daily use during pregnancy and the first six months after delivery are being examined in relation to pregnancy outcomes and infant growth in the first six months of life.[27] Pregnant women are randomly assigned to one of the following groups: 1) control in pregnancy and postpartum, 2) supplementation in pregnancy and control postpartum, 3) control in pregnancy and supplementation postpartum, or 4) supplementation in pregnancy and postpartum. The study will examine birth size (weight and length), gestational age at delivery, maternal weight gain in pregnancy, maternal weight at six months postpartum, infant growth, and breast milk composition. Both studies will have data available in 2024.

GLOBAL IMPLEMENTATION GUIDANCE FOR BEP SUPPLEMENTATION IS UNDERWAY

The WHO is developing implementation guidelines for its 2016 BEP recommendations. Their efforts are centered on identifying and addressing the challenges and concerns faced by partners in implementing the recommendations, aiming to provide comprehensive global implementation guidance.

> *We're not revising the guideline, we're operationalizing it. We're building on the guideline to clarify implementation…. So, the first exercise we undertook was to understand what the actual challenges and concerns in terms of BEP implementation are.... The implementation guidance will be at the global level, not country-specific.* **— Multilateral organization expert**

PROGRAM CONSIDERATIONS: INTRODUCTION OF BEP INTO COUNTRY ANC PLATFORMS

Moving forward, reviewing of countries' data, priorities, policies, and guidelines on BEP and underweight in pregnancy is needed. Global and country program considerations listed below present opportunities to introduce and promote maternal BEP supplementation through routine ANC to help expand the reach, quality, and sustainability of implementation.

GLOBAL LEVEL

POLICY AND GUIDANCE

- Standardize the global definition of BEP to guide countries.
- Standardize BEP performance indicators to monitor its context-specific implementation and outcomes based on existing WHO ANC guidance.
- Develop global implementation guidance for BEP supplementation and take into consideration how BEP will be provided alongside other interventions in the ANC package and supplementary foods programs.[28]

COUNTRY LEVEL

To ascertain the readiness for the introduction of BEP, country program implementers and government stakeholders should consider the following: service readiness, product identification and supply system, SBC, and research.

SERVICE READINESS

- Ascertain the level of burden of underweight at both national and subnational levels, including among adolescents, and the need and urgency to include BEP by 1) reviewing existing data or 2) collecting data on prevalence of underweight among pregnant women (> 20 %) in selected areas of the country.
- Conduct assessment of the current situation of underweight among pregnant women by reviewing existing reports and nutrition programs, projects in the country that provide BEP along with country priorities to better understand how, where, and when to start introduction of BEP via ANC.

- Identify implementation platforms whether as part of ANC services or existing programs, i.e., supplemental feeding programs like CMAM.
- Assess health workforce limitations, service provider capacity, and approaches for delivering BEP, including task shifting.
- Ensure that provider training includes updated guidance on BEP (i.e., in-service and pre-service, if possible).

PRODUCT IDENTIFICATION AND SUPPLY SYSTEM

- Gain consensus on the definition and composition of BEP supplements in country—which products and formulations are given to pregnant/lactating women—to ensure that these meet the globally recommended standards.
- Evaluate the type of BEP supplement based on convenience, meal replacement risk, packaging ease, safety, and transport considerations and form, based on sharing risks, stability, packaging cost, taste, nutrition specifications, salt and sugar content, and energy density.

SBC

- Conduct research or review existing data on how women perceive and use supplements based on cultural and social determinants and use of locally available foods.
- Ascertain providers' level of understanding and skillsets around BEP provision during ANC.
- Ensure providers are equipped with appropriate and updated counselling skills and associated materials, which can be integrated as part of ANC, as needed.

RESEARCH

- Review evidence from ongoing clinical trials, when available, on optimal BEP composition, including regional fortification and dietary impact and possible local production.
- Improve understanding of various approaches (i.e., targeting households vs. blanket approaches), with regards to cost, training, health service delivery efficiency, optimal cutoffs by MUAC and BMI, and any drawbacks in communities (i.e., actual increased risk of overweight/obesity due to blanket supplementation, increased cost due to the need of more BEP products).
- Use country program data to document the cost effectiveness of delivering BEP supplementation through routine ANC.

CONCLUSION

Balanced energy protein supplementation holds great promise in improving maternal and neonatal health outcomes, particularly in areas with high rates of maternal underweight. Ongoing effectiveness trials will provide critical data to inform the integration of BEP into maternal health care programs. By considering the programmatic recommendations outlined in this policy brief, countries can enhance the reach, quality, and sustainability of BEP supplementation within ANC platforms, contributing to healthier pregnancies and improved birth outcomes.

REFERENCES

1. Black, R. E. *et al.* Maternal and Child Undernutrition and Overweight in Low-Income and Middle-Income Countries. *The Lancet* 382, 427–451 (2013).
2. Victora, C. G. *et al.* Maternal and Child Undernutrition: Consequences for Adult Health and Human Capital. *The Lancet* 371, 340–357 (2008).
3. United Nations Children's Fund. *Undernourished and Overlooked: A Global Nutrition Crisis in Adolescent Girls and Women*. (2023). doi:10.18356/9789213626764.
4. Ota, E., Hori, H., Mori, R., Tobe-Gai, R. & Farrar, D. Antenatal dietary education, and supplementation to increase energy and protein intake. *Cochrane Database Syst. Rev.* (2015).
5. Visser, J., McLachlan, M. H., Maayan, N. & Garner, P. Community-based supplementary feeding for food insecure, vulnerable, and malnourished populations - an overview of systematic reviews. *Cochrane Database Syst. Rev.* (2018).
6. Imdad, A. & Bhutta, Z. A. Effect of balanced protein energy supplementation during pregnancy on birth outcomes. *BMC Public Health* 11, S17 (2011).
7. Lassi, Z. S. *et al.* Effects of nutritional interventions during pregnancy on birth, child health and development outcomes: A systematic review of evidence from low- and middle-income countries. *Campbell Syst. Rev.* 17, e1150 (2021).
8. Imdad, A. & Bhutta, Z. A. Maternal Nutrition and Birth Outcomes: Effect of Balanced Protein-Energy Supplementation: Maternal nutrition and birth outcomes. *Paediatr. Perinat. Epidemiol.* 26, 178–190 (2012).
9. de Onis, M., Villar, J. & Gülmezoglu, M. Nutritional Interventions to Prevent Intrauterine Growth Retardation: Evidence from Randomized Controlled Trials. *Eur. J. Clin. Nutr.* 52 Suppl 1, S83-93 (1998).
10. World Health Organization. *WHO Recommendations on Antenatal Care for a Positive Pregnancy Experience*. (2016).
11. Perumal, N. *et al.* Impact of scaling up prenatal nutrition interventions on human capital outcomes in low- and middle-income countries: a modeling analysis. *Am. J. Clin. Nutr.* 114, 1708–1718 (2021).
12. Members Of An Expert Consultation On Nutritious Food Supplements For Pregnant And Lactating Women. *Framework and Specifications for the Nutritional Composition of a Food Supplement for Pregnant and Lactating Women (PLW) in Undernourished and Low Income Settings*. (2019). https://gatesopenresearch.org/documents/3-1498.
13. Jakazi, C., Perumal, N., Sudfeld, C. & Smith, E. Clarification of the Nutritional Composition and Related Evidence for Nutritious Food Supplements in Pregnancy for Undernourished Women. *Curr. Dev. Nutr.* 4, nzaa054_085 (2020).
14. de Kok, B. *et al.* Prenatal fortified balanced energy-protein supplementation and birth outcomes in rural Burkina Faso: A randomized controlled efficacy trial. *PLOS Med.* 19, e1004002 (2022).
15. Hanley-Cook, G. *et al.* Fortified Balanced Energy-Protein Supplementation, Maternal Anemia, and Gestational Weight Gain: A Randomized Controlled Efficacy Trial among Pregnant Women in Rural Burkina Faso. *J. Nutr.* 152, 2277–2286 (2022).
16. Liberato, S. C., Singh, G. & Mulholland, K. Effects of protein energy supplementation during pregnancy on fetal growth: a review of the literature focusing on contextual factors. *Food Nutr. Res.* 57, 20499 (2013).

17. Stevens, B. *et al.* The effect of balanced protein energy supplementation in undernourished pregnant women and child physical growth in low- and middle-income countries: a systematic review and meta-analysis: Undernourished pregnant women and child growth. *Matern. Child. Nutr.* 11, 415–432 (2015).
18. USAID. *Ethiopia: Nutrition Profile*. https://2017-2020. usaid.gov/sites/default/files/documents/1864/Ethiopia-Nutrition-Profile-Mar2018-508.pdf (2018).
19. USAID. *Ghana: Nutrition Profile*. https://www.usaid.gov/sites/default/files/2022-05/Copy_of_Ghana-2Nutrition-Profile_1.pdf (2021).
20. USAID. *Malawi:Nutrition Profile*. https://2017-2020.usaid.gov/sites/default/files/documents/1864/Malawi-Nutrition-Profile-Mar2018-508.pdf (2017).
21. USAID. *Mozambique: Nutrition Profile*. https://www.usaid.gov/sites/default/files/2022-05/tagged_Mozambique-Nutrition-Profile.pdf (2021).
22. UNICEF. *Nutrition Profile:Colombia*. https://data.unicef.org/wp-content/uploads/country_profiles/Colombia/Nutrition_COL.pdf (2010).
23. USAID. *Nepal: Nutrition Profile*. https://2017-2020.usaid.gov/sites/default/files/documents/1864/Nepal-Nutrition-Profile-Mar2018-508.pdf (2020).
24. Lama, T. P. *et al.* Acceptability of 11 fortified balanced energy-protein supplements for pregnant women in Nepal. *Matern. Child. Nutr.* 18, e13336 (2022).
25. Gernand, A. D. *et al.* Harmonization of maternal balanced energy-protein supplementation studies for individual participant data (IPD) meta-analyses – finding and creating similarities in variables and data collection. *BMC Pregnancy Childbirth* 23, 107 (2023).
26. Johns Hopkins Bloomberg School of Public Health. *BEP Supplementation Research in Bangladesh* (JiVitA-BEP-IR) (Target-BEP). (2023).
27. Tielsch, J. M. Balanced Protein-Energy Supplement in Pregnancy and Early Lactation on Birth Outcomes and Growth in Southern Nepal. (2023). https://classic.clinicaltrials.gov/ct2/show/NCT03668977.
28. James, P. T. *et al.* Women's nutrition: A summary of evidence, policy and practice including adolescent and maternal life stages. *Emerg. Nutr. Netw.* (2022).

APPENDIX 1. KEY INFORMANTS INTERVIEW QUESTIONS

GLOBAL STAKEHOLDERS INTERVIEW QUESTIONS:

INTRODUCTION: USAID MOMENTUM is seeking to interview nutrition implementing partners and women's nutrition/health experts to identify policy and programmatic considerations for introducing balanced energy protein (BEP) supplementation for women as part of facility or community antenatal care, in development contexts. In 2016, the World Health Organization (WHO) recommended balanced energy protein (BEP) supplementation in countries with a high prevalence (≥ 20%) of underweight pregnant women to decrease the risk of stillbirth and small for gestational age (SGA) newborns. BEP provides health benefits for the mother, including improving weight gain and reducing risk of anemia. To be successful, countries must address challenges encountered in operationalizing the recommended supplementation. The interviews will provide information that will guide country programming- in the development of a programmatic report and brief for USAID.

1. Tell me about your role and any work you've done on women's nutrition and BEP and quality ANC.

   PROBE: What is your definition of BEP

2. What steps can countries take to create an enabling environment for the successful introduction of BEP within health systems?

   PROBE: Engaging national stakeholders, raising awareness about its benefits, developing a consensus around the evidence, review maternal health or nutrition strategies or protocols.

3. Are there any examples of partnerships between governments, non-governmental organizations, and international agencies that have fostered an enabling environment for BEP supplementation initiatives? If so, please describe.

4. Is BEP in any country's policies/guidelines? – which countries? Please describe.

5. Are you aware of countries that routinely provide BEP during ANC? If yes, what is the type of product/formulation?

6. If countries wanted to introduce BEP, what information can guide that process for integration into ANC services? Any successful country examples, from your experience?

7. What steps have been made to strengthen health service delivery of BEP supplements across countries?

   PROBE: Training – in-service, counseling, capacity-building initiatives

8. Tell me about your experience in ensuring there are adequate BEP supplies across the globe.

   PROBE: What are the key challenges/successful aspects in ensuring there's an adequate supply of BEP supplements?

9. What steps can countries take to ensure they have enough BEP supplies?

   PROBE: Can you explain a bit more (adequate/inadequate/ stock outs), possibility of local manufacturing

10. Are there any success stories of countries that have effectively integrated BEP supplementation into existing ANC programs, resulting in improved nutrition during pregnancy?

11. What are the key challenges for BEP supplementation integration into ANC, based on your experience adding new interventions to ANC packages, or from your experience with BEP?

12. Are there any strategies that have shown success in promoting BEP supplementation and improved maternal nutrition outcomes?

13. Cost is a challenge for BEP - what can countries do to address this challenge?

14. Are there any factors that enable or hinder use of BEP (compliance)?

    PROBE: barriers (acceptability – taste, color, smell, familiarity/resemblance to local food, sharing)

15. How can countries integrate BEP supplementation into routine monitoring systems, such as health management information systems (HMIS), and consider opportunities to include BEP monitoring in health facility assessments and household surveys?

    PROBE: Any challenges?

16. Is there any research that has been conducted so far to understand the social, cultural, and economic determinants affecting the acceptance and utilization of BEP supplements?

17. In addition to assessing prevalence of underweight in women, what preliminary assessments or research countries should do to inform their decision to integrate BEP in ANC?

18. What should be addressed in future to achieve high BEP supplementation coverage in countries?

19. Anything else you would like to add?

COUNTRY STAKEHOLDERS INTERVIEW QUESTIONS

INTRODUCTION: USAID MOMENTUM is seeking to interview nutrition implementing partners and women's nutrition/health experts to identify policy and programmatic considerations for introducing balanced energy protein (BEP) supplementation for women as part of facility or community antenatal care, with an emphasis on development contexts. In 2020, the World Health Organization (WHO) recommended balanced energy protein (BEP) supplementation in countries with a high prevalence (≥20%) of underweight pregnant women to decrease the risk of stillbirth and small for gestational age (SGA) newborns. BEP provides health benefits for the mother, including improving weight gain and reducing risk of anemia. To be successful, countries must address challenges encountered in operationalizing the recommended supplementation. The interviews will provide information that will guide country programming- in the development of a programmatic report and brief for USAID.

1. Tell me about your role and any work you've done on women's nutrition, BEP, and quality ANC.

   PROBE: Are you aware of the 2016 ANC guidelines – about the BEP recommendations?

2. What are the key priorities in your country around nutrition for pregnant women? for example, Anemia, preeclampsia?

3. What is provided in the ANC package?

4. Are there areas in your country where the rate of underweight among pregnant women is 20% or more?

5. How are underweight pregnant women handled in the health system. Please describe screening and treatment, Probe: facility and community level.

6. Has 2016 WHO ANC recommendations been contextualized in your country?

   PROBE: Are the health providers aware of the 2016 WHO BEP recommendations?

7. Are BEP supplements provided as part of ANC services in your country? Why or why not?

   PROBE: are there community structures being used

8. Are there any specific policies and guidelines that your government has put in place to facilitate the introduction of BEP supplements for women in your country? Please describe.

   PROBE: Are there plans to update the existing policies and guidelines according to 2016 WHO recommendations?

9. Are there any programs or implementing partners offering BEP supplements through ANC services in your country? **(If not then continue with the questions below). If yes, continue with question 19.**

COUNTRIES THAT ARE NOT PROVIDING BEP AS PART OF ROUTINE ANC.

10. Given that your country is currently not providing BEP supplements for pregnant women as part of ANC services, is it something that you would consider in the future? Why or why not?

    PROBE: Have there been active discussions around BEP supplementation in the country?

11. If your country wanted to introduce BEP supplements, what would be the main considerations?

    PROBE: policy environment, service readiness, distribution and storage, cost/affordability, cultural beliefs, counselling, need of local evidence)

12. What positive or negative impacts will adding BEP to ANC have on existing ANC services and providers workload? How can these impacts (mentioned by the interviewee) be minimized?

    PROBE: Training, job aids, task shifting, etc.)

13. Do you anticipate any challenges during the introduction process that might hinder its success?

    PROBE: Could you comment on factors that would facilitate or hinder uptake and compliance of BEP in terms of cultural or social issues, different formulations, taste, smell, sharing and perception?

14. What strategies or social behavior change activities could be utilized to promote acceptance and adherence to BEP supplements if it were to be rolled out in your country?

    PROBE: Facility-level components and or community level components in the strategies.

15. Tell me about nutrition commodities like iron, folic acid supplementation that are being provided to pregnant women.

    PROBE: Availability, supply chain issues, stock outs, how BEP could be affected by that.

    PROBE: Local manufacturing. Do you think if there's a possibility, is that something that could be done in your country or what about preference for a local product?

16. We know that BEP supplements have not been introduced yet in the country, but could there be any facilitating factors or challenges to collecting data on BEP? In terms of the routine and your health information system.

    PROBE: Is counseling on different components also monitored?

17. Is there anything else you wanted to comment on regarding any challenges to integrating BEP into the ANC services in your country?

18. Is there anything else you would like to add?

FOR COUNTRIES THAT HAVE INTRODUCED BEP:

19. What steps have been made to strengthen health service delivery of BEP supplements in your country? (Are providers trained? Is guidance aligned/updated to WHO ANC 2016 recommendations) Please describe?

20. If yes, what type of product/formulation? Please explain.

21. Can you briefly explain the BEP introduction process? Probe: Successful elements/ challenges; how do you screen pregnant women (MUAC vs BMI).

22. If your country already has BEP, how are factors that affect BEP supplementation being addressed?

    PROBE: (cost/affordability, cultural beliefs, counselling, acceptability)

23. What positive or negative impacts will adding BEP to ANC have on existing ANC services and providers workload? How can these impacts (mentioned by the interviewee) be minimized? (Probe? Training, job aids, task shifting, etc.)

24. Tell me about the availability of BEP supplies in your country.

    PROBE: Can you explain a bit more (adequate/inadequate/ stock outs) How do you make sure there's enough BEP supplies in your country?

25. Are BEP supplements distributed in your country? Please describe why or why not.

    PROBE: Procurement, is there local manufacturing?

26. What strategies/ social behavior change can promote acceptance and adherence to BEP supplementation?

    PROBE: strategies /behavior change currently in use, also probe - key influencers, community structures, for future endeavors

27. What factors can facilitate or hinder uptake of BEP supplements by mothers? (compliance)

    PROBE: Taste, sharing, color

28. Is BEP being monitored in your country? If yes, how? If no, what are the challenges? (Routine monitoring system, surveys, HIS reports)

    PROBE: Are there any challenges to BEP data collection and monitoring

29. Have you integrated BEP into ANC in your country? If yes, has the integration of balanced energy protein supplementation into antenatal care services impacted maternal and child health outcomes in your country? How? If no, what are the challenges to integration/introduction?

30. For the future, how can high BEP supplementation coverage be achieved in your country? (Probe: local research, updated training/guidelines)

31. Is there anything else you would like to add?

APPENDIX 2. SUMMARY OF MACRONUTRIENT TARGETS FROM THE 2017 BILL & MELINDA GATES FOUNDATION EXPERT CONSULTATION MEETING

Summary of Macronutrient Targets	
Total energy	250–500 kcal per daily serving
Fat content	10%–60% of energy
Protein content	16 g (range 14–18 g) with a digestible indispensable amino acid score (DIAAS) of ≥ 0.9
Carbohydrate content	No specific recommendations and depends on the fat content of product type
Trans fats	No more than 1%, as a standard safety requirement
Fatty acid (optional)	Min of 1.3 g of n-3 or 300 mg DHA+EPA (of which 200 mg DHA) to achieve a healthy n-6:n ratio of the supplement of 5:1

APPENDIX 3. TYPE AND NUTRITION COMPOSITION OF BEP PRODUCTS USED IN STUDIES

Study	Country	BEP nutritious supplements used in studies	BEP nutritious supplements composition		
			Energy	Proteins	Fats
Imdad (2012)	Gambia	High energy biscuits containing roasted groundnuts, rice flour, sugar, and groundnut oil	1017 kilocalories (kcals)	22 g	56 g
	USA	Food vouchers for milk, eggs, and cheese	900–1000 kcals	40-50 g	Not indicated
	England	Flavored milk	407 kcals	14.6 g	Not indicated
	South Africa	High-bulk supplement – mixture of beans and maize, given as mush with added vitamins	3,240 kJ (776 kcals)	36 g (18.6%)	Not indicated
		Low-bulk porridge containing dried skimmed milk, maize, flour, vitamins, and minerals	2,930 kJ (700 kcals)	44 g (25%)	Not indicated
	Colombia	Supplement containing 60 g dried skim milk, 150 g enriched bread, and 20 g vegetable oil	3,580 kJ (856 kcals)	18%	Not indicated
	Burkina Faso	Fortified spread consisting of 33% peanut butter, 32% soy flour, 15% vegetable oil, 20% sugar, and a multiple micronutrient cocktail	1.56 MJ (372 kcals)	14.7 g	67%
	Iran	Traditional food (rice-milk porridge, lentils, pottage, cheese, yogurt, eggs, and milk with bread)	400 kcals	15 g	Not indicated

Study	Country	BEP nutritious supplements used in studies	BEP nutritious supplements composition		
			Energy	Proteins	Fats
Liberato, Singh & Mulholland (2013)	Panama	*Atole* (i.e., traditional beverage fortified with micronutrients)	3,800 kJ (910 kcals)/L	28%	Not indicated
Ota et al., 2015	East Java, Indonesia	Supplement (warm drink flavored with herbs used in "jamu") containing a dry powder (50% fat, 10% casein, and 40% glucose)	465 kcals	7.1 g	Not indicated
	New York, U.S.	Balanced energy/protein 16 oz beverage supplement containing vitamins/minerals (“complement”)	322 kcals	6 g	7.6 g
		16 oz high-protein beverage	470 kcals	40 g/day (34%),	8.6 g,
	Birmingham, U.K.	Flavored carbonated glucose drink plus vitamins	273 kcals	11% of energy as protein	Not indicated
		Flavored carbonated glucose drink plus skim milk powder plus vitamins	425 kcals	10% of energy as protein	Not indicated
Stevens et al., 2015	Indonesia	Low protein energy drink (sunflower, palm oil in text aid added to hot beverage) with casein and glucose	52 kcals	6.2 g	Not indicated
	Colombia	Weekly food basket for whole household (milk powder, bread, and vegetable oil)	155 kcals	20 g	Not indicated
	Thailand	Locally available supplementary food. Six formulas with protein and energy contents developed from locally available raw materials and were provided as single serving packets and consumed as a snack.	350-500 kcal/100 g food	16–22 g/100 g of food	Not indicated

Study	Country	BEP nutritious supplements used in studies	BEP nutritious supplements composition		
			Energy	Proteins	Fats
Visser et al., 2018	Taiwan	Chocolate-flavored liquid supplement (initially sweetened with saccharine, then with sucrose) plus vitamins and minerals	800 kcals	40 g	26.6 g
Lassi 2021	India	50 g sesame cake, 40 g jaggery, and 10 g oil	417 kcals	30 g	Not indicated
de Kok et al., 2022	Burkina Faso	BEP (PlumpyMom) fortified with multiple micronutrients	393 kcals	14.5 g	26 g
Hanley-Cook et al., 2022	Burkina Faso	BEP (PlumpyMom) fortified with multiple micronutrients	393 kcals	14.5 g	26 g

*Both de Kok et al., 2022, and Hanley-Cook et al., 2022, used data from the MISAME-III RCT among pregnant women in rural Burkina Faso, hence the similarity.

** The supplements described in the table above are based on the available published information. If studies were reported more than once in the systematic reviews, the supplements were only listed once in the table.

www.usaidmomentum.org

@USAID_MOMENTUM
@USAIDMOMENTUM
@USAID MOMENTUM