

MOTHeRS' Project Emergency Food Bag

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Poor diet quality during pregnancy is associated with gestational diabetes, dyslipidemia, preeclampsia, and other pregnancy complications. Food insecurity during pregnancy is related to poor diet quality, excess weight gain, depression, and anxiety. The following procedure was followed to design the contents of the MOTHeRS' Project Emergency Food Bag.

1. Identified nutrients of known importance for the health and wellbeing of pregnant women and the developing fetus:

- a. Search of literature conducted by Jana Schellenberger, evidence librarian, Laupus Library using key words: pregnancy, nutrition, food insecurity, food deserts, interventions, dietary supplements. Identified and reviewed relevant papers from the US and Canada.
- b. Reviewed the following evidence-based resources to identify target nutrients and their daily recommended values that are important for pregnant women, but are often present in their diets in inadequate amounts. Specific nutrients identified in the 2020 NASEM report included choline, iron, folic acid, iodine, protein, omega-3 fatty acids, calcium, and vitamin D. Additionally other researchers have noted the link between mood and nutrient deficiencies of folate, vitamin B12, calcium, iron, selenium, zinc and omega-3-fatty acids.
 - i. NASEM - Nutrition during pregnancy and lactation: Exploring new evidence: Proceedings of a workshop National Academies of Sciences, Engineering, and Medicine 2020. Washington, DC: The National Academies Press.
<https://doi.org/10.17226/25831>. First update by the Institute of Medicine since 1990 report Nutrition During Pregnancy.
 - ii. Weismiller DG, Kolasa KM. Special concerns through early pregnancy journey. *Nutrition Today*. 2016;51(4):175-185
 - iii. Kolasa KM, Weismiller DG. Nutrition during pregnancy and lactation. Berdanier CD, Dwyer J, Heber D (ed). In "CRC Handbook of Nutrition and Food". 2007; pages 261-278.
 - iv. Kaiser LL, Campbell CG. Practice paper of the Academy Nutrition and Dietetics: Nutrition and Lifestyle for a Healthy Pregnancy Outcome. *J Acad. Nutr Diet*. 2014;114:1447. *J Acad Nutr Diet*. 2014;114(9):1447. doi:10.1016/j.jand.2014.07.001
 - v. Hill AM, Nunnery DL, Ammerman A, Dharod JM. Nutrient and Food Group Intakes of Low-Income Pregnant Women by Race/Ethnicity. *J Health Disparities Research and Practice*. 2019;12(1):62-79. (sample from North Carolina)
 - vi. Hill A, Nunnery D, Ammerman, A, Dharod, J. Racial/Ethnic Differences in Diet Quality and Eating Habits Among WIC Pregnant Women: Implications for Policy and Practice. *American Journal of Health Promotion*. 2020;3(2):169-176. (sample from NC)
 - vii. Leung BMY, Kaplan B. Perinatal depression: prevalence, risks, and the nutrition link--a review of the literature. *J Am Dietet A*. 2009;109:1566-1575.
 - viii. Gross S, Mendelsohn AL, Arana MM, Messito MJ. Food insecurity during e20184113 and breastfeeding by low-income Hispanic mothers. *Pediatrics*. 1029; 143(6):
- c. Compared nutrients in available prenatal vitamins from Walmart and ECU Pharmacy to determine what nutrient coverage could be expected, and what gaps may still exist, in women who take a regular, daily, prenatal vitamin. Nutrients typically missing or present in amounts

<50% of the RDA, from standard prenatal multivitamins included, choline, omega-3 fatty acids, calcium, and sometimes iodine.

- i. MVM Comparison Chart:
<https://docs.google.com/spreadsheets/d/1KxmhiejGHvP8XBMtWtYaqJ5FJSwfKc4P2BZosLTgXaM/edit?usp=sharing>
- d. Reviewed food items included in WIC Package V, available to pregnant women, to identify which foods, and food quantities, were already available to high-risk pregnant women through the WIC program.
 - i. WIC Food Package V:
https://drive.google.com/file/d/1jk7MpQCGfgW5W36zoPc_SpFf7Q_AZCes/view?usp=sharing

Together, this information provided insight into which nutrients, and which food items, should be prioritized for inclusion in the food bags. Namely, those nutrients of concern are choline, iron, folic acid, iodine, protein, omega-3 fatty acids, calcium, and vitamin D.

2. Compiled data on good food sources of the identified nutrients of concern for pregnant women:

- a. Using data from the USDA Agricultural Research Service (ARS), the NIH's Office of Dietary Supplements (ODS), and other evidence-based resources, specific food items were identified that are high in each of the nutrients listed above. Most high-ranking food items from the ARS and ODS resources were included, though preference was given for items that are readily available at Food Lion, those that are relatively low-cost, and those that are generally shelf stable. This data was organized in a spreadsheet with each nutrient's list of food items organized in descending order by amount of target nutrient per standard serving.
 - i. Food Sources of Target Nutrients:
<https://drive.google.com/file/d/1kV08yxEGF2mZIZScD08dz7FXplEyC0rB/view?usp=sharing>

3. Interviewed local nutrition/dietetics experts/providers on the food habits and preferences common among high-risk pregnant women in Chowan, Duplin, and Pitt Counties:

- a. Sara Foreman, Albemarle Regional Health Services, WIC Nutrition Director
 - i. Meeting Notes: https://docs.google.com/document/d/1IVnUkdOtjvWTuD-rxSDlvRXMdeX_r6ZomyBNjLcpW7I/edit?usp=sharing
 - ii. Noteworthy Points: Approximately 375-390 women receive and use WIC benefits in Chowan County each month. Of these women, most (60%) are African American, and have other children, and Ms. Foreman estimated that about 85% of their WIC population also receive SNAP benefits. Ms. Foreman noted that low-fat milk products are generally preferred less than whole or 2% varieties, and that consuming fruits and vegetables are not a high priority in this population. Canned fish/seafood/meat products, however, are generally well-received. She also noted that younger women have little knowledge and skill in food preparation. Most women in the Chowan county area redeem their WIC vouchers at Food Lion or Walmart.
- b. Breanna Dietz, Vidant Medical Center Clinical Dietitian
 - i. Meeting Notes:
<https://docs.google.com/document/d/164UYk95c2jbsGpYvYy0kPLY1k8LXJmECknl17e8SXko/edit?usp=sharing>
 - ii. Noteworthy Points: Ms. Dietz estimated that the women she sees at VMC with gestational diabetes usually have a higher BMI, are older, have at least one child at home, and also noted that there are more African Americans than other groups. She did not note any

- noticeable difference in women receiving WIC or SNAP benefits who had, or did not have, gestational diabetes. Diabetes diet education level was generally low. Food habits and preferences among women with gestational diabetes that Ms. Dietz has noticed include: Frequent snacking (especially craving high-carbohydrate foods between meals), frequent hospital snack choices of peanut butter, fruit, crackers, and yogurt, and a preference for food assistance foods that can be easily incorporated into a variety of meals. She also noted that fish did not seem to be a preferred meal choice for these women.
- iii. VMC Hospital Snack List was provided as examples of typical snacks available to women at VMC with gestational diabetes:
<https://drive.google.com/file/d/1KjdhY6eND7ZB1uyX8EoH40QRn9vt92K8/view?usp=sharing>
- c. Julia Greenwood, Vidant Duplin Dietitian
 - i. Meeting Notes:
<https://docs.google.com/document/d/1Hcaar64kvqINB9SLVSegHsdFP8dsb3ADkm8yaQWXtPE/edit?usp=sharing>
 - ii. Noteworthy Points: High-risk pregnant women in Duplin County, according to Ms. Greenwood's estimation, were generally overweight, of younger age, had other children at home, using nutrition assistance programs, and often receiving inadequate prenatal care (may not be taking an appropriate prenatal multivitamin). She also noted that a large portion of their population identifies as Hispanic/Latino. General nutrition knowledge and compliance is low among the patients she sees in Duplin county, food preparation skills are limited, and the western diet (convenience foods and SSBs) characterizes the eating pattern of many she sees.
 - d. Bonnie Lesko-Roberts, Pitt County WIC Dietitian
 - i. Meeting Notes:
<https://docs.google.com/document/d/11qeAPK41bjDJD5FStRlsW7a1CI75e4Uick5E7iwGOI/edit?usp=sharing>
 - ii. Noteworthy Points: The number of women on Pitt County WIC over the last month was 489. Ms. Lesko-Roberts estimated that most women who come into WIC and screen positive for food insecurity were also already using SNAP. Other characteristics that were mentioned included varied literacy levels (often low levels), majority African American (62.5%), and a small population of women identifying as Hispanic/Latino. The largest WIC redemption stores were, again, Food Lion and Walmart. Challenges Ms. Lesko-Roberts identified in this population were educating on changing eating patterns to include 6 smaller meals each day instead of 1-2 large meals, appropriate portion sizes, and adding more protein to the foods available. Foods that are generally well-liked included juices, single-serving, pre-portioned food items, NSA/low-sodium canned foods, and any protein source. She felt that canned seafood products would be well-received if women know how to use them to create meals. Foods that are more challenging, or not generally well received included brown rice, 100% whole grain products, and low-fat milk products. She echoed the reports that there seems to be a generational difference in food preparation skill, with a lot of young people not having a large level of knowledge in how to cook and prepare foods.
 - e. Other experts interviewed include Shelia Garner RDN, CDCES, Newport NC; Lorelei Jones, NC Cooperative Extension Service EFNEP Director; Lauren Sastre PhD, RDN, assistant professor East Carolina University. Two list-serves were queried in hopes of identifying successful interventions: Society for Nutrition Education and Food and Nutrition Specialist (international).

4. Review of healthy shelf-stable snack items:

- a. The following resource was reviewed, along with the VMC snack list provided by Breanna Dietz (Step 3biii), to provide ideas of possible healthy snack items that could be included in the MOTHeRS' Food Bag.
- b. Shelf-Stable Snack Food Ideas:
<https://drive.google.com/file/d/1xa7on0dDFsTQeeNplQe6HRAwXaKem1tC/view?usp=sharing>

5. Creation of a list of acceptable foods that could be included in the MOTHeRS' Food Bag:

- a. Using the list of food items identified as good sources of the nutrients of concern during pregnancy (step 2), and the suggested food categories and quantities used by the MFP, a spreadsheet was created of possible items that could be included in the MOTHeRS' Food Bag. Inclusion in this spreadsheet was contingent on nutritional value of target nutrients, relative cost, availability at Food Lion, shelf-stability, and foods that the nutrition experts identified were generally well-received and well-utilized by the population of interest (step 3).
- b. A rough Food Lion cost (and purchase unit size) was determined for each of the items identified in the above step (Step 5a).
- c. Items were then selected from each food category, using the MFP food cards as a guide for the quantity of each category to include. Items that were prioritized for inclusion are those not typically available with the WIC food package, those high in the target nutrients (especially animal protein sources, foods high in omega-3 fatty acids, and foods high in choline), those that could be incorporated into healthy snacks, and those that would be generally accepted by the target population. This was done until the budget of \$70 was reached.
- d. Food Bag Option Spreadsheet: <https://drive.google.com/file/d/1d-2luMfPnLSpd03G2q8XvDHdyZ7ONaU9/view?usp=sharing>

6. Identification of food items to be provided in the MOTHeRS' Pregnancy Emergency Food Bag: Selection of an acceptable food bag. The contents will be the same regardless of trimester or comorbidity (e.g. gestational diabetes, hypertension, low or high weight gain). It is assumed the women will be taking a prenatal vitamin mineral supplement that includes choline and iron.

- a. Food/beverage should provide at least one of the nutrients identified as inadequate in the diet of pregnant women in the U.S. This is possible because there are funds to purchase the foods rather than rely only on donated items.
- b. Food/beverage will be shelf stable
- c. Foods can be readily incorporated into a meal or snack
- d. Foods are known to be acceptable to women residing in rural eastern North Carolina. If generally unknown, specific instructions on how to use the food will be provided
- e. Foods will be sugar free or low in added sugars and low in carbohydrates.
- f. Cost of contents of bag under \$70

7. Nutrition analysis of the proposed food bag:

- a. Using ESHA nutrient analysis software and the Food Lion online shopping tool to identify what is available at a Food Lion in Chowan County, a nutrition analysis was performed to determine the nutrition adequacy of the proposed food bag.
- b. Complete list of total nutrient provision from the proposed food bag is at:
<https://docs.google.com/document/d/12jmHtTRnTnXNM8ZyOFRH2gipx5d6Uu-AxwW20TAKj3U/edit?usp=sharing>

Calories and Nutrients of Importance

Calories	23,658 kcal		
Protein	1,193 gm	Calcium	14,208 mg
Carbohydrates	3,460 gm	Iron	464 mg
Fat	637 grams	Iodine	991 mcg
Folate	14,337 mcg	Choline	4,184 mg
Vitamin D	179 mcg	Omega 3, total	15,510 mg

It is estimated that if these foods are only used by the pregnant woman it would meet the target nutrients for two weeks; if added to the WIC benefits, it would last 4 weeks.

8. Cost analysis of the proposed food bag:

- Using the online shopping tool for a Food Lion in Chowan County, a cost analysis of the selected food items was completed. From the prices of what is available at the Chowan County Food Lion, the final proposed bag total was \$65.00.
- Cost receipt from Chowan County Food Lion online shopping cart:
<https://drive.google.com/file/d/1Uym1v4IW16c2nHWCR9BnDpMmDzLavchA/view?usp=sharing>
- Cost and unit size breakdown of items selected for the MOTHeRS' Food Bag:
<https://drive.google.com/file/d/1IyuECse5dZ0ydoihp0hru5o-9SrN6x-t/view?usp=sharing>

9. Estimated breakdown of MOTHeRS' Food Bag coverage and duration of target nutrients:

- Using the evidence-based resources from Step 1, the RDA's for each of the target nutrients were organized in a spreadsheet.
- Information was then obtained from the IOM's book *WIC Food Packages: Time for a Change* (2006), specifically the chapter, "Nutrient Profiles of Current and Revised Food Packages," on the estimated daily nutrient coverage from WIC Food Package V. Estimated values used were from the USDA Nutrient Database for Standard Reference. This information was organized in the same spreadsheet, and the "gap" remaining for each target nutrient was then calculated.
- Using the ESHA nutrient analysis (Step 7b), the total nutrient provision of the proposed MOTHeRS' Food Bag could then be divided by the RDA for each target nutrient to estimate the number of days the MOTHeRS' Food Bag would provide adequate nutrition for women not receiving WIC benefits. The total nutrient provision of the proposed food bag could also be divided by the remaining "gap" leftover from the WIC package to estimate the number of days the MOTHeRS' Food Bag would provide adequate nutrition for women who are receiving WIC benefits. The information collected in this analysis suggests that, on its own, the proposed food bag would be able to provide adequate coverage of the target nutrients (if consumed solely by the mother) for two weeks on its own, and one month if combined with WIC benefits.
- The daily estimated provision of each target nutrient was also determined by dividing the totals from the proposed MOTHeRS' Food Bag by a duration period of either 1 month or 2 weeks. These values could then be used to determine the %RDA provided by the Bag within those same time periods. Results from this are included in the spreadsheet.
- Estimated Coverage/Duration:
<https://drive.google.com/file/d/1SdUigtJuZOgO23vqqXqrAHMmFmS3HR7h/view?usp=sharing>
- Using the food package data from the Nutrition Facts label on each selected food item from a Food Lion in Chowan County, the number of servings of each food item was determined. This was then summed with other food items in each food category to determine the number of servings of each food category provided by the food bag.

- g. Servings Provided, organized by food category: <https://drive.google.com/file/d/1ZFW-4stpGdOuNRzX76cVpKMKGL3nsMCM/view?usp=sharing>

Chicken, canned in water	1	3 oz	8	55
Tuna, canned in water	2	3 oz	6	
Quinoa	1	1/4 c	8	
Mixed Nuts, lightly salted	1	3T	10	
PB, no sugar added (JIF) (low Na/sugar)	1	2T	13	
Multigrain Tasteo's	1	1 c	13.5	70.5
Oatmeal, old fashioned	1	1/2 c	13	
Grits (plain)	1	Individual packets	12	
Egg noodles, enriched, wide	1	1 c	8	
WW Crackers, reduced fat	1	16 crackers	9	
Pretzels, Twisted, Mini, baked	1	22 pretzels	15	
Raisins, seedless, can	1	1/4 c	14	
Mandarin Orange cups, no sugar added	1	4 oz	4	24
Applesauce, unsweetened	1	4 oz	6	
Leaf Spinach, canned	1	1/2 c	3	17
Mushrooms, canned	1	1/2 c	2	
Asparagus, cut, canned	1	1/2 c	2	
Tomatoes, diced, no salt added	1	1/2 c	3.5	
Collard Greens, canned, low sodium	1	1/2 c	3	
Green beans, canned, no salt added	1	1/2 c	3.5	
Black beans, canned	1	1/2 c	3.5	
Kidney beans, dried	1	1/4 c	11	18
Chickpeas, canned	1	1/2 c	3.5	
Evaporated Milk, fortified, lowfat	2	2T	24	
Dry milk, nonfat	1	3.2oz packets	3	35
Carnation Breakfast Essentials, dry mix, sugar-free	1	Individual packets	8	