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FOOD AND NUTRITION TECHNICAL ASSISTANCE

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Dietary Diversity as a Measure of the Micronutrient Adequacy of Women's Diets: Results from Rural Bangladesh Site

Mary Arimond, Liv Elin Torheim, Doris Wiesmann, Maria Joseph and Alicia Carriquiry

December 2009

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Foreword

This report is one in a series of technical reports produced under the Women's Dietary Diversity Project (WDDP). The WDDP is a collaborative research initiative to assess the potential of simple indicators of dietary diversity to function as proxy indicators of the micronutrient adequacy of women's diets in resource-poor areas. Work carried out under the WDDP includes the development of a standard analysis protocol and application of that protocol to five existing data sets meeting the analytic criteria established by the project. The data sets analyzed as part of the WDDP are from sites in Bangladesh, Burkina Faso, Mali, Mozambique and the Philippines.

Comparative results across the five sites are presented in a summary report, which will be published in 2010:

Mary Arimond, Doris Wiesmann, Elodie Becquey, Alicia Carriquiry, Melissa C. Daniels, Megan Deitchler, Nadia Fanou, Elaine Ferguson, Maria Joseph, Gina Kennedy, Yves Martin-Prével and Liv Elin Torheim. *Dietary Diversity as a Measure of the Micronutrient Adequacy of Women's Diets in Resource-Poor Areas: Summary of Results from Five Sites*.

Detailed results for each data set are discussed in individual site reports:

- Bangladesh: Mary Arimond, Liv Elin Torheim, Doris Wiesmann, Maria Joseph and Alicia Carriquiry. *Dietary Diversity as a Measure of the Micronutrient Adequacy of Women's Diets: Results from Rural Bangladesh Site*.

- Burkina Faso: Elodie Becquey, Gilles Capon and Yves Martin-Prével. *Dietary Diversity as a Measure of the Micronutrient Adequacy of Women's Diets: Results from Ouagadougou, Burkina Faso Site*.

- Mali: Gina Kennedy, Nadia Fanou, Chiara Seghieri and Inge D. Brouwer. *Dietary Diversity as a Measure of the Micronutrient Adequacy of Women's Diets: Results from Bamako, Mali Site*.

- Mozambique: Doris Wiesmann, Mary Arimond and Cornelia Loechl. *Dietary Diversity as a Measure of the Micronutrient Adequacy of Women's Diets: Results from Rural Mozambique Site*.

- Philippines: Melissa C. Daniels. *Dietary Diversity as a Measure of the Micronutrient Adequacy of Women's Diets: Results from Metropolitan Cebu, Philippines Site*.

This report presents the results for the Bangladesh site.

The WDDP initiative began in 2006. Funding is provided by the United States Agency for International Development (USAID)'s Food and Nutrition Technical Assistance II Project (FANTA-2) and its predecessor project, FANTA, at the Academy for Educational Development (AED). The WDDP has been a collaboration among researchers from the International Food Policy Research Institute (IFPRI), FANTA, Akershus University College, Food and Agriculture Organization of the United Nations, Institute of Research for Development, Iowa State University, London School of Hygiene and Tropical Medicine, University of North Carolina at Chapel Hill and Wageningen University.

Acknowledgements

Funding for this report was provided by the United States Agency for International Development (USAID) through the Food and Nutrition Technical Assistance II Project (FANTA-2) and its predecessor project, FANTA, at the Academy for Educational Development (AED).

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We gratefully acknowledge the contributions of a group who joined the authors in meetings convened in Copenhagen (April 27-28, 2006), in conjunction with the Sixth International Conference on Dietary Assessment Methodology:

Inge D. Brouwer	Wageningen University, Netherlands
Marie-Claude Dop	Food and Agriculture Organization of the United Nations (FAO), Rome
Elaine Ferguson	University of Otago, New Zealand (in 2006); London School of Hygiene and Tropical Medicine (LSHTM; 2008)
Yves Martin-Prével	Institute of Research for Development (IRD)
Suzanne Murphy	Cancer Research Center of Hawaii
Marie Ruel	International Food Policy Research Institute (IFPRI)
Jeanne de Vries	Wageningen University, Netherlands
Lynne Wilkins	Cancer Research Center of Hawaii

We are grateful to Marie Ruel for providing early guidance in conceptualizing the study; the analytic protocol also developed from her earlier work with data from Kenya. In addition, we thank Yisehac Yohannes and Wahid Quabili for providing background information on the data set, and Howarth Bouis and his research team for sharing these data. We are also grateful to Ali Subandoro and Yisehac Yohannes for their work on sub-sample selection and on tables, and to Jay Willis for helping finalize this document. Finally, we thank Lora Iannotti for useful comments on a previous draft. Any remaining errors are ours.

Acronyms and Abbreviations

AED	Academy for Educational Development
AI	Adequate Intake
AUC	Area under the curve
BLUP	Best linear unbiased predictor
BMI	Body mass index
BMR	Basal metabolic rate
BMR_{est}	Estimated basal metabolic rate
CIAT	Centro Internacional de Agricultura Tropical
cm	Centimeter(s)
CV	Coefficient of variation
DANIDA	Danish International Development Agency
DATA, Ltd.	Data Analysis and Technical Assistance, Ltd.
DHS	Demographic and Health Surveys
DRI	Dietary Reference Intakes
EAR	Estimated average requirement
FANTA	Food and Nutrition Technical Assistance Project
FANTA-2	Food and Nutrition Technical Assistance II Project
FAO	Food and Agriculture Organization of the United Nations
FCT	Food composition table
FGI	Food group diversity indicator
FGI-6	Food group diversity indicator summed from 6 groups, minimum intake 1 g per group
FGI-6R	Food group diversity indicator summed from 6 groups, minimum intake 15 g per group
FGI-9	Food group diversity indicator summed from 9 groups, minimum intake 1 g per group
FGI-9R	Food group diversity indicator summed from 9 groups, minimum intake 15 g per group
FGI-13	Food group diversity indicator summed from 13 groups, minimum intake 1 g per group
FGI-13R	Food group diversity indicator summed from 13 groups, minimum intake 15 g per group
FGI-21	Food group diversity indicator summed from 21 groups, minimum intake 1 g per group
FGI-21R	Food group diversity indicator summed from 21 groups, minimum intake 15 g per group
g	Gram(s)
h	Hour
IFPRI	International Food Policy Research Institute
IML	International Minilist
IOM	Institute of Medicine (United States National Academy of Sciences)
IRD	Institute of Research for Development
IZiNCG	International Zinc Nutrition Consultative Group
kcal	Kilocalorie(s)
kg	Kilogram(s)
LSHTM	London School of Hygiene and Tropical Medicine
µg	Microgram(s)
µg /d	Microgram(s) per day
mg	Milligram(s)
mg/d	Milligram(s) per day
MPA	Mean probability of adequacy
NGO	Nongovernmental organization
NPNL	Non-pregnant non-lactating
NRV	Nutrient reference values of the Codex Alimentarius
OC	Oral contraceptives
ORC Macro	Opinion Research Corporation Macro International, Inc.
PA	Probability of adequacy
R1	Round 1 of data collection, June-September 1996
R2	Round 2 of data collection, October-December 1996
RAE	Retinol activity equivalents
RE	Retinol equivalent

ROC	Receiver-operating characteristic
SD	Standard deviation
UK	United Kingdom
US	United States
UNICEF	United Nations Children's Fund
UNU	United Nations University
USAID	United States Agency for International Development
USDA	United States Department of Agriculture
WDDP	Women's Dietary Diversity Project
WHO	World Health Organization

Executive Summary

BACKGROUND

In resource-poor environments across the globe, low quality monotonous diets are the norm. When grain- or tuber-based staple foods dominate and diets lack vegetables, fruits and animal-source foods, risk for a range of micronutrient deficiencies is high. Women of reproductive age constitute one vulnerable group. While information on micronutrient deficiencies is scarce, it is clear that poor micronutrient status among women is a global problem and is most severe for poor women. Information about dietary patterns for women across countries is also scarce, but the Demographic and Health Surveys (DHS) have recently begun to fill this information void.

The broad objective of this study, carried out under FANTA's Women's Dietary Diversity Project (WDDP), is to use an existing data set with dietary intake data from 24-hour (24-h) recalls to analyze the relationship between simple indicators of dietary diversity – such as could be derived from the DHS – and diet quality for women. Adequate diet quality is defined here as a diet that delivers adequate amounts of selected micronutrients, to meet the needs of women of reproductive age. We recognize that definitions of diet quality often include other dimensions, such as moderation and balance. However, because low intakes remain the dominant problem in many of the poorest regions, focus in this work is on micronutrient adequacy only.

Dietary diversity – i.e., the number of foods consumed across and within food groups over a reference period – is widely recognized as a key dimension of diet quality. There is ample evidence from developed countries showing that dietary diversity is indeed strongly associated with nutrient adequacy. There is less evidence from developing countries, but the few available studies of adult women have also supported the association between diversity and nutrient adequacy.

OBJECTIVES

To assess the potential of simple indicators of dietary diversity to function as proxy indicators of diet quality, the following main objectives were identified for the WDDP:

1. Develop a set of diversity indicators, varying in complexity, but all amenable to construction from simple survey data
2. Develop an indicator of diet quality, using current best practices to assess adequacy across a range of key micronutrients
3. Explore relationships among diversity indicators, energy intake and diet quality
4. Test and compare the performance of various indicators

As a secondary objective, the WDDP also aimed to characterize micronutrient adequacy for women of reproductive age in each study site.

Indicator performance in just one site is not sufficient to address the broader objective of developing indicators for global use. Therefore, although site-specific results pertaining to objective four are presented in this report, the results for indicator performance are most useful when considered across multiple sites. This discussion is provided in the WDDP summary report.

DATA AND SAMPLING

The data analyzed for this report comprise a subset of women's dietary intake data from surveys undertaken by the International Food Policy Research Institute (IFPRI) and collaborators in 1996. The surveys were originally designed to determine both nutrition and resource allocation effects of several nongovernmental organization (NGO)-disseminated agricultural technologies in three rural study areas in Bangladesh. Sampling strategies aimed to represent adopters, likely adopters (in areas where interventions had not yet begun), and non-adopters for the agricultural technologies in question.

Households were followed longitudinally. The subset of observation days used for this analysis was drawn from the first two rounds: June-September 1996 (round 1 [R1]) and October-December 1996 (round 2 [R2]).

METHODS

Quantitative 24-h recall data were collected by highly-trained enumerators. For each woman, information was gathered on all meals eaten in or away from home in the previous 24 hours, during the two survey rounds. Estimates of nutrient intakes were based on a food composition table constructed specifically for the study, drawing on several sources. Intake was calculated for energy, protein, animal-source protein, fat, carbohydrates, vitamin A, vitamin C, thiamin, riboflavin, niacin, vitamin B6, folate, vitamin B12, calcium, iron and zinc. Extreme intakes were examined and some observations were excluded, yielding a final sample of 412 women, with second observations available for 147.

Eight food group diversity indicators (FGIs) were created, each summing food groups consumed to generate a food diversity score. The indicators vary in the extent to which major food groups are disaggregated. The indicators also vary in regard to the amount of food (either 1 gram [g] or 15 g) that must be consumed in order for the food group to count. The most aggregated indicator has 6 major food groups (FGI-6). The more disaggregated indicators have 9, 13, and 21 food groups (FGI-9, FGI-13, FGI-21), with nutrient-dense food groups (animal-source foods, fruits and vegetables) more disaggregated than staple food groups. The indicators with a 15 g minimum consumption requirement use the same food groups as FGI-6, FGI-9, FGI-13, and FGI-21. Throughout the report, these indicators are referred to as FGI-6R, FGI-9R, FGI-13R, and FGI-21R, respectively.

Probability of adequacy (PA) was calculated for the 11 micronutrients listed above, taking into account both distributions of requirements and distributions of estimated usual intakes. For most nutrients, adequacy was assessed relative to the Food and Agriculture Organization of the United Nations (FAO)/ World Health Organization (WHO) requirements. Exceptions to this are described in **Section 5.6**. Probabilities were averaged across the 11 micronutrients to form a summary indicator of diet quality: "mean probability of adequacy" (MPA).

Correlations and simple linear regressions were used to describe relationships between the various diversity indicators, energy intake and MPA. Performance of the indicators was assessed using receiver-operating characteristic (ROC) analysis, and through examination of indicator characteristics such as sensitivity, specificity and total misclassification.

RESULTS

Analysis of the eight diversity indicators showed that food group diversity scores did differ between those indicators that counted any intake of 1 g or more, compared to those that required 15 g in order for a food group to count. Most of the differences were accounted for by intake of red and green chili peppers and garlic, which were consumed in very small amounts. Some women also ate trivial amounts (less than 15 g) of fish, and of some other fruits and vegetables. Overall dietary patterns were similar for lactating and non-pregnant non-lactating (NPNL) women, although lactating women had higher energy intakes, primarily due to consumption of larger quantities of rice. Lactating women were also more likely to consume small fish and red chilies, and lactating women who consumed other flesh foods ate slightly larger amounts.

The women's diets were dominated by starchy staples (largely rice), which accounted for 86 percent of total energy. Starchy staples also provided well over half of the protein, thiamin, niacin, B6, and zinc in the diets, and provided approximately half of the riboflavin and iron. While starchy staples provided the majority of these micronutrients across the sample, results showed that women with higher intakes of starchy staples had diets with poorer micronutrient density.

Although other food groups were eaten in small quantities, they provided substantial proportions of the folate, vitamin A, vitamin C and calcium in the diet and all of the vitamin B12 (because this last is found only in animal-source foods). The most nutritionally important of these other food groups, in roughly descending order of importance in the diet, were dark green leafy vegetables, fish, nuts and seeds, and dairy.

Average micronutrient intakes were below – and in many cases far below – estimated average requirements (EARs) for most of the 11 micronutrients assessed. Consistent with this, the estimated prevalence of adequate intake was very low (1-15 percent) for thiamin, riboflavin, folate and iron; low (19-28 percent) for niacin, vitamin B12, calcium, and iron; moderate (49-67 percent) for vitamins A, B6, and C; and high (93 percent) for zinc only. For lactating women the prevalence of adequate intakes was lower, due to higher requirements during lactation. The MPA provides a summary of this information and underscores the very low quality of the women's diets. Most women (84 percent) had an MPA below 50 percent; the median MPA was 35 percent for NPNL women, and only 23 percent for lactating women.

All eight dietary diversity indicators were significantly associated with intakes of each of the 11 micronutrients and were also correlated with MPA. Because both diversity and MPA were also associated with increases in energy intakes, we examined partial correlations for diversity and nutrient intakes and adequacy, controlling for energy. These analyses showed that the increases in nutrient intakes and adequacy that accompany increases in diversity result *both* from increased total intakes (reflected in energy intakes) *and* from increases in the nutrient density of the diet. Regression results for NPNL women confirmed that each of the eight diversity indicators significantly predicted MPA, with or without controlling for energy. For this data set, the best results were obtained with the 9-food group and 13-food group indicator, where 15 g was used as the cutoff for each food group to "count" (FGI-9R and FGI-13R).

ROC analysis confirmed that imposing a 15 g restriction in order for a food group to "count" increased the predictive power of the diversity indicators. Examination of various cutoffs for MPA (a necessary step prior to evaluating indicator characteristics) showed that there was no way to examine indicators of good diet quality in this population, because the distribution of MPA was so low. Examination of indicator characteristics using MPA cutoffs of 50 percent, 60 percent and 70 percent showed that FGI-9R and FGI-13R once again performed best, although sensitivity was quite low for FGI-9R at the 50 percent of MPA cutoff. Considering FGI-9R at higher MPA cutoffs, and FGI-13R at all three, misclassification ranged from 19-24 percent, sensitivity from 61-92 percent, and specificity from 75-82 percent. These levels are acceptable for indicators of this type; that is, population-level indicators for assessment and monitoring.

GENERALIZABILITY

For a number of reasons – the complexity and aims of the original sampling, our selection of a sub-sample for analysis, and the passage of time – we cannot claim that the estimates of prevalence of adequacy in this sample directly and precisely reflect those of any particular group of Bangladeshi women at present. At the same time, there is no reason to believe that the general picture that emerges is not representative. In areas where families remain impoverished and heavily reliant on one unfortified staple food, the poor diet quality and low nutrient adequacy described herein are likely to prevail.

For the main purpose of this study – developing indicators of diet quality – neither the sampling/sub-sampling nor the passage of time affect the usefulness of the data set: for women with diets similar to these, the relationships between food group diversity, energy intake and micronutrient adequacy should be similar to those found here. However, additional data sets that include better-nourished women should be examined in order to identify indicators that function at higher levels of overall nutrient adequacy. Results from other sites also allow more complete analysis of indicators for lactating women.

CONCLUSIONS

Our results from rural Bangladesh indicate that micronutrient intakes were very inadequate. Notably, intakes were inadequate for all micronutrients except zinc, not just those that are the usual focus of public health interventions (i.e., iron/folate during pregnancy, vitamin A, iodine). Programs narrowly focused on one or several micronutrients will not alleviate the major deficits identified here.

Diets of lactating women were particularly deficient relative to their nutrient needs. For this sub-group of women, exploration of indicator cutoffs was not possible due to the very low and narrow observed range of the diet quality indicator.

Simple population-level indicators are needed to assess the quality of women's diets and to monitor progress in improving diets. This report contributes to a multi site research initiative aimed at identifying appropriate indicators. Our results from rural Bangladesh indicate that food group diversity indicators are very promising and may be a simple and valid option for population-level assessment and for monitoring progress toward improved micronutrient intakes among women of reproductive age. The diversity indicators explored in this report were correlated not only with overall micronutrient adequacy, averaged across 11 micronutrients, but were also correlated with each individual micronutrient. This underscores their usefulness as proxy indicators of overall diet quality in resource-poor settings.

1. Background

In resource-poor environments across the globe, low quality monotonous diets are the norm. When grain- or tuber-based staple foods dominate and diets lack vegetables, fruits, and animal-source foods, risk for a variety of micronutrient deficiencies is high. Those most likely to suffer from deficiencies include infants and young children, and adolescent girls and women of reproductive age. Unfortunately, outside of developed countries, very little information is available on women's micronutrient status, but even with limited data, it is clear that poor micronutrient status among women is a global problem, and is most severe for poor women.[1]

Similarly, comparable information about dietary patterns for women across countries is also scarce. The Demographic and Health Surveys (DHS) have recently added questions on mothers' diets in order to begin to fill this information void. The current survey questionnaire includes a set of questions about food groups eaten in the last 24 hours by mothers of young children under three years of age (see **Appendix 5**).[2]

The broad objective of this study, carried out under FANTA-'s Women's Dietary Diversity Project (WDDP), is to use an existing data set with dietary intake data from 24-hour (24-h) recall to analyze the relationship between simple indicators of dietary diversity – such as could be derived from the DHS and other surveys – and diet quality for women.

Simple indicators are urgently needed in developing countries to characterize diet quality, to assess key diet problems, such as lack of animal source foods, fruits and vegetables, and to identify sub-groups particularly at risk of nutrient inadequacy. Simple indicators are also needed to monitor and evaluate intervention programs. The present study contributes to development of such simple indicators. At the same time, the study also provides descriptive information on dietary patterns and levels of micronutrient adequacy for women in one resource-poor setting.

For the purposes of this study, adequate diet quality is defined as a diet that has a high probability of delivering adequate amounts of selected micronutrients, to meet the needs of women of reproductive age. We recognize that definitions of diet quality often include other dimensions, such as moderation (e.g., in intakes of energy, saturated/trans fat, cholesterol, sodium, refined sugars) and balance. But because low intakes remain the dominant problem in many of the poorest regions, our focus in this work is on micronutrient adequacy only.

[1] Kennedy and Meyers 2005.
[2] Appendix 5 excerpts the relevant questions from the model questionnaire; the entire questionnaire is available on the Opinion Research Corporation Macro International, Inc., (ORC Macro) DHS website at: http://www.measuredhs.com/aboutsurveys/dhs/questionnaires.cfm (accessed September 7, 2007).

2. Dietary Diversity

Dietary diversity – i.e., the number of foods consumed across and within food groups over a reference time period – is widely recognized as being a key dimension of diet quality. It reflects the concept that increasing the variety of foods and food groups in the diet helps to ensure adequate intake of essential nutrients, and promotes good health. There is ample evidence from developed countries showing that dietary diversity is indeed strongly associated with nutrient adequacy, and thus is an essential element of diet quality.[3]

There is less evidence from developing countries where monotonous diets, relying mostly on a few plant-based staple foods, are typical. Even fewer studies from developing countries have aimed to confirm this association specifically among adult women. The available studies have generally supported the association between diversity and nutrient adequacy.[4] One exception to this was reported in a study from urban Guatemala, but in this study diversity was defined as the number of unique foods consumed over 14 24 hour periods; this meant that even very infrequently consumed items counted in the score.[5]

Previous studies have generally been context-specific, and diversity has been operationalized differently in each study.[6] While this has made comparisons difficult, it has also suggested that the relationship is robust. This report, along with the companion reports from additional sites, extends knowledge of the relationship between simple diversity indicators and nutrient adequacy for women.

[3] Randall, Nichaman and Contant, Jr. 1985; Krebs-Smith et al. 1987; Kant 1996; Drewnowski et al. 1997; Cox et al. 1997; Lowik, Hulshof and Brussaard 1999; Bernstein et al. 2002; Foote et al. 2004.
[4] Ogle, Hung and Tuyet 2001; Torheim et al. 2003, 2004; Roche et al. 2007.
[5] Fitzgerald et al. 1992.
[6] Ruel 2003.

3. Objectives

To assess the potential of simple indicators of dietary diversity to function as proxy indicators of diet quality, the following main objectives were identified for the WDDP:

1. Develop a set of diversity indicators, varying in complexity, but all amenable to construction from simple survey data
2. Develop an indicator of diet quality, using current best practices to assess adequacy across a range of key micronutrients
3. Explore relationships among diversity indicators, energy intake, and the indicator of diet quality
4. Test the performance of various indicators using cut-points along the range of diversity scores; assess performance (sensitivity, specificity and total misclassification) relative to various cutoffs for diet quality, as data allow

As a secondary objective, the WDDP also aimed to characterize micronutrient adequacy for women of reproductive age in each study site.

Indicator performance in just one site is not sufficient to address the broader objective of developing indicators for global use. Therefore, although site-specific results pertaining to objective four are presented in this report, the results for indicator performance are most useful when considered across multiple sites. This discussion is provided in the WDDP summary report.[7]

[7] Arimond et al 2009.

4. Bangladesh Study: Original Research Objectives and Context [8]

The data used in this report comprise a subset of women's dietary intake data from surveys undertaken by the International Food Policy Research Institute (IFPRI) and collaborators in 1996. The surveys were originally designed to determine both nutrition and resource allocation effects of several nongovernmental organization (NGO)-disseminated agricultural technologies, in three rural study areas in Bangladesh, as follows:

1. Saturia: Commercial vegetable production
2. Mymensingh: Polyculture fish production in household-owned ponds
3. Jessore: Polyculture fish production in group-managed ponds

Sampling strategies were complex and site-specific, and aimed to represent adopters, likely adopters (in areas where interventions had not yet begun), and non-adopters. Households were followed longitudinally, with four survey rounds across 16 months aiming to capture change across seasons. The subset of observation days for this analysis was drawn from the first two rounds (R1 and R2) of data collection. Note that as there are two rice harvests per year in these areas (May-June and November-December), neither survey round fell entirely in a lean season nor entirely in a harvest season.[9]

While the three sites varied across a number of dimensions (e.g., landholding), they were similar to each other, and to rural Bangladesh in general, in average per capita income (approximately US $200 per capita per year). Survey households in Saturia and Jessore were generally quite poor, whereas some households in Mymensingh – those who owned fishponds – were somewhat better off. On average, food accounted for 69 percent of all household expenditures.

Diets were dominated by rice, with similar rice intakes across all income strata. Fortified foods were not consumed by women in the study sample. Intakes of animal-source foods, fruits, and vegetables were low, and did not increase markedly as a direct effect of any of the interventions. However, intakes of animal-source foods increased strongly with income, indicating strong "latent demand" for these foods; intakes of fruits and sugar also increased substantially with income. Intakes of vegetables increased, but less markedly; Bouis et al.[10] concluded that demand for vegetables was not strong.

The study had a focus on micronutrients, and therefore assessed hemoglobin status for women and children. Limited information on iron supplement use was gathered, and intra-household distribution of iron-rich foods was also assessed.

Anemia prevalence was very high (50-60 percent of women and 40-50 percent of preschoolers, depending on study area). There was no information gathered on iron/folate supplement use during pregnancy, but approximately 20 percent of the non-pregnant women reported receiving and consuming iron tablets that were routinely distributed with birth control pills, for a median duration of approximately two years. No information is available on frequency of consumption.

Concerning intra-household distribution, the study also showed that within households, women consumed a disproportionately low share of preferred foods, such as animal-source foods, potentially exacerbating a poor nutrition (and micronutrient) situation.

[8] Except as noted, all information for Section 4 is taken from Bouis et al. 1998.
[9] Personal communication from W. Quabili, who was involved in the fieldwork (December, 2007). Note also that Ramadan did not fall during either of the two survey rounds used for this analysis.
[10] 1998.

5. Methods

5.1. DATA COLLECTION FOR 24-HOUR RECALL AND CALCULATION OF NUTRIENT INTAKES

The 24-h recall data were collected by enumerators from Data Analysis and Technical Assistance (DATA, Ltd.) in Dhaka, a consultancy firm with extensive experience collecting dietary data. Most enumerators had Master's degrees and underwent three weeks of training, including participation in a three-day pilot survey, prior to data collection.

For each individual in the study households, the following information was collected in the 24-h recall: meals, name of foods/mixed dishes, and weight of each food/dish the individual had consumed. Recipe data for mixed dishes were collected from the female household member who was responsible for cooking (or supervising cooking) and serving food. For foods eaten outside the home, or those prepared before the recall day in question, average recipes were constructed from similar dishes eaten in the home, averaging data from across all households (see **Section 5.3**).

In the home, women were asked to recall each ingredient in the recipe, as well as the raw weight (as purchased) for each ingredient.[11] To find the total weight of a prepared dish, the intakes of the dish of each individual, as well as leftovers or foods given to animals, were summed. The proportion of each ingredient in the dish was calculated, and the proportion of the dish that the person consumed was estimated. Each individual's intake of each ingredient (grams as eaten) was then calculated by multiplying the weight of the ingredient in the dish with the proportion of the dish consumed by the individual.

A project-specific food composition table (FCT) had already been developed using nutrient values from the International Minilist (IML).[12] We reviewed the FCT and in cases where it was judged that the foods in the sample did not correspond well to those in the IML (30 foods), nutrient values were replaced with data from the United States Department of Agriculture (USDA) FCT[13] or the food composition database for Mali.[14]

Nutrient intake was calculated using FoodCalc[15] for energy, protein, animal-source protein, fat, carbohydrates, vitamin A, animal-source vitamin A, vitamin C, thiamin, riboflavin, niacin, vitamin B6, folate, vitamin B12, calcium, iron and zinc.

5.2. TIMING OF REPEAT RECALLS

Repeat recalls are needed in order to construct a summary variable for nutrient adequacy that takes into account day-to-day (intra-individual) variation in nutrient intakes. However, the repeat recalls in this data set were originally designed with a different objective: the study aimed to characterize intakes in different seasons. Thus, round 2 of data collection (R2; October to December 1996) occurred approximately three-to-four months following round 1 (R1; June to September 1996). This introduces more variability in both food group and nutrient intake as both seasonal and day-to-day variability are contained in the differences between observation days. There is no reason to believe the time gap between observations introduces any bias into estimates of adequacy.

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[11] Senior DATA staff confirmed that recall of weights, with good precision, was feasible in this context (personal communication, Z. H. Zihad, 2006).
[12] The IML can be accessed in the User's Guide to the Worldfood Dietary Assessment System at: http://www.fao.org/infoods/software_worldfood_en.stm.
[13] USDA 2006.
[14] Barikmo, Ouattara and Oshaug 2004.
[15] FoodCalc intake calculator, at: http://www.ibt.ku.dk/jesper/FoodCalc/Default.htm, version 1.3 (accessed July 2006).

5.3. EXCLUSIONS FROM THE ORIGINAL SAMPLE

The original R1 sample included 1,301 women ages 15-49. However, of these, 95 were excluded because they were missing data on mixed dishes. In addition, the use of "averaged" recipes as described above presented problems in constructing food group diversity scores to reflect actual food group intake. If all averaged recipes were included, many women had falsely high diversity scores. This is because while any one recipe might include six or eight ingredients, the averaged recipes could include many more (well over 50 ingredients in a number of cases), but in very small quantities. Thus, women consuming the averaged recipe would be assigned very high diversity scores, even when this did not reflect their true food group consumption (because within individual households recipes were far more simple). In order to exclude the worst cases of "false diversity," we created a subset of the data, excluding any woman who was reported to have more than ten ingredients from these averaged recipes. This resulted in the exclusion of nearly half of the original sample (564 women).

Next, we examined the energy intakes estimated as described above. There were a number of extreme high outliers for energy intake, and these appeared to be associated with implausibly extreme estimates of rice intake. We examined distributions and excluded women whose energy intakes were either below a basal metabolic rate (BMR) factor of 0.9 or above a factor of 3.0.[16] Use of these BMR-factor cutoffs resulted in exclusion of 62 women. In addition, 20 women with missing anthropometry were excluded (because BMR factors could not be calculated). Mean energy intake among the remaining women was 2,200.

Next, we judged that there were too few pregnant women in the sample to allow an analysis during pregnancy, thus 31 pregnant women and 129 women for whom pregnancy status was unknown were excluded from the sample (because we could not select appropriate requirements for the latter). The final R1 sample size was 412 (111 lactating and 299 non-pregnant non-lactating [NPNL] women).[17] Lactation status was defined based on R1.[18] The same exclusion criteria were used for R2 data, with the additional restriction that R2 observations were only selected if the woman had not been excluded from analysis for R1. The proportions of exclusions for various reasons were similar to R1. The final subset of R2 data consisted of 147 women. The analysis protocol for the WDDP[19] (described in **Section 5.4**) requires that repeat measures be available for a subset of women only; it is not problematic that the final subset has substantially fewer women in R2.

Women in the final R1 subset were compared with the full sample, across a number of demographic and socioeconomic characteristics. This comparison showed that the R1 subset does not represent the full sample. Women in the sub-sample had eaten fewer dishes away from home and tended to be older and less educated. They were more likely to be married and less likely to currently report "student" as their main occupation; over 90 percent of women in the selected sub-sample reported homemaking as their

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[16] Goldberg et al. (1991) provides a method for assessing the quality of dietary data through evaluating estimated energy intake (EI_{rep}). EI_{rep} is compared with the person's estimated basal metabolic rate (BMR_{est}). The ratio between EI_{rep} and BMR_{est} is called the BMR factor. The BMR factor can be used as a lower cutoff value for identifying under-reporters. The lower cutoff value, with a 95 percent confidence limit, is based on an energy requirement of 1.55xBMR for a person with a sedentary lifestyle, adjusted for the number of days of recall data. For a single recall day, the lower cutoff value is 0.90xBMR; using this cutoff, we excluded 19 women with low energy intakes. The highest energy intake that can be sustained over a longer period of time is 2.4xBMR (FAO/WHO/UNU 2001). An upper cutoff value of 2.4xBMR has therefore been used by some. However, a single day's energy intake can be more extreme. For our purposes, we set the upper cutoff to 3.0xBMR, in order to identify likely over-reporters. This resulted in the exclusion of 53 women with reported intakes between 3,228 and 9,070 kilocalories (kcal).

[17] Note that some women were excluded by multiple criteria. Note also that for the overall sample, 2 women whose lactation status was unknown were included, and were assumed to be non-lactating, for a full sample size of 412.

[18] Since information on intakes from both rounds are combined to generate "estimated usual intake" for any individual, only one set of requirements can be used and we selected requirements based on lactation status in R1. Four women reported breastfeeding in R1, but not in R2. Three women reported that they were breastfeeding in R2, but not in R1.

[19] Arimond et al. revised October 2008 and Arimond et al. March 2008.

main occupation. They were also more likely than those excluded to have low body mass index (BMI; less than 18.5).

5.4. DEVELOPMENT OF ANALYTICAL PROTOCOL

This report results from a collaborative process begun in early 2006. A draft research protocol was discussed with a group of potential collaborators who were invited to meet in Copenhagen on April 27-28, 2006, in conjunction with the Sixth International Conference on Dietary Assessment Methodology; participants are listed in the **Acknowledgements**. This group was invited to participate in a second phase of the project, in which data from a variety of sites would be analyzed using the same protocol. Following the meeting, discussions continued on several issues (e.g., selection of source(s) for requirements, definition of food groups). Statistical methods were also further elaborated by colleagues at Iowa State University.[20] These discussions and exercises formed the basis for a revised analysis protocol.[21] The protocol details a number of decisions, which are also summarized below, including:

- Selection of key nutrients
- Selection of nutrient requirements: estimated average requirements (EARs) and estimates of variability in requirements (standard deviation [SD] or coefficient of variation [CV])
- Definition and construction of food group diversity indicators (FGIs)
- Definition and construction of a summary variable for diet quality (mean probability of adequacy [MPA])
- Statistical methods for analysis

As noted, for the purposes of this work, we defined adequate diet quality as a diet that has a high probability of delivering adequate amounts of selected micronutrients, to meet the needs of women of reproductive age.

Macronutrient intakes are reported for descriptive purposes. In addition, we present results relating the food group diversity indicators to energy intake. This is because in many previous studies, energy intakes have been shown to increase with increases in dietary diversity.[22] We aimed to assess to what extent any observed increases in micronutrient intakes were due to increases in quantity as compared to increases in micronutrient density.

5.5. KEY NUTRIENTS

The selection of a set of micronutrients was discussed at the Copenhagen meeting. Considerations included known public health relevance, as well as the availability of nutrient data both in data sets collected by the potential collaborators and in a range of food composition tables likely to be used.

In previous work with infants and young children, we used a set of "problem" nutrients identified in a global review.[23] To our knowledge, there is no such global review identifying a list of "problem" nutrients for women of reproductive age. The recent review cited previously[24] concluded that available information is extremely limited. However, it is known that poor pregnancy outcomes can result from a wide range of micronutrient deficiencies, including deficiencies in iron, folate, B vitamins, antioxidants, vitamin D and iodine.[25] Similarly, low maternal intake or stores during lactation can also affect breast-milk levels of B vitamins, vitamin A and iodine. In addition, low intakes of calcium have also been documented among women of reproductive age.[26] Consequences for child-bearing and lactation are not the only concerns; micronutrient deficiencies affect women's health from adolescence through aging.

[20] See Joseph 2007.
[21] Arimond et al. revised October 2008 and Arimond et al. March 2008.
[22] See, for example, Ogle, Hung and Tuyet 2001; Foote et al. 2004; Torheim et al. 2004.
[23] WHO/UNICEF 1998.
[24] Kennedy and Meyers 2005.
[25] Allen 2005.
[26] Bartley, Underwood and Deckelbaum 2005.

For the purposes of the WDDP, the following micronutrients were agreed to be of focus:

Vitamins	Minerals
Thiamin	Calcium
Riboflavin	Iron
Niacin	Zinc
Vitamin B6	
Folate	
Vitamin B12	
Vitamin A	
Vitamin C	

Vitamin D had been considered but was dropped both because it does not have an EAR and because of its absence from many FCTs. Similarly, reliable data on iodine content of foods are generally not available.

5.6. REQUIREMENTS AND REQUIREMENT DISTRIBUTIONS

Appendix 6 defines the EAR and SD (some calculated from CV) selected for use in the WDDP; the table of EAR also identifies the units to be used, which follow from the selection of requirements. Group consensus at the Copenhagen meeting was that the World Health Organization (WHO) / Food and Agriculture Organization of the United Nations (FAO) EAR would generally be most appropriate, given the purposes of the project.

Exceptions were made in the case of the minerals (calcium, iron and zinc). The WHO/FAO EAR of 840 milligrams per day (mg/d) for calcium[27] is quite high, and this value was not felt to be well justified in the supporting document. It is set between the United Kingdom (UK) EAR (525 mg) and the United States (US) "Adequate Intake" value (AI)[28] of 1,000 mg but is closer to the US AI. The group felt that this may well be too high and would certainly pull down any summary measure of adequacy. The decision was taken to use the US AI and to evaluate probability of adequacy (PA) following the method used by Foote et al.[29]

For iron intakes, assessment of the PA requires special attention to the shape of the requirement distribution. When evaluating PA for most nutrients, analysis methods assume a symmetric distribution of requirements in the population. However, it is well established that the requirement distribution for iron is strongly skewed, particularly for menstruating women. The US Dietary Reference Intakes (DRI) provide a solution to assessing PA for iron through provision of a separate reference table.[30] However, this table incorporates an assumption regarding absorption (18 percent) that is likely to be inappropriate for our data sets. For the purposes of the WDDP, the US Institute of Medicine (IOM) Table, with the US requirements, has been adapted for absorption levels of either five percent or ten percent for NPNL and lactating women and is presented in **Appendix 6**. For pregnant women, an absorption level of 23 percent is used.

In the case of zinc, the International Zinc Nutrition Consultative Group (IZiNCG) recently presented updated recommendations for international use,[31] and these were adopted for the WDDP.

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[27] 840 mg/d is the WHO/FAO (2004) EAR for NPNL women, and is the same for lactating women. The EAR is 940 mg/d for pregnant women.

[28] The US DRI include "Adequate Intakes" where there was judged to be insufficient basis for setting an EAR. An AI is an experimentally determined estimate of nutrient intake by a defined group of healthy people. Some seemingly healthy individuals may require higher intakes and some individuals may be at low risk on even lower intakes. The AI is believed to cover their needs, but lack of data or uncertainty in the data prevents being able to specify with confidence the percentage of individuals covered by this intake (IOM 1997).

[29] 2004.

[30] Table G-7 in IOM 2006.

[31] IZiNCG 2004; Hotz 2007.

In addition to the use of US and IZiNCG values for mineral requirements, US values were also used when SD and/or CV were not available from WHO/FAO, as was the case for vitamin A.

Finally, for both iron and zinc, WDDP researchers needed to select absorption levels appropriate for the dietary patterns observed in their research context. For the purposes of this project, it was agreed that absorption levels could be selected at sample level and used for all women, rather than attempting to characterize individual diets and set absorption levels on an individual basis. **Appendix 6** also provides the available guidance for selection of absorption levels at population level.

For analysis of the Bangladesh data, we assumed intermediate levels of absorption for iron and zinc. In the case of zinc, this choice was clear: this is the recommended level for mixed diets that include flesh foods, and for vegetarian diets that are not based primarily on unrefined cereal grains or high extraction flours.[32] The staple food in the study area was refined/polished rice, and the diet pattern did include some flesh foods.

For iron, the choice between an assumption of low or intermediate absorption was less clear. WHO/FAO[33] guidance suggests assuming low absorption when intake of flesh foods and vitamin C is "negligible" and intermediate when intake is "minimal," but no quantitative definitions are provided for "negligible" or "minimal." Gibson and Ferguson[34] suggest interpreting "minimal" to describe diets in which the main meal includes at least 50 grams (g) of flesh foods and 30 mg of vitamin C. Daily intakes (but not on a per meal basis)[35] of 69 percent of the women exceeded these amounts for one or both flesh foods and vitamin C. In addition, iron absorption is estimated to be increased by 50 percent in the presence of anemia.[36] Over half the women in the Bangladesh study sample were anemic; therefore we chose to assume intermediate absorption, which will result in a conservative estimate of inadequacy. Descriptive results for both low and intermediate absorption are presented, but the intermediate level is assumed in further analyses, including construction of a summary variable for micronutrient adequacy.

5.7. FOOD GROUP DIVERSITY INDICATORS

As noted in **Section 2**, dietary diversity has been operationalized in a wide variety of ways, and one contribution of the WDDP is a direct comparison of the performance of several indicators across multiple sites to assess the micronutrient adequacy of women's diets. Therefore those who met in Copenhagen carefully considered a number of questions related to grouping of foods in the indicators to be evaluated, including:

- How many and which sets of food groupings will be used (and why)?
- Will the WDDP use indicators based on number of individual foods?
- What amounts (g) will be used to decide if the woman ate the food group? Alternatively, should "servings" be defined and food group consumption determined by whether or not a serving was consumed?
- If a minimum amount (g) of food consumed is required for a food group to "count" in the dietary diversity score, how many different cutoffs should be used (1 g, 10 g, 20 g, 50 g) and should the cutoffs be the same for all food groups? If not, how will the cutoff amounts be chosen?

The group considered whether there could be an empirical basis for definition of food groupings, but agreed that elaboration of this would be a huge project in itself, requiring complex analyses across a large number of data sets. For practical reasons, this exercise was not considered. Instead, it was accepted that the selection would be based on collective knowledge and experience, keeping in mind the following:

[32] Gibson and Ferguson 2008.
[33] 2004.
[34] 2008.
[35] Data were not available at the level of the meal.
[36] Gibson and Ferguson 2008.

- It should be possible to collect the required information on food groups and sub-groups in the context of simple surveys.
- Distinctions between groups should be nutritionally relevant and related to the selected micronutrients.
- Nutrient-dense food groups, and food groups providing a wider range of nutrients, should be more disaggregated than starchy staples.

There was consensus that indicators based on food groups were more promising. Defining "servings" (in order to use "one serving" as a quantity cutoff) was not viewed as useful if the WDDP was to remain relevant to simple surveys such as the DHS. However, the group agreed to test two quantity cutoffs (1 g and 15 g) for food groups summed in each indicator, in order to see if the relationship between diversity and micronutrient adequacy is stronger when quantity is considered in any way. It was not considered practical to try to employ different quantity cutoffs for different food groups, as elaborating an empirical basis for defining different quantity cutoffs would also be a large task in itself. Finally, the group affirmed that since the objective was to relate diversity to micronutrient adequacy, foods and groups that provide primarily energy but few or no micronutrients (e.g., fats/oils,[37] sweets, alcohol) would not be included in any indicator. However, the group also affirmed that there can be many good reasons for including these in survey instruments.

Regarding classification of fruits and vegetables as "vitamin A-rich" and "vitamin C-rich," the protocol evolved over time. Initially, the Codex Alimentarius definition of "high source" (30 percent of "Nutrient Reference Value" [NRV]) was employed. However, as the project evolved, this resulted in some counterintuitive classifications in some data sets; e.g., mango was not consistently classified as vitamin A-rich, tomato was not consistently classified as vitamin C-rich. Therefore, in the current analysis, the Codex Alimentarius definition of "source" (15 percent of NRV) was employed.[38]

The discussions and decisions are reflected in the food groupings shown in **Table A**. Four sets of food groups are listed, which were summed to form 6-group, 9-group, 13-group, and 21-group diversity indicators. For each set of food groups (6, 9, 13, and 21 groups), two indicators were constructed. The first counted a food group as eaten if at least 1 g was consumed; these are referred to as FGI-6, FGI-9, FGI-13 and FGI-21. The second counted the food group if at least 15 g was consumed; these are referred to as FGI-6R, FGI-9R, FGI-13R and FGI-21R, the "R" denoting the 15-g restriction. Thus, a total of eight FGIs were constructed. Grams of intake were assessed based on foods as eaten (e.g., raw, cooked). At present, only the two most aggregated indicators – FGI-6 and FGI-9 – can be constructed from the DHS questions. However, with slight modification in a future round, FGI-13 could be constructed.[39]

[37] The exception to this is red palm oil/palm nut pulp, which is very rich in vitamin A. When these are consumed they should be coded as vitamin A-rich fruits for the purposes of constructing diversity variables. There were no red palm products consumed by the women in the Bangladesh study sample.

[38] For definition of "source" and "high source," see Codex Alimentarius Commission, Guidelines adopted 1997, revised 2004; for definition of NRV: Codex Alimentarius Commission, Guidelines adopted 1985, revised 1993.

[39] In order to construct the FGI-13, questions would need to be added for small fish eaten whole, and for vitamin C-rich fruits and vitamin C-rich vegetables.

Table A. Food Groups Summed in Diversity Indicators [a, b]

6-group indicators	9-group indicators	13-group indicators	21-group indicators
All starchy staples	All starchy staples	All starchy staples	Grains and grain products
			All other starchy staples
All legumes and nuts	All legumes and nuts	All legumes and nuts	Cooked dry beans and peas
			Soybeans and soy products
			Nuts and seeds
All dairy	All dairy	All dairy	Milk/yogurt
			Cheese
Other animal source foods	Organ meat	Organ meat	Organ meat
	Eggs	Eggs	Eggs
	Flesh foods and other miscellaneous small animal protein	Small fish eaten whole with bones	Small fish eaten whole with bones
		All other flesh foods and miscellaneous small animal protein	Large whole fish/dried fish/shellfish and other seafood
			Beef, pork, veal, lamb, goat, game meat
			Chicken, duck, turkey, pigeon, guinea hen, game birds
			Insects, grubs, snakes, rodents and other small animals
Vitamin A-rich fruits and vegetables	Vitamin A-rich dark green leafy vegetables	Vitamin A-rich dark green leafy vegetables	Vitamin A-rich dark green leafy vegetables
	Other vitamin A-rich vegetables and fruits	Vitamin A-rich deep yellow/orange/red vegetables	Vitamin A-rich deep yellow/orange/red vegetables
		Vitamin A-rich fruits	Vitamin A-rich fruits
Other fruits and vegetables	Other fruits and vegetables	Vitamin C-rich vegetables	Vitamin C-rich vegetables
		Vitamin C-rich fruits	Vitamin C-rich fruits
		All other fruits and vegetables	All other vegetables
			All other fruits

[a] For each set of food groups (6, 9, 13, and 21 groups), two indicators were constructed. The first counted a food group as eaten if at least 1 g was consumed; the second counted the food group if at least 15 g was consumed; thus, a total of eight FGIs were constructed. Grams of intake were assessed based on foods as eaten (e.g., raw, cooked).
[b] "Vitamin A-rich" is defined as > 60 RAE/100g; "vitamin C-rich" is defined as > 9 mg/100g; these represent 15 percent of the NRV.

5.8. A SUMMARY MEASURE OF DIET QUALITY: MEAN PROBABILITY OF ADEQUACY

The WDDP used the probability approach to assess nutrient adequacy for a population; this approach incorporates information (or assumptions) both about the distribution of nutrient requirements in the population, and about day-to-day (intra-individual) variation in nutrient intake.[40] The probability approach has replaced earlier methods of assessing adequacy, which did not incorporate such information and have been shown to yield incorrect assessments. The approach is appropriate, given the ultimate objective of this work, which is to develop simple indicator(s) for use at population level.

In order to use the probability approach, the entire distribution of requirements should be known. The method appears to be robust to misspecification of variance, so long as the distribution is symmetric (however, requirements are known to be nonsymmetric for iron). The PA associated with "usual intake" is calculated for each member of the group, and the prevalence of adequacy is estimated as the average of the probabilities. In practice, the usual intake can be estimated from repeated 24-h recalls. Once PA is estimated for all nutrients, these can be averaged across nutrients to construct a MPA. This average, in turn, can be correlated with dietary diversity indicators, and further analyses performed.

5.9. SUMMARY OF ANALYTICAL APPROACH AND STATISTICAL METHODS

Applying the WDDP analysis protocol to the Bangladesh study sample, we completed the following six main tasks:

1. Derived a set of eight simple candidate indicators of dietary diversity for adult women, such as could be based on a single day's food group recall (see **Section 5.7**)
2. Constructed the summary indicator "MPA," incorporating information on nutrient requirement distributions and on day-to-day variability in intakes (see **Section 5.8** and details below)
3. Assessed distributions of variables and transformed as needed to approximate normal distributions
4. Used correlations and simple linear regressions to describe relationships between the various dietary diversity indicators, energy intake and MPA
5. Tested the performance of simple one-day dietary diversity indicators in predicting micronutrient adequacy of the diet as measured by MPA, using receiver-operating characteristic (ROC) analysis
6. Assessed indicator qualities (sensitivity, specificity and total misclassification) for several cutoffs of MPA, at various diversity cutoffs

For all statistical tests, values of $P < 0.05$ were considered significant. Nonparametric tests were used when testing differences between skewed variables, such as in tests of differences in median energy and nutrient intakes for lactating and NPNL women. Chi-square tests were used for comparisons of categorical variables.

The second task – construction of MPA – required a series of steps that can be summarized as follows:[41]

- Transformed nutrient intakes: Since nutrient intakes are nearly always skewed, intake distributions were adjusted to approximate normal. We used a Box-Cox transformation (a power transformation) for each nutrient. Transformation parameters used with each nutrient are presented in **Table 8**.[42]
- Calculated individual and population means for intakes of each nutrient, using the transformed variables (note that some individuals had only one observation).
- Calculated within- and between-person variances were calculated for the transformed intake variables.
- Using these variances, calculated the "best linear unbiased predictor" (BLUP) of the *usual* intake for each nutrient, for each woman.

[40] Barr, Murphy and Poos 2002; IOM 2000a.
[41] See Arimond et al. revised October 2008, Arimond et al. March 2008 and Joseph 2007 for a more detailed description of construction of MPA.
[42] Distributions of the food group diversity indicators were considered acceptable (approximately normal) for use without transformation in correlations and regressions.

- Using the BLUPs, calculated the PA for iron (NPNL women) from the table in **Appendix 6**; also calculated the PA for calcium using the method of Foote et al.[43] (also described in **Appendix 6**).
- With the exception of calcium, and of iron for NPNL women, information on the distribution of requirements (CV/SD) is available and distributions are assumed to be approximately normal. For these remaining nutrients and iron for lactating women, we needed to transform the requirement distributions using the same power transformation as selected above for each nutrient. We did this by generating a random normal variable (with "n" = 800) to simulate the requirement distribution; this distribution was then transformed.
- The PA for each nutrient (excluding calcium, and iron for NPNL women) was then calculated. Then all PA, including iron and calcium, were averaged to form MPA. The distribution of MPA was also transformed to approximate normality. The untransformed values are presented in descriptive tables, and the transformed variable was used in correlation and regression analyses.

[43] 2004.

6. Results

Results presented in this section are organized as follows:

1. Characteristics of women, and energy and macronutrient intakes
2. Description of dietary patterns
3. Distributions of micronutrient intakes and food group diversity scores
4. Micronutrient intakes and adequacy
5. Contributions of food groups to nutrient intakes
6. Relationship between diversity indicators and estimated intakes of individual micronutrients
7. Relationship between energy from specific food groups and mean probability of adequacy
8. Relationship between diversity indicators and total energy intake
9. Relationship between diversity indicators and mean probability of adequacy
10. Performance of diversity indicators using selected cutoffs for mean probability of adequacy

Most tables and figures are presented in separate sections following the text. Results are presented separately for lactating women (Tables L1, L2, etc. in **Appendix 2**) and NPNL women (Tables N1, N2, etc. in **Appendix 3**); these results for physiological sub-groups follow the results for the entire sample (Table 1, Table 2, etc. in **Appendix 1**). Where relevant, differences between physiological sub-groups were tested for significance; test results are reported in the text. A subset of tables reporting data for the second observation day (R2) only are included in **Appendix 4** and are referred to as Table A4-1, etc.

6.1. CHARACTERISTICS OF WOMEN, AND ENERGY AND MACRONUTRIENT INTAKES

Descriptive statistics are presented in **Table 1** for the full sample (n = 412, R1) and in **Table A4-1**[44] for R2 (n = 147). Mean age in the sample was 31-33 years and did not vary between R1 and the R2 sub-sample. Average age among lactating women was lower (28 years at R1; $P < .001$). Women's heights and weights did not vary between rounds and reflected small stature, with an average height of 150 centimeters (cm) and an average weight of 42-43 kilograms (kg). These anthropometric characteristics were similar for lactating and NPNL women.

Approximately half of the women had low BMI (less than 18.5) at the time of the first observation (R1), while 60 percent of the sub-sample measured in R2 had low BMI ($P < 0.05$). This could reflect either seasonal change or a nonrepresentative sub-sample, and it is not possible to distinguish the two. In R1, fewer lactating women had very low BMI (14 percent vs. 21 percent of NPNL with BMI less than 17.0), but a higher proportion had BMIs in the 17.0-18.49 range ($P = 0.05$ for overall chi-square test). The proportion with normal BMI (18.5-24.9) was the same for the two physiological groups, at 50 percent.

Median energy intake was 2,162 kilocalories (kcal) for R1 and 2,244 for R2, with a wide range in each round (1,011-3,599 in R1; 1,067-3,643 in R2) (**Table 2** and **Table A4-2**); energy intakes were not significantly different between rounds. Energy intakes were higher for lactating women (R1 median of 2,360 kcal vs. 2,083 kcal; $P < 0.001$). In the absence of information on physical activity, adequacy of energy intakes is difficult to assess. Estimated energy requirements depend on BMR (which, in turn, depends on age, height, weight and body composition) and, critically, on time spent at varying levels of physical activity. For example, for an 18-29 year-old woman weighing 45 kg, estimated daily average energy requirements vary from 1,650 kcal to 2,550 kcal, depending on her level of physical activity.[45] Median intakes for our sample of slightly smaller women fell near the mid-point of that range.

Median intake of protein (51-53 g) was moderately low and fat intake (12-13 g) was very low; protein intakes were higher among lactating women (59 g in R1; $p < 0.01$). More than 80 percent of energy intake was from carbohydrates, with protein contributing ten percent, compared to a WHO[46] population-level recommendation of 10-15 percent. However, only two percent of energy was from animal-source protein,

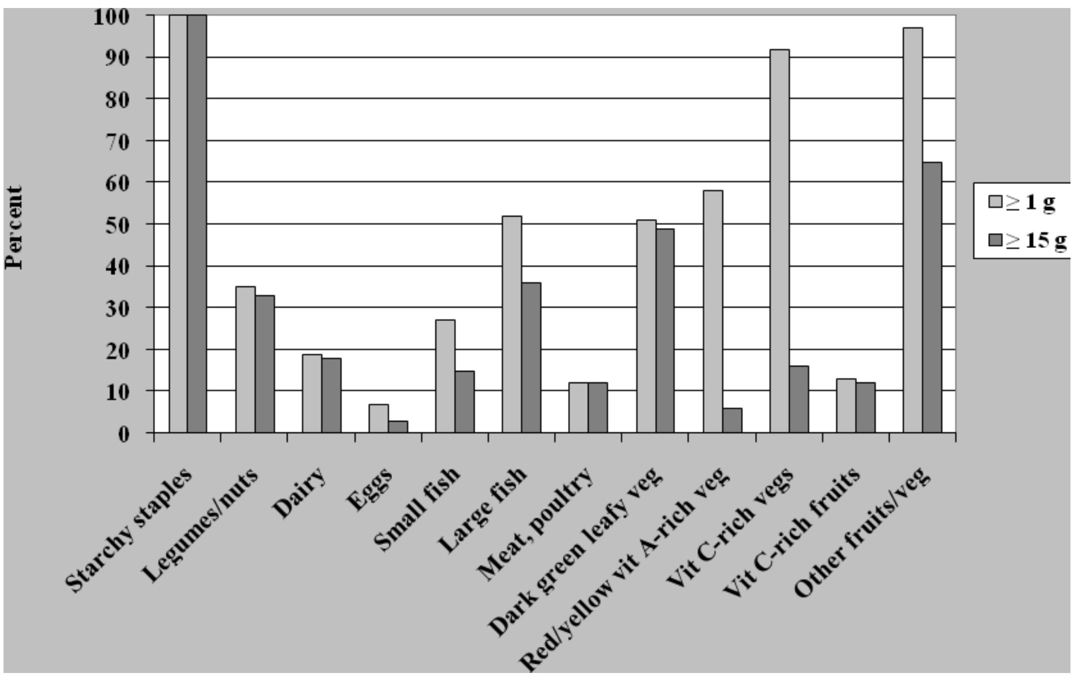
[44] See Appendix 4.
[45] FAO/WHO/UNU 2001.
[46] 2003.

which is generally of higher quality than plant-source protein. Fat intake provided only six percent of total energy intake, compared to the WHO population-level recommendation of 15-30 percent. The proportion of energy from carbohydrates, protein and fat did not differ by round, or between lactating and NPNL women.

6.2. DESCRIPTION OF DIETARY PATTERNS

Dietary patterns from R1 are detailed in **Tables 3-7**. **Tables 3a-d** and **Figure A**, below, show the proportion of women who consumed each food group on the first recall day.[47] **Table 3a** shows results when foods are grouped into 6 major groups, **Table 3b** shows 9 groups, **Table 3c** shows 13 groups and **Table 3d** shows 21 groups. Each table and the figure also illustrate differences between the 1 g cutoff for "counting" as having eaten the food group, and the 15 g cutoff.

Figure A. Food Groups Consumed with Two Lower Limits for Defining Consumption, All Women, Round 1



Patterns for lactating and NPNL women were similar for many food groups, and at the highest level of aggregation, there were no differences by physiological status. More disaggregated tables show that a higher proportion of lactating women consumed at least 1 g of small fish (37 percent vs. 24 percent of NPNL women) and of vitamin A-rich yellow/orange/red vegetables (70 percent vs. 53 percent; P-values were < 0.01 for these comparisons). However, when the 15 g cutoff was used, a significant difference by physiological group was only found for small fish (P < 0.05). Because overall patterns for lactating and NPNL women were similar, results for all women are described in the text below.

At the highest level of aggregation (**Table 3a**), all women reported consuming starchy staples, approximately one in three reported consuming legumes/nuts, and one in five had dairy. For these three food groups, there were no substantial differences between the 1 g and the 15 g cutoffs; that is, those

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[47] The food groups in Figure A do not correspond exactly with FGI-13 groups or with FGI-21 groups. Several disaggregated food groups, included only in FGI-21, were selected to allow illustration of all groups where the 1 g vs. the 15 g minimum made a substantial difference.

who had 1 g of these foods also tended to have at least 15 g. For the other food groups, the cutoff made a difference. Using the 1 g cutoff, 75 percent reported consuming other (nondairy) animal source foods; this dropped to 59 percent when the 15 g cutoff was imposed. The difference for vitamin A-rich fruits and vegetables was even greater, with a drop from 85 percent (1 g cutoff) to 58 percent (15 g cutoff). "Other fruits and vegetables" dropped from 100 percent to 82 percent.

Tables 3b-d provide further disaggregation of food groups and show that the differences described above can be traced to the following food sub-groups: large fish, small fish eaten whole, vitamin A-rich yellow/orange/red vegetables, vitamin C-rich vegetables, and "all other vegetables." Differences were extremely large for the vitamin A-rich yellow/orange/red vegetables (dropping from 58 percent to six percent when the 15 g minimum was imposed) and vitamin C-rich vegetables (dropping from 92 percent to 16 percent). These differences were entirely due to consumption of red and green chili peppers, and garlic; all three were consumed by a majority of women. Fruits and animal-source foods other than fish were more likely to be eaten in quantities of at least 15 g.

Tables 4a-d describe quantities consumed from each food group, both for all women and for those consuming the food group, with **Table 4a** showing the least disaggregated grouping (six groups) and so on, as for **Tables 3a-d**. **Table 4a** once again shows a diet dominated by staple foods, with median intake of 1,861 kcal from starchy staples. Looking across all women, no other food group had a median intake higher than 38 kcal. Even among those consuming the other food groups, most food groups contributed few kcal (104 kcal from legumes/nuts, 67 kcal from dairy, 61 kcal from other animal source foods, and approximately 50 kcal from fruits and vegetables).

Further disaggregation (**Tables 4b-d**) shows the same picture, with no food group other than starchy staples providing substantial kcal when considering the whole sample. However, the disaggregated tables show that some groups, when eaten, were eaten in substantially larger amounts than others. For example, when red meat was eaten, a moderate amount was consumed (median 56 g / 85 kcal), whereas when small fish eaten whole were consumed, the amounts were trivial (median 17 g / 19 kcal). Similarly, the vitamin A-rich yellow/orange/red vegetables and the vitamin C-rich vegetables were eaten in trivial amounts (medians of 4-6 g and 4-9 kcal). Aside from chili peppers and garlic (eaten by over half of the women and rich in vitamins A [red chili] and C [green chili, garlic]), a few women had okra or yam stem, one woman had cabbage, and one woman had radish (all rich in vitamin C). Similarly, a few women had pumpkin and one woman had plantain flower (both rich in vitamin A). Clearly, in this population, results for these two food groups reflect intake of chilies and garlic.

Aside from staple food consumption, results for lactating women were again very similar to those for NPNL women. Lactating women consumed more staple foods (2,057 kcal vs. 1,793 kcal for NPNL women, $P < 0.01$). This difference in staple food consumption accounted for approximately 95 percent of the 277 kcal gap in median energy intake between the two groups. The only other difference was a tendency for lactating women to eat larger quantities of flesh foods (*excluding* the small fish) when they consumed these foods (median intake of 77 kcal vs. 47 kcal for NPNL women who consumed these foods, $P < 0.05$). Among consumers, both groups consumed small quantities of small fish and red chilies, but, as noted above, a higher proportion of lactating women consumed these.

Table 5 presents mean and median scores for all eight food group diversity indicators. Scores for the first, 6-food group indicator (FGI-6), ranged from 2 to 6; when the 15 g cutoff was imposed (FGI-6R), the scores ranged from 1-6. Unlike the 6-group scores, scores for the other 6 indicators did not range to the highest possible score. Consistent with this, medians for the most aggregated indicators fell at mid-point or higher on the possible scale (4.0 and 3.0 for FGI-6 and FGI-6R, respectively) whereas medians for the other indicators fell well below the halfway point for possible scores (e.g., only 4.0 for FGI-21R). Scores for lactating and NPNL women did not differ.

Table 6 shows the percent of observations at each score for each indicator, and illustrates the tight clustering of scores, even on the longer (more disaggregated) indicators. For most indicators, scores clustered on a four-point range; the exception was the simplest indicator (FGI-6) where over 90 percent of women clustered on three scores.

Cross-tabulations of food group diversity scores against the individual food groups provide a picture of how diets diversify (i.e., what is the most common second food group when the score is 2, etc.; **Tables 7a-h**). Focusing on FGI-21R (**Table 7h**), it appears that the most common "second" food groups were dark green leafy vegetables (39 percent) and "other vegetables" (22 percent). At scores of 3, "other starchy staples" (largely potatoes; 37 percent) and large whole fish/dried fish/shellfish/seafood (27 percent) were most likely to be added (in addition to those mentioned at a score of 2). At scores of 4, legumes (13 percent), dairy (15 percent), small fish eaten whole with bones (11 percent), vitamin C-rich vegetables (15 percent), vitamin C-rich fruits (10 percent), and "other fruits" (15 percent) were added. Diets continued to diversify as scores increased; however, there were a number of food groups that were never reported by a substantial proportion of women.

6.3. DISTRIBUTIONS OF MICRONUTRIENT INTAKES AND FOOD GROUP DIVERSITY SCORES

Intake distributions for most nutrients, as well as intra-individual standard deviations of intake, were strongly skewed (**Figures 1-22**); this is typical in most settings. Nutrient intake distributions were therefore transformed prior to further analysis. In contrast, distributions for all eight diversity indicators (**Figures 23-30**) were generally normal but "lumpy," as the scores are not truly continuous (i.e., there are only whole number scores).

6.4. MICRONUTRIENT INTAKES AND ADEQUACY

R1 median micronutrient intakes (**Table 8**) were well below the EARs for most B vitamins and for iron, and calcium intake was well below the AI. Median intakes for vitamins A, B6 and C and for zinc were above EARs. With the exception of vitamin B12 and zinc, micronutrient intakes were generally slightly lower in R2; differences were statistically significant for all nutrients except niacin, calcium and zinc. Relationships to EAR were similar, except for vitamins A and C, where the median intakes dropped below the EAR.

Median micronutrient intakes were similar for lactating and NPNL women, with the exception of thiamin, niacin, vitamin B6 and zinc. Intakes of these four nutrients were higher among lactating women; vitamin A intakes were also higher, but the difference was not significant (P = 0.37, nonparametric test of equality of medians).

The estimated PA incorporates information from both survey rounds. Distributions for PAs (**Figures 31-41**) show many women with PAs below 0.30 for many micronutrients; this is especially true for lactating women (**Figures L31-41**). Because a probability cannot exceed 100 percent, PAs range up to 1.0 and even very high intakes would be evaluated as a PA of 1.0. Therefore distributions of some nutrients also show a spike at 1.0. When averaged across all women, the PA is equivalent to a population-level estimate of prevalence.[48]

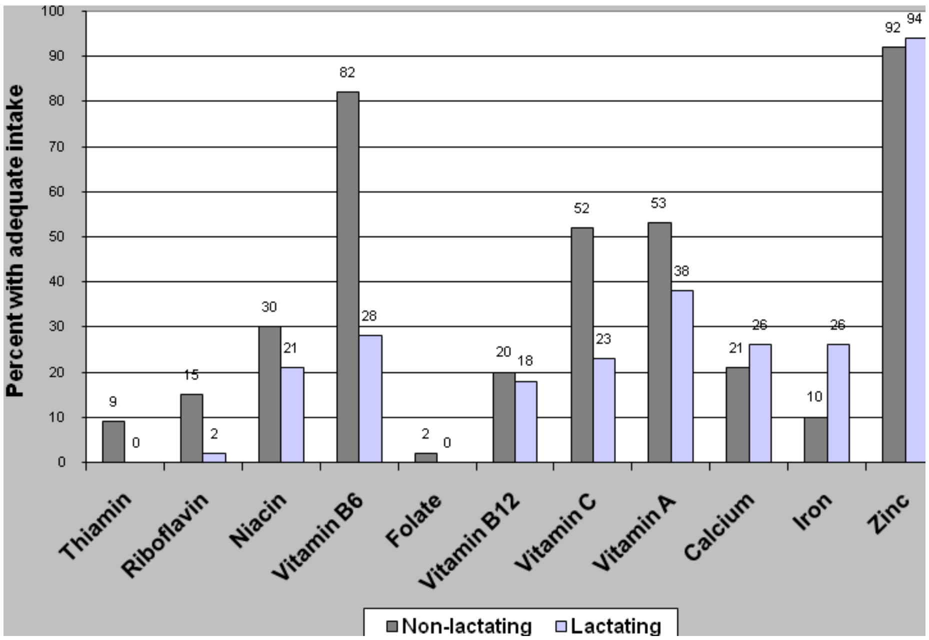
When all women in the sample were grouped together, these estimates of prevalence of adequate intake ranged from very low (1-15 percent) for thiamin, riboflavin, folate and iron; to low (19-28 percent) for niacin, vitamin B12 and calcium; to moderate (49-67 percent) for vitamins A, B6 and C; to high (93 percent) for zinc (**Table 8**). **Figure B**, below, shows the prevalence of adequate intake for lactating and NPNL women separately. Estimated prevalence of adequacy was lower for lactating women for most nutrients, due to higher requirements. PA was at or near zero for folate for all women, and at or near zero for thiamin and riboflavin for lactating women. Among NPNL women only two nutrients had a prevalence of adequate intake substantially above 50 percent (vitamin B6 and zinc); among lactating women this was true only for zinc.

Appendix 7 presents alternate tables, assuming low absorption for both iron and zinc. As noted, there is clear justification for assuming "intermediate" absorption for zinc. For iron, the case is less clear, but on

[48] IOM 2000a.

balance seemed justified. **Table 8** shows the implications of this judgment: when low absorption is assumed, estimated prevalence of adequacy for iron drops from 14 percent to one percent for the entire sample, from ten percent to zero percent for NPNL women, and from 26 percent to three percent for lactating women. Whether low or intermediate absorption is assumed, it is clear that iron intakes are very far from adequate for this group of women.

Figure B. Estimated Prevalence of Adequate Intake for 11 Micronutrients, by Physiological Group [a]



[a] Estimated prevalence was calculated taking into account intakes in both rounds of data collection.

6.5. CONTRIBUTIONS OF FOOD GROUPS TO NUTRIENT INTAKES

Tables 9a-d show the contributions of each of the food groups to intakes of energy, and macro- and micronutrients at R1. Since rice dominates the diet, starchy staples contribute 86 percent of total energy and 70 percent of the total protein. Starchy staples also provide more than half of the thiamin (62 percent), riboflavin (53 percent), niacin (67 percent), vitamin B6 (62 percent), and zinc (75 percent) in the diet. Both starchy staples (43 percent) and dark green leafy vegetables (20 percent) contribute to iron intakes. Vitamin B12 is provided primarily by fish (74 percent) and dairy (11 percent). Multiple food groups contribute to intakes of each of the other nutrients, with the following main sources, in order of percent contribution for each nutrient (those groups contributing at least 10 percent of total intake are shown):

- Folate: Starchy staples, dark green leafy vegetables, legumes/nuts, other fruits and vegetables
- Vitamin A: Dark green leafy vegetables, vitamin A-rich yellow/orange/red vegetables
- Vitamin C: Dark green leafy vegetables, vitamin C-rich vegetables, starchy staples, other fruits and vegetables
- Calcium: Dark green leafy vegetables, starchy staples, large fish, small fish with bones

Note that dairy products – usually the most important source of calcium – contribute only six percent to intakes in this sample.

Patterns were very similar for lactating and NPNL women, with two differences. Despite being eaten in very small quantities, small fish provided a larger share of their vitamin B12 (34 percent vs. 20 percent for NPNL women). Similarly, vitamin A-rich yellow/orange/red vegetables provided a larger share of their vitamin A intake (38 percent vs. 29 percent for NPNL women).

6.6. RELATIONSHIP BETWEEN DIVERSITY INDICATORS AND ESTIMATED INTAKES OF INDIVIDUAL MICRONUTRIENTS

When the whole sample (lactating and NPNL women) was considered together, all eight diversity indicators were positively and significantly associated with estimated intakes of each micronutrient (**Table 10**). This remained true when energy was controlled for. Correlations for the simplest indicator (FGI-6) ranged from 0.16 to 0.48 and from 0.11 to 0.44 when energy was controlled for. Several of the more disaggregated indicators had somewhat higher correlations. For example, for FGI-9R, correlations ranged from 0.24 to 0.50, and from 0.24 to 0.45 when energy was controlled for. Correlations dropped most, when energy was controlled for, for those nutrients where starchy staples were the largest source (thiamin, riboflavin, niacin, vitamin B6, zinc and iron).

Results for lactating and NPNL women followed similar patterns, but correlations tended to be higher for NPNL women. For lactating women, several correlations were not significant (vitamin C and FGI-6 and FGI-9; vitamin A and FGI-21 and FGI-21R) (**Tables L10** and **N10**).

6.7. RELATIONSHIP BETWEEN ENERGY FROM SPECIFIC FOOD GROUPS AND MEAN PROBABILITY OF ADEQUACY

Examination of the distribution of MPA for all women (**Figure 42**) and for NPNL women (**Figure N42**) shows a wide range across the possible scale of 0-1.0, with sufficient variability to allow exploration of associations with food groups and food group diversity, etc. However, the distribution for lactating women (**Figure L42**) had far less variability, with the majority of values very low. Median MPA was 35 percent for NPNL women and only 23 percent for lactating women. Distribution of MPA was skewed, and the MPA variable was transformed for use (below) in correlations and regressions. However, it was not possible to find an adequate transformation of MPA for lactating women.

Section 6.5 described the contributions of food groups to intakes of specific nutrients. One way to assess the contribution of food groups to intakes across all micronutrients is to look at associations (correlations) between energy intake from each food group and MPA (**Tables 11a-d**). These correlations reflect both the frequency and quantity of intake from each group, as well as the nutrient density of the foods consumed and the variability observed in MPA.

At the highest level of aggregation (**Table 11a**), intakes from all six major food groups were positively and significantly associated with MPA, with correlations ranging from 0.16-0.20 (legumes/nuts, dairy, and other fruits and vegetables) to 0.49 (dark green leafy vegetables). The more disaggregated food groupings (**Tables 11b-d**) provide a more specific look at which food groups related most strongly to MPA. The strongest correlations, in decreasing order (**Table 11d**), were with dark green leafy vegetables, grains/grain products, nuts and seeds, small fish, large fish, and dairy. Correlations with energy from most of the other fruits and vegetable groups were also significant.

Tables 11a-d also illustrate how the relationship between food groups and MPA was modified when energy was controlled for. In this case, the relationship between grains/grain products and MPA became negative – in other words, increases in intake from this group were associated with lower micronutrient density. The direction of association remained positive for all other food groups, indicating that increases in intake of these food groups were associated with higher diet quality (defined as micronutrient adequacy) and with micronutrient density of the diet. For dark green leafy vegetables, the correlation increases, indicating that this food group in particular improves micronutrient density.

Tables L11a-d show that results are less consistent for lactating women. That is, correlations with MPA were not observed for energy from several food groups. For lactating women, the strongest correlations were the negative correlation for energy from staple foods (when energy is controlled for) and positive correlations for dark green leafy vegetables and for small fish.

6.8. RELATIONSHIP BETWEEN DIVERSITY INDICATORS AND TOTAL ENERGY INTAKE

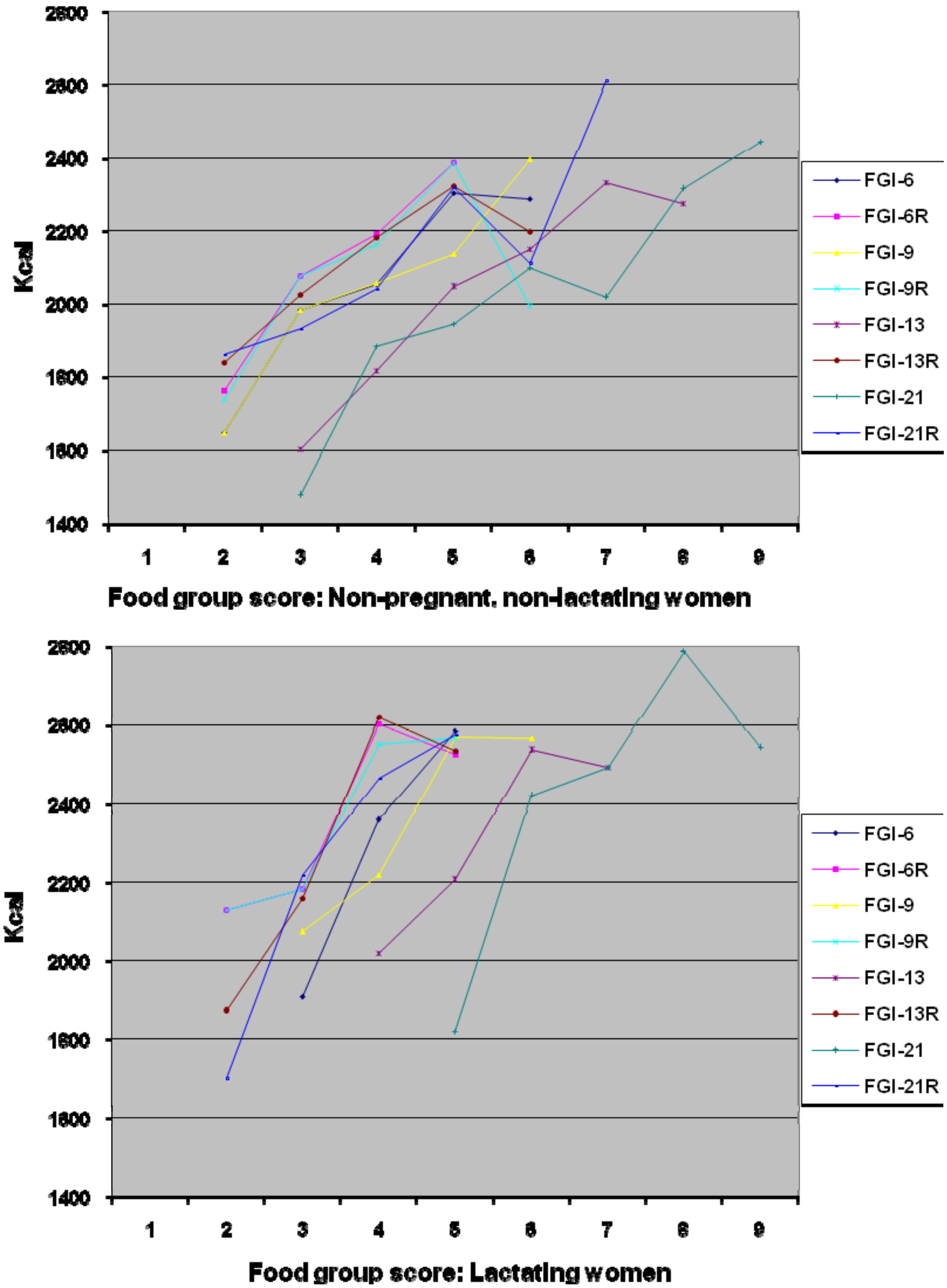
Each of the food group diversity indicators was also positively and significantly correlated with energy intake. These relationships are illustrated in **Figure C**, below, and in **Tables 12-13**. Correlations increased somewhat with increasing disaggregation of food groups, particularly for NPNL women (**Tables N12-13**). Correlations did not increase for a given level of disaggregation (set of food groups) when the 15 g minimum requirement was imposed (**Table 13**). However, as would be expected, values were higher for any given diversity score when the 15 g requirement is imposed (see **Figure C**). Overall, correlations were moderate, ranging from 0.19 to 0.33, depending on indicator and physiological group.

6.9. RELATIONSHIP BETWEEN DIVERSITY INDICATORS AND MEAN PROBABILITY OF ADEQUACY

Section 6.6 described positive associations between food group diversity indicators and individual nutrient intakes and showed associations with each nutrient. **Section 6.7** described positive associations between energy intakes from many individual food groups and MPA. Given these, it is not surprising that the various food group diversity indicators were also significantly and positively associated with MPA (**Figure D**, below, and **Tables 14-15**).

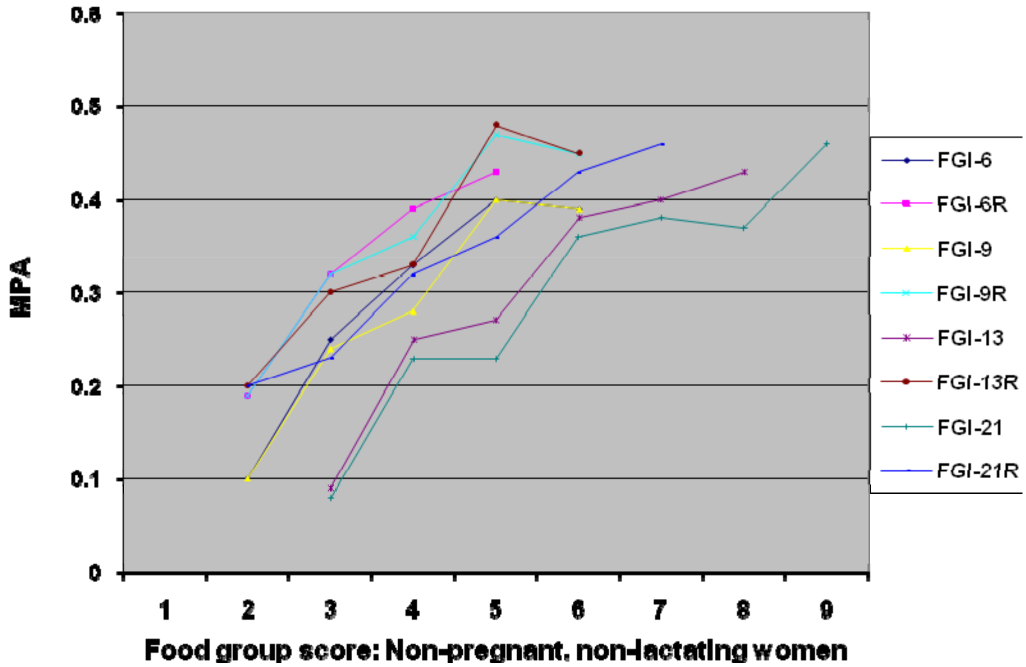
Each of the eight indicators was significantly and positively associated with MPA; correlations were slightly attenuated when energy was controlled for. Correlations were stronger for NPNL women (**Tables N14-15**), ranging from 0.39-0.52 (0.32-0.46 controlling for energy) as compared to a range of 0.28-0.41 for lactating women (0.15-0.35 controlling for energy) (**Tables L14-15**). **Figure D** also highlights the very low range for MPA for lactating women.

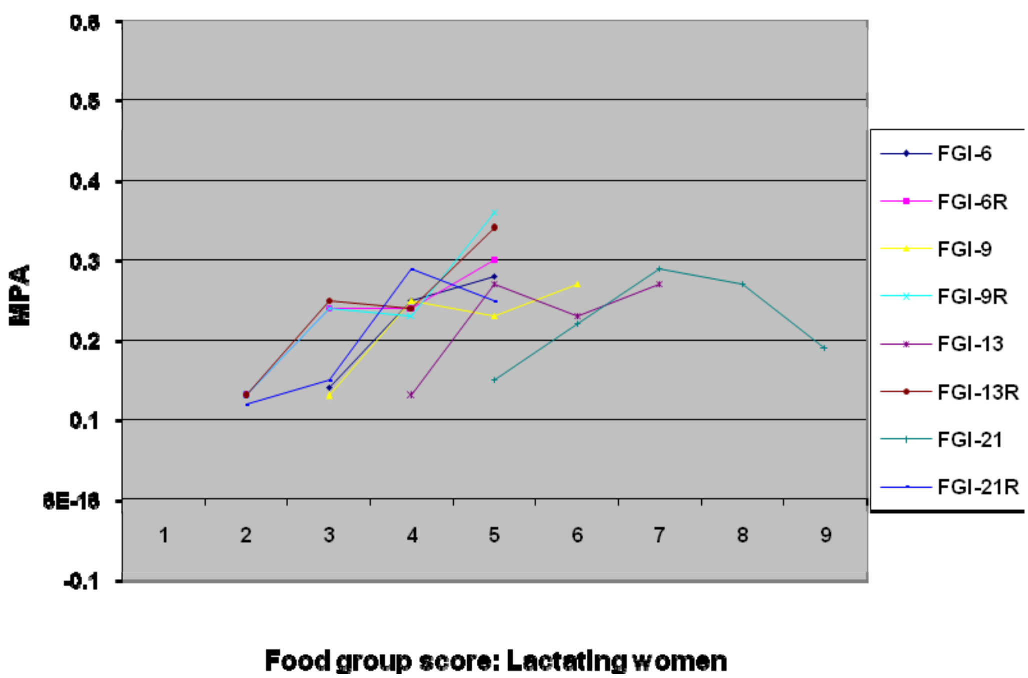
Figure C. Total Energy Intake (kcal) by Food Group Scores for Various Diversity Indicators, by Physiological Group [a, b]



[a] Data points representing fewer than 10 observations are omitted.
[b] FGI-6 is the food group indicator with 6 groups, FGI-9 has 9 food groups, FGI-13 has 13, and FGI-21 has 21. FGI-6R has 6 groups, with at least 15 g consumed in order for each group to "count." Similarly, FGI-9R, FGI-13R and FGI-21R have the same 15 g requirement in order for a food group to "count."

Figure D. Mean Probability of Adequacy by Food Group Scores for Various Diversity Indicators, by Physiological Group [a, b]





[a] Data points representing fewer than 10 observations are omitted.
[b] FGI-6 is the food group indicator with 6 groups, FGI-13 has 13 food groups, and FGI-21 has 21. FGI-6R has 6 groups, with at least 15 g consumed in order for each group to "count." Similarly, FGI-13R and FGI-21R have the same 15 g requirement in order for a food group to "count."

In contrast to the relationship between diversity and energy, increasing disaggregation did not consistently increase correlations. For NPNL women, the strongest correlation was with FGI-9R (the 9-food group indicator where at least 15 g must be eaten in order for the group to "count" in the score), closely followed by FGI-13R (**Table N15**). For lactating women, the strongest correlations were also with FGI-9R and FGI-13R (**Table L15**). In contrast to the relationship with energy, imposing the 15 g requirement *did* consistently result in substantially higher correlations for each level of aggregation and both physiological groups. In addition, as for energy intake, at any given level of diversity MPA was higher for the 15 g indicator than for the corresponding 1 g indicator. For example, for NPNL women with a score of 5, the median MPA was 0.27 for FGI-13 and 0.48 for FGI-13R (**Table N14**).

Table N16 provides another way of looking at the relationship between the diversity indicators and MPA, for NPNL women. Simple linear regressions showed that the food group diversity scores were consistently significant in models controlling for the woman's height and age.[49] This remained true (and overall explanatory power increased) when total energy intake was included in the model. When all women were included in the models, the coefficients for lactation were negative and significant, as would be expected based on the descriptive results. The overall explanatory power of the models was lower when NPNL women were considered separately; the adjusted R^2 ranged from 0.16-0.27. When energy was included in the models, the adjusted R^2 increased to 0.32-0.39. As for correlations, the highest adjusted R^2 values are observed for FGI-9R, but results for FGI-13R were very similar.

6.10. PERFORMANCE OF DIVERSITY INDICATORS USING SELECTED CUTOFFS FOR MEAN PROBABILITY OF ADEQUACY

Below, we provide a discussion of the Bangladesh indicator performance results. However, testing indicator performance for assessment of the micronutrient adequacy of the diet is most useful when results for standard indicators are compared across a wide range of sites. As noted earlier, the comparative results of indicator performance are reported in the WDDP summary report[50] and allow for firmer conclusions regarding the general usefulness of the indicators.

Because diet quality is so poor for the women in this sample from Bangladesh, there is no way to assess the predictive power of the diversity indicators to identify women with high MPA; only two women had an MPA greater than 80 percent (**Table 17**). We therefore explored indicator characteristics at cutoff points of greater than 50 percent, greater than 60 percent, and greater than 70 percent MPA for NPNL women, but note that these cutoffs (particularly the first two) cannot be considered to define adequate diets. For lactating women, only five percent of the women (six individuals) had an MPA greater than 50 percent, and only one woman out of the 111 had an MPA greater than 60 percent, so indicators could not be evaluated for this sub-group.

The overall performance of each indicator (at each MPA cutoff) is summarized by the "area under the curve" (AUC) derived from ROC analysis. As a rule of thumb, an AUC $\geq$ 0.70 can be considered to reflect an indicator with some potential. All eight diversity indicators had AUC significantly different from 0.50, which represents the null hypothesis of "no predictive power" (**Table N18**). The four indicators with the 15 g restriction all had AUC exceeding 0.70 at the 50 percent MPA cutoff. At the 60 percent and 70 percent MPA cutoffs, the AUC for seven of the eight indicators exceeded 0.70 (the exception was FGI-6). Overall, the AUCs for all women varied from 0.59 (FGI-6 at MPA greater than 50 percent) to 0.84 (FGI-13R at MPA greater than 60 percent).

[49] Regressions were performed with and without a "robust" option, to rule out problems with heteroskedasticity. Results were identical, indicating that the assumption of no heteroskedasticity is valid. Residual plots were examined and distributions of residuals were tested for normality. For NPNL women, residuals were normally distributed. For the sample of all women, regression diagnostics were more mixed but on balance were judged appropriate to proceed with linear regression for the full sample. The distribution of MPA for lactating women could not be transformed to approximate normal. Regression analysis was performed but residuals were non-normally distributed in a majority of the models for the various indicators; therefore regression results for lactating women are not reported.

[50] Arimond et al. 2009.

In comparing indicators, it is also useful to assess which AUC are significantly different from others. **Table N19** compares all indicators and identifies statistically significant differences. These comparisons are consistent with results for correlations and regressions, and show that FGI-6 performed worst at all MPA cutoffs. In a number of cases, the indicators with the 15 g minimum requirement had significantly higher AUCs than did the corresponding indicators without this requirement. The 21-group indicators generally did not perform as well as FGI-13R. While some differences were not significant, the picture that emerges is of best performance by FGI-6R, FGI-9R and FGI-13R.

Finally, indicator performance can be assessed through examining characteristics of indicator quality – sensitivity, specificity and total misclassification – across a range of cutoffs for varying levels of diversity, and for both MPA cutoffs (**Tables N20a-h**). **Box 1** provides an explanation of indicator characteristics, specifically as used in this context.

Box 1. Predicting Higher Diet Quality: Indicator Characteristics

Because we are trying to "predict" higher (better) MPA (above the cutoff), indicator characteristics have different interpretations than they do when the aim is to assess risk, which is the more standard use in epidemiology.

In this case, sensitivity assesses the proportion of all those who truly have better MPA who are identified by the indicator. Specificity assesses the proportion of those who truly have lower MPA who are identified by the indicator.

There are always trade-offs between sensitivity and specificity; which one should be "favored" depends on the intended uses of the indicator and sometimes on other factors, such as level of resources available for helping those identified as in need. For the purposes of the WDDP – development of indicators to assess and compare diet quality for women and to track change across time – it is reasonable to aim for a balance between sensitivity and specificity, but to favor specificity when trade-offs must be made. This means that we prefer to be certain to identify all those with low MPA, and are willing to accept that some women with better MPA are classified incorrectly. The alternative would be to accept more women with low MPA but classified as "better."

There are no fixed criteria for determining what absolute levels of sensitivity, specificity and misclassification may be acceptable. The costs and risks of misclassification depend on the use of the indicator. In general, yardsticks for population-level assessment may have lower requirements – i.e. more misclassification could be tolerated – than would indicators used to differentially allocate resources or to trigger action. Indicators used at the individual level (e.g., in screening) may have even higher requirements. For the purposes of the WDDP, we aimed to minimize misclassification, but considered levels of misclassification below 30 percent to be acceptable.

Tables N20a-h are, once again, consistent with results above. In examining the tables, it is useful to focus on the three indicators with the highest AUC (FGI-6R, FGI-9R and FGI-13R), and to simultaneously consider both the balance between sensitivity and specificity, and the total misclassification. Considering these, FGI-6R at a cutoff of ≥ five groups has misclassification of 25 percent for the MPA cutoff of 50 percent, dropping to 15 percent for the MPA cutoff of 70 percent. However, sensitivity is quite low (25-50 percent). The same food group cutoff (≥ five groups) also works best for FGI-9R, misclassification is similar (19-23 percent), and sensitivity is improved (44-67 percent). At this same food group cutoff, FGI-13R provides a slightly higher misclassification (22-24 percent) and still better sensitivity, but with slightly lower specificity.

In summary, across all three indicators and all three MPA cutoffs, the same food group cutoff of ≥ five provides the best balance between sensitivity and specificity while minimizing misclassification. Among the three, at the lowest MPA cutoff of 50 percent, sensitivity may be unacceptably low for FGI-6R and FGI-9R. At higher MPA cutoffs (60 percent and 70 percent), FGI-9R provides substantially better sensitivity than FGI-6R and higher specificity than FGI-13R.

7. Summary and Discussion

This report supports the potential of simple indicators of dietary diversity to function as proxy indicators of diet quality for women of reproductive age in resource-poor settings, although results for lactating women were less promising. In addition, the report provides a detailed assessment of dietary patterns and uses state-of-the-art methods to assess micronutrient adequacy for a group of poor rural women in Bangladesh. To date, few studies have employed the newer probability approach to assess micronutrient adequacy for women in resource-poor regions.

7.1. DIETARY PATTERNS

The diets of these women in rural Bangladesh, like diets of the poor in many settings, are dominated by starchy staples. In this case, starchy staples (largely rice) contributed 86 percent of total energy. Starchy staples also provided well over half of the protein, thiamin, niacin, vitamin B6 and zinc in the diets, and provided approximately half of the riboflavin and iron. Lactating women had higher energy intakes, which were mostly accounted for by higher intakes of starchy staples. The percent of energy from protein and from fat were very similar for lactating and NPNL women.

While starchy staples provided the majority of these micronutrients across the sample, results showed that women with higher intakes of starchy staples had diets with poorer micronutrient density (**Tables 11a-d**). Although other food groups were eaten in small quantities, they provided substantial proportions of the folate, vitamin A, vitamin C and calcium in the diet, and all of the vitamin B12 (because this last is found only in animal-source foods). The most nutritionally important of these other food groups, in roughly descending order of importance, were dark green leafy vegetables, fish, nuts and seeds, and dairy (**Table 11d**).

7.2. MICRONUTRIENT INTAKES AND ADEQUACY

For NPNL women, average micronutrient intakes were below – and in many cases far below – EARs for seven (R1) or nine (R2) of the 11 micronutrients assessed. Consistent with this, the estimated prevalence of adequate intake was very low for thiamin, riboflavin and folate; low for niacin, vitamin B12 and calcium; moderate for vitamins A, B6 and C; and high only for zinc. For lactating women, the picture was starker, with estimated prevalence of adequacy at or near zero for thiamin, riboflavin and folate, and under 40 percent for all other nutrients except zinc (94 percent).

The MPA provides a summary of this information and underscores the very low quality of the women's diets. Most NPNL women (80 percent) had an MPA below 50 percent; the median MPA was 35 percent. However, for NPNL women, MPA was well distributed, especially across the range of 0-50 percent (**Figure N42**); this variability allowed assessment of the relationship between food group diversity and diet quality. Among lactating women, 95 percent had an MPA below 50 percent, and the median was 23 percent. The distribution of MPA among lactating women did not allow an assessment of indicator performance for this sub-group.

7.3. RELATIONSHIPS BETWEEN FOOD GROUP DIVERSITY, DIET QUALITY AND ENERGY INTAKE

One of the most striking results from this analysis is the evidence that all eight food group diversity indicators were correlated with intakes of each of the 11 nutrients. This was true for all women (**Table 10**) and for NPNL women (**Table N10**), and there were few exceptions to this for lactating women (**Table L10**). In other words, the relationship between diversity and diet quality was not driven by a strong relationship with one or a few nutrients. In this sample, increases in food group diversity were associated with increased intake of each nutrient, despite the fact that non-staple foods were generally eaten in very small amounts. The magnitude of the correlations is meaningful. For NPNL women, these ranged from 0.27 to 0.51, depending on nutrient, for the two "best" candidate indicators for this data set (FGI-9R and

FGI-13R). For lactating women, correlations were slightly lower, and ranged from 0.22-0.47 for these same two indicators.

Each food group diversity indicator was also associated with MPA, with correlations ranging from 0.39 (FGI-6) to 0.52 (FGI-9R) for NPNL women, and from 0.28-0.41 for lactating women (**Figure D** and **Tables 15**, **N15** and **L15**). Correlations were higher for those indicators where at least 15 g must have been consumed in order for the food group to "count." The magnitude of the correlations, as well as the shape of the relationship illustrated in **Figure D**, suggests that these simple indicators provide meaningful information about diet quality (when quality is defined as micronutrient adequacy). For NPNL women, regression analyses confirmed that each of the diversity scores remain significant in models controlling for the woman's age and height. These models, which did not include energy intake, explained 16-27 percent of the variability in MPA (**Table N16**).

As has been shown in other studies,[51] our analysis indicated that each of the eight food group diversity indicators was also associated with energy intake (**Figure C** and **Tables 12-13**), with correlations ranging from 0.24 to 0.30. In contrast to the relationship with MPA, the relationship with energy intakes was not consistently higher for either physiological group. This is likely due to the fact that, unlike MPA, distributions of energy intakes are wide for both lactating and NPNL women.

In order to understand to what extent the association between diversity and MPA was related to the nutrient density of the diet, as opposed to the total quantity of food consumed, we assessed partial correlations, controlling for energy intake. Correlations, both with individual nutrients and with MPA, were slightly attenuated but remained significant and of meaningful magnitude. Each diversity indicator remained significant in regression models that included energy intake, as well as the other covariates listed above (**Table N16**), and for NPNL women, these models explained between 32-39 percent of the variability in MPA. In sum, food group diversity indicators were strongly associated with MPA both because diversity was associated with higher quantity intake (kcal) and because it was associated with higher quality intake (nutrient density).

7.4. INDICATOR PERFORMANCE

Results from a single site cannot provide guidance for development of indicators for general (global) use. However, this report is one in a technical series of WDDP reports describing site-specific results; information on indicator performance is summarized across five sites in the WDDP summary report.[52]

For this Bangladesh site, indicator performance was not evaluated for predicting diet quality for lactating women, because the very low and narrow distribution of MPA did not allow it. For NPNL women, the results summarized in the previous sections indicate that in this site, the relationship between simple food group diversity indicators and diet quality for women is both meaningful and strong. The ROC analysis, which summarizes predictive power across all possible scores for the diversity indicators, also supported this. The AUC was significant for all indicators: AUC were above 0.70 for all four "restricted" indicators at the 50 percent MPA cutoff, and were above 0.70 for all but FGI-6 at the 60 percent and 70 percent cutoffs, indicating predictive power.

However, for many policy and program purposes, continuous indicators (e.g., average food group diversity) are not useful. Instead, dichotomous indicators are needed and are used to set objectives, assess progress, etc. In order to construct dichotomous indicators, indicator cutoffs must be selected. Selection of cutoffs is informed by an examination of indicator characteristics such as sensitivity, specificity and level of misclassification.

In order to assess such characteristics, it is also necessary to define a dichotomous "gold standard" to represent "true" diet quality. In this case, that means selecting a cutoff for MPA. Ideally, the aim would be to identify a cutoff above which diets can comfortably be described as reasonably adequate. Given the

[51] Ogle, Hung and Tuyet 2001; Foote et al. 2004; Torheim et al. 2004.
[52] Arimond et al 2009.

distribution of MPA in this sample, no such cutoff is possible. For example, if a cutoff were set at 90 percent of MPA, there would be no cases above the cutoff, and indicator characteristics could not be evaluated. The highest MPA cutoff that could be evaluated in this sample was 70 percent MPA, among NPNL women. However, very few women (14 individuals) were above 70 percent MPA, so analysis at this cutoff should be interpreted with caution. Cutoffs of 50 percent and 60 percent of MPA are certainly too low to be acceptable as a definition of adequacy; arguably, 70 percent is also too low.

At these three MPA cutoffs, review of sensitivity, specificity and misclassification showed that the best trade-offs were demonstrated by three indicators: FGI-6R, FGI-9R, and FGI-13R. In all cases (all three MPA cutoffs and all three indicators), the food group diversity score associated with the best trade-offs was five or more food groups. Among the three indicators, sensitivity was lowest for FGI-6R. Sensitivity was also low for FGI-9R at the 50 percent MPA cutoff. Considering only FGI-9R (at 60 percent and 70 percent MPA) and FGI-13R (at all three MPA cutoffs), misclassification ranged from 19-24 percent, sensitivity from 61-92 percent, and specificity from 75-82 percent. These levels are acceptable for indicators of this type; that is, population-level indicators for assessment, monitoring and evaluation. If no better indicator of adequate diet quality (i.e. at higher MPA) is identified through analysis of data from other sites, and if results for other sites are similar at these lower MPA cutoffs, it is possible that an indicator of "poor" diet quality could be developed.

7.5. PRELIMINARY IMPLICATIONS FOR OPERATIONALIZING FOOD GROUP DIVERSITY

The broad objective of the WDDP is to develop very simple indicators, so that the required data could be collected in large household surveys such as the DHS. With this objective in mind, we explored using both a 1 g cutoff and a 15 g cutoff in order for a food group to count in each indicator score. If indicators constructed with a 1 g cutoff had performed as well as those with a 15 g cutoff, it would have suggested that enumerators could aim to determine if the respondent woman had any food in the group in any amount. However, results from this site indicate that indicators that exclude trivial amounts (less than 15 g) perform better. In this site, this was primarily an issue for chilies, garlic, and to a lesser extent for fish. For the purposes of surveys, this suggests that it may suffice to try to ensure that foods used as flavorings/condiments be excluded from the recall. In this study site, chilies, garlic and small fish (but not large fish) could be described as flavorings or condiments.

It is sometimes argued that foods such as chilies should be included in food group recalls, because they are important sources of certain nutrients. Indeed, in our sample, these foods provided a large proportion of certain nutrients. However, in this site, the inclusion of these foods did not strengthen the relationship between diversity and MPA; on the contrary, it weakened the relationship.

7.6. GENERALIZABILITY

For a number of reasons – the complexity and aims of the original sampling, our selection of a sub-sample for analysis, and the passage of time – it cannot be claimed that the estimates of prevalence of adequacy in this sample directly and precisely reflect those of any particular group of Bangladeshi women at present. At the same time, there is no reason to believe that the general picture that emerges is not representative. In areas where families remain impoverished and heavily reliant on one staple food, the poor diet quality and low nutrient adequacy described herein are likely to prevail.

For the main purpose of the WDDP – developing indicators of diet quality – neither the sampling/sub-sampling nor the passage of time affect the usefulness of the data set. For women with diets similar to these, the relationships between food group diversity, energy intake, and micronutrient adequacy should be similar to those found here.

8. Conclusions

Information on diet quality and micronutrient adequacy, using newer methods of assessment, is very scarce for poor women globally. Much of the available information is focused on pregnant women, and sometimes on only one or several nutrients related to specific health outcomes. NPNL women of reproductive age – and lactating women – are also vulnerable. In some contexts women may receive less high-quality, nutrient-dense foods than other family members; this was, in fact, documented in our study area.[53] These are the foods that could improve their nutrient intakes and status.

Our results from rural Bangladesh indicate that micronutrient intakes were very inadequate indeed, and this was true across almost every nutrient examined. This should stimulate further efforts to focus attention and resources toward this problem. The study notes that intakes were inadequate for nearly *all* micronutrients, not just those that are the usual focus of public health interventions (iron/folate during pregnancy, vitamin A and iodine). Programs narrowly focused on one or several micronutrients will alleviate the major deficits identified here.

For lactating women in this study site, intakes of all micronutrients except zinc were very low relative to requirements. While diversity scores were strongly associated with MPA, the distribution of MPA limited analysis. For NPNL women, our results indicate that food group diversity indicators are very promising and may be a simple and valid option for population-level assessment and for monitoring progress toward improved micronutrient intakes among women of reproductive age. The diversity indicators explored in this report were correlated not only with overall micronutrient adequacy, averaged across 11 micronutrients, but were also correlated with each individual micronutrient. This underscores their usefulness as proxy indicators of overall diet quality in resource-poor settings.

[53] Bouis et al. 1998.

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Appendix 1. Tables and Figures, All Women

Table 1. Description of Sample, All Women, R1

	n	Mean	SD	Median	Range
Age (year)	412	31.3	9.4	32.0	15.0-49.0
Height (cm)	412	150.3	5.1	150.1	137.4-166.0
Weight (kg)	412	42.6	5.8	42.0	30.0-74.0
BMI	412	18.8	2.2	18.6	13.6-28.8
% Illiterate	412	67.5			
% Lactating	410	27.1			
% Pregnant	412	0.0			
	n	**Percent**			
BMI <16	27	6.6			
BMI 16-16.9	52	12.6			
BMI 17-18.49	118	28.6			
BMI 18.5-24.9	208	50.5			
BMI 25-29.9	7	1.7			
BMI ≥ 30	0	0.0			

Table 2. Energy and Macronutrient Intakes, All Women, R1

	Mean	SD	Median	Range	Percent of kcal
Energy (kcal)	2,187.6	529.4	2,162.9	1,011.0-3,598.8	
Protein (g)	54.6	19.1	50.6	19.6-152.1	10
Animal source (g)	11.6	14.6	6.8	0.0-121.0	2
Plant source (g)	42.9	12.1	41.7	18.0-92.8	8
Total carbohydrate (g)	449.3	110.7	447.8	179.1-742.2	82
Sugars (g)	8.2	12.7	3.3	0.8-102.1	2
Total fat (g)	15.0	8.7	12.6	2.3-54.1	6
Saturated fat (g)	3.7	2.3	3.2	0.8-18.8	2

Table 3a. Percent of Women Who Consumed 6 Major Food Groups, All Women, R1

	≥ 1 g	≥ 15 g
All starchy staples	100	100
All legumes and nuts	35	33
All dairy	19	18
Other animal source foods	75	59
Vitamin A-rich fruits and vegetables [a]	85	58
Other fruits and vegetables	100	82

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.

Table 3b. Percent of Women Who Consumed 9 Sub-Food Groups, All Women, R1

	≥ 1 g	≥ 15 g
All starchy staples	100	100
All legumes and nuts	35	33
All dairy	19	18
Organ meat	0	0
Eggs	7	3
Flesh foods and other miscellaneous small animal protein	72	57
Vitamin A-rich dark green leafy vegetables [a]	51	49
Other vitamin A-rich vegetables and fruits [a]	64	16
Other fruits and vegetables	100	82

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.

Table 3c. Percent of Women Who Consumed 13 Sub-Food Groups, All Women, R1

	≥ 1 g	≥ 15 g
All starchy staples	100	100
All legumes and nuts	35	33
All dairy	19	18
Organ meat	0	0
Eggs	7	3
Small fish eaten whole with bones	27	15
All other flesh foods and miscellaneous small animal protein	60	45
Vitamin A-rich dark green leafy vegetables [a]	51	49
Vitamin A-rich deep yellow/orange/red vegetables [a]	58	6
Vitamin C-rich vegetables [b]	92	16
Vitamin A-rich fruits [a]	10	10
Vitamin C-rich fruits [b]	13	12
All other fruits and vegetables	97	65

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g.

Table 3d. Percent of Women Who Consumed 21 Sub-Food Groups, All Women, R1

	≥ 1 g	≥ 15 g
Grains and grain products	100	100
All other starchy staples	48	46
Cooked dry beans and peas	22	20
Soybeans and soy products	0	0
Nuts and seeds	18	17
Milk/yogurt	19	18
Cheese	0	0
Beef, pork, veal, lamb, goat, game meat	7	7
Organ meat	0	0
Chicken, duck, turkey, pigeon, guinea hen, game birds	6	5
Large whole fish/dried fish/shellfish and other seafood	52	36
Small fish eaten whole with bones	27	15
Insects, grubs, snakes, rodents and other small animal	0	0
Eggs	7	3
Vitamin A-rich dark green leafy vegetables [a]	51	49
Vitamin A-rich deep yellow/orange/red vegetables [a]	58	6
Vitamin C-rich vegetables [b]	92	16
All other vegetables	96	57
Vitamin A-rich fruits [a]	10	10
Vitamin C-rich fruits [b]	13	12
All other fruits	22	17

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g.

Table 4a. Summary of Food Group Intake (FGI-6), All Women, for All R1 Observation Days and for Days When the Food was Consumed

	All (n = 412)					Among those who consume			
Food group	Mean amount (g)	Mean energy (kcal)	Median amount (g)	Median energy (kcal)	Percent consuming	Mean amount (g)	Mean energy (kcal)	Median amount (g)	Median energy (kcal)
All starchy staples	1,674.1	1,888.1	1,643.6	1,860.5	100	1,674.1	1,888.1	1,643.6	1,860.5
All legumes and nuts	25.8	43.7	0.0	0.0	35	72.9	123.3	55.7	104.3
All dairy	20.1	13.5	0.0	0.0	19	103.5	69.4	100.0	67.0
Other animal source foods	30.0	67.4	20.9	37.8	75	40.3	90.4	31.4	60.8
Vitamin A-rich fruits and vegetables [a]	71.9	35.8	44.7	24.8	85	84.8	42.2	59.9	30.2
Other fruits and vegetables	108.7	53.5	72.7	22.8	100	108.9	53.6	72.8	22.9

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.

Table 4b. Summary of Food Group Intake (FGI-9), All Women, for All R1 Observation Days and for Days When the Food Was Consumed

	All (n = 412)					Among those who consume			
Food group	Mean amount (g)	Mean energy (kcal)	Median amount (g)	Median energy (kcal)	Percent consuming	Mean amount (g)	Mean energy (kcal)	Median amount (g)	Median energy (kcal)
All starchy staples	1,674.1	1,888.1	1,643.6	1,860.5	100	1,674.1	1,888.1	1,643.6	1,860.5
All legumes and nuts	25.8	43.7	0.0	0.0	35	72.9	123.3	55.7	104.3
All dairy	20.1	13.5	0.0	0.0	19	103.5	69.4	100.0	67.0
Organ meat	0.0	0.0	0.0	0.0	0				
Eggs	1.4	2.5	0.0	0.0	7	19.8	34.9	14.2	25.8
Flesh foods and other miscellaneous small animal protein	28.6	64.9	19.9	34.2	72	39.5	89.7	30.9	61.4
Vitamin A-rich dark green leafy vegetables [a]	48.4	23.2	4.2	2.1	51	95.9	46.0	77.9	34.2
Other vitamin A-rich vegetables and fruits [a]	23.5	12.6	2.1	5.0	64	36.8	19.6	4.2	9.8
Other fruits and vegetables	108.7	53.5	72.7	22.8	100	108.9	53.6	72.8	22.9

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.

Table 4c. Summary of Food Group Intake (FGI-13), All Women, for All R1 Observation Days and for Days When the Food Was Consumed

	All (n = 412)					Among those who consume			
Food group	Mean amount (g)	Mean energy (kcal)	Median amount (g)	Median energy (kcal)	Percent consuming	Mean amount (g)	Mean energy (kcal)	Median amount (g)	Median energy (kcal)
All starchy staples	1,674.1	1,888.1	1,643.6	1,860.5	100	1674.1	1888.1	1643.6	1860.5
All legumes and nuts	25.8	43.7	0.0	0.0	35	72.9	123.3	55.7	104.3
All dairy	20.1	13.5	0.0	0.0	19	103.5	69.4	100.0	67.0
Organ meat	0.0	0.0	0.0	0.0	0				
Eggs	1.4	2.5	0.0	0.0	7	19.8	34.9	14.2	25.8
Small fish eaten whole with bones	6.0	15.6	0.0	0.0	27	22.0	57.5	16.9	18.8
All other flesh foods and miscellaneous small animal protein	22.6	49.3	11.0	21.8	60	37.9	82.5	27.7	53.8
Vitamin A-rich dark green leafy vegetables [a]	48.4	23.2	4.2	2.1	51	95.9	46.0	77.9	34.2
Vitamin A-rich deep yellow/orange/red vegetables [a]	10.4	7.8	1.7	4.1	58	17.8	13.2	3.5	8.6
Vitamin C-rich vegetables [b]	16.1	6.1	5.2	3.5	92	17.5	6.6	5.6	3.9
Vitamin A-rich fruits [a]	13.0	4.8	0.0	0.0	10	134.3	49.4	108.5	39.1
Vitamin C-rich fruits [b]	11.4	8.8	0.0	0.0	13	87.3	67.4	71.0	61.9
All other fruits and vegetables	81.1	38.5	38.8	14.4	97	83.7	39.8	45.5	15.2

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g.

Table 4d. Summary of Food Group Intake (FGI-21), All Women, for All R1 Observation Days and for Days When the Food Was Consumed

	All (n = 412)					Among those who consume			
Food group	Mean amount (g)	Mean energy (kcal)	Median amount (g)	Median energy (kcal)	Percent consuming	Mean amount (g)	Mean energy (kcal)	Median amount (g)	Median energy (kcal)
Grains and grain products	1,636.8	1,842.1	1,619.7	1,819.7	100	1,636.8	1,842.1	1,619.7	1,819.7
All other starchy staples	37.3	45.9	0.0	0.0	48	77.6	95.6	60.6	66.9
Cooked dry beans and peas	14.2	27.1	0.0	0.0	22	63.7	121.2	37.6	102.0
Soybeans and soy products	0.0	0.0	0.0	0.0	0				
Nuts and seeds	11.6	16.6	0.0	0.0	18	64.6	92.6	55.7	77.8
Milk/yogurt	20.1	13.5	0.0	0.0	19	103.5	69.4	100.0	67.0
Cheese	0.0	0.0	0.0	0.0	0				
Beef, pork, veal, lamb, goat, game meat	5.6	7.9	0.0	0.0	7	76.9	107.9	55.6	84.5
Organ meat	0.0	0.0	0.0	0.0	0				
Chicken, duck, turkey, pigeon, guinea hen, game birds	2.5	3.5	0.0	0.0	6	39.3	56.2	32.2	46.2
Large whole fish/dried fish/shellfish and other seafood	14.5	37.9	4.1	8.0	52	28.1	73.2	21.9	47.3
Small fish eaten whole with bones	6.0	15.6	0.0	0.0	27	22.0	57.5	16.9	18.8
Insects, grubs, snakes, rodents and other small animal	0.0	0.0	0.0	0.0	0				
Eggs	1.4	2.5	0.0	0.0	7	19.8	34.9	14.2	25.8
Vitamin A-rich dark green leafy vegetables [a]	48.4	23.2	4.2	2.1	51	95.9	46.0	77.9	34.2
Vitamin A-rich deep yellow/orange/red vegetables [a]	10.4	7.8	1.7	4.1	58	17.8	13.2	3.5	8.6
Vitamin C-rich vegetables [b]	16.1	6.1	5.2	3.5	92	17.5	6.6	5.6	3.9
All other vegetables	61.6	16.0	21.4	9.2	96	63.9	16.6	24.5	9.7
Vitamin A-rich fruits [a]	13.0	4.8	0.0	0.0	10	134.3	49.4	108.5	39.1
Vitamin C-rich fruits [b]	11.4	8.8	0.0	0.0	13	87.3	67.4	71.0	61.9
All other fruits	19.5	22.5	0.0	0.0	22	89.2	103.1	49.5	64.5

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g.

Table 5. Diversity Scores for Various Diversity Indicators, All Women, R1

Indicator	Number of food groups and level	Mean	SD	Median	Range
FGI-6	6 major food groups	4.1	0.9	4.0	2-6
FGI-6R [a]	6 major food groups	3.5	1.0	3.0	1-6
FGI-9	9 food subgroups	4.5	1.1	4.0	2-7
FGI-9R [a]	9 food subgroups	3.6	1.1	4.0	1-7
FGI-13	13 food subgroups	5.7	1.3	6.0	2-10
FGI-13R [a]	13 food subgroups	3.7	1.3	4.0	1-8
FGI-21	21 food subgroups	6.5	1.6	6.0	2-11
FGI-21R [a]	21 food subgroups	4.4	1.5	4.0	1-9

[a] "R" indicates that at least 15 g must be consumed in order for the food group/subgroup to "count" in the score.

Table 6. Percent of Observation Days at Each Food Group Diversity Score, All Women, R1

Number of food groups eaten	Diversity Indicators							
	FGI-6	FGI-6R	FGI-9	FGI-9R	FGI-13	FGI-13R	FGI-21	FGI-21R
1	0	1	0	1	0	2	0	1
2	3	16	3	16	1	16	1	9
3	18	34	14	32	4	28	3	20
4	46	35	35	32	14	28	6	27
5	28	13	30	16	27	19	17	23
6	5	2	15	3	31	4	28	12
7			3	0	16	3	20	6
8			0	0	7	0	15	2
9			0	0	2	0	9	1
10					0	0	2	0
11					0	0	1	0
12					0	0	0	0
13					0	0	0	0
14							0	0
15							0	0
16							0	0
17							0	0
18							0	0
19							0	0
20							0	0
21							0	0

Table 7a. Percent of Observation Days on Which Different Food Groups Were Consumed, by Food Group Diversity Score, All Women, R1 (FGI-6 - 1 g Minimum)

	Number of food groups eaten					
	1	**2**	**3**	**4**	**5**	**6**
Percent (number) of observation days at each diversity score	0 (0)	3 (14)	18 (72)	46 (189)	28 (117)	5 (20)
Food groups	**Percent of observation days on which each food group was consumed**					
All starchy staples	–	100	100	100	100	100
All legumes and nuts	–	0	6	21	70	100
All dairy	–	0	0	6	41	100
Other animal source foods	–	0	39	82	90	100
Vitamin A-rich fruits and vegetables [a]	–	7	56	91	99	100
Other fruits and vegetables	–	93	100	100	100	100

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.

Table 7b. Percent of Observation Days on Which Different Food Groups Were Consumed, by Food Group Diversity Score, All Women, R1 (FGI-6R - 15 g Minimum)

	Number of food groups eaten					
	1	**2**	**3**	**4**	**5**	**6**
Percent (number) of observation days at each diversity score	1 (3)	16 (65)	34 (139)	35 (143)	13 (52)	2 (10)
Food groups	**Percent of observation days on which each food group was consumed**					
All starchy staples	100	100	100	100	100	100
All legumes and nuts	0	5	11	47	77	100
All dairy	0	0	5	23	48	100
Other animal source foods	0	22	52	70	87	100
Vitamin A-rich fruits and vegetables [a]	0	25	55	64	90	100
Other fruits and vegetables	0	49	78	97	98	100

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.

Table 7c. Percent of Observation Days on Which Different Food Groups Were Consumed, by Food Group Diversity Score, All Women, R1 (FGI-9 - 1 g Minimum)

	Number of food groups eaten								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Percent (number) of observation days at each diversity score	0 (0)	3 (14)	14 (57)	35 (144)	30 (123)	15 (62)	3 (12)	0 (0)	0 (0)
Food groups	**Percent of observation days on which each food group was consumed**								
All starchy staples	–	100	100	100	100	100	100	–	–
All legumes and nuts	–	0	7	21	46	73	92	–	–
All dairy	–	0	0	7	30	37	83	–	–
Organ meat	–	0	0	0	0	0	0	–	–
Eggs	–	0	4	4	6	18	33	–	–
Flesh foods and other miscellaneous small animal protein	–	0	42	72	80	97	100	–	–
Vitamin A-rich dark green leafy vegetables [a]	–	7	33	37	60	81	92	–	–
Other vitamin A-rich vegetables and fruits [a]	–	0	14	60	79	95	100	–	–
Other fruits and vegetables	–	93	100	100	100	100	100	–	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.

Table 7d. Percent of Observation Days on Which Different Food Groups Were Consumed, by Food Group Diversity Score, All Women, R1 (FGI-9R - 15 g Minimum)

	Number of food groups eaten								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Percent (number) of observation days at each diversity score	1 (3)	16 (64)	32 (133)	32 (130)	16 (67)	3 (14)	0 (1)	0 (0)	0 (0)
Food groups	**Percent of observation days on which each food group was consumed**								
All starchy staples	100	100	100	100	100	100	100	–	–
All legumes and nuts	0	5	11	43	73	79	100	–	–
All dairy	0	0	3	27	34	86	100	–	–
Organ meat	0	0	0	0	0	0	0	–	–
Eggs	0	2	1	3	10	7	0	–	–
Flesh foods and other miscellaneous small animal protein	0	20	53	66	75	100	100	–	–
Vitamin A-rich dark green leafy vegetables [a]	0	17	44	49	82	93	100	–	–
Other vitamin A-rich vegetables and fruits [a]	0	6	10	17	28	36	100	–	–
Other fruits and vegetables	0	50	78	95	97	100	100	–	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.

Table 7e. Percent of Observation Days on Which Different Food Groups Were Consumed, by Food Group Diversity Score, All Women, R1 (FGI-13 - 1 g Minimum)

	Number of food groups eaten												
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
Percent (number) of observation days at each diversity score	0 (0)	1 (2)	4 (16)	14 (56)	27 (109)	31 (127)	16 (64)	7 (30)	2 (7)	0 (1)	0 (0)	0 (0)	0 (0)
Food groups	**Percent of observation days on which each food group was consumed**												
All starchy staples	–	100	100	100	100	100	100	100	100	100	–	–	–
All legumes and nuts	–	0	6	5	25	40	56	70	86	100	–	–	–
All dairy	–	0	0	0	10	21	39	33	86	100	–	–	–
Organ meat	–	0	0	0	0	0	0	0	0	0	–	–	–
Eggs	–	0	0	4	5	6	13	17	29	0	–	–	–
Small fish eaten whole with bones	–	0	0	7	17	25	44	80	57	100	–	–	–
All other flesh foods and miscellaneous small animal protein	–	0	13	43	48	69	75	80	100	100	–	–	–
Vitamin A-rich dark green leafy vegetables [a]	–	50	0	32	48	50	64	83	100	100	–	–	–
Vitamin A-rich deep yellow/orange/red vegetables [a]	–	0	0	27	41	69	86	93	100	100	–	–	–
Vitamin C-rich vegetables [b]	–	0	88	82	92	96	94	97	100	100	–	–	–
Vitamin A-rich fruits [a]	–	0	6	0	9	12	13	13	29	0	–	–	–
Vitamin C-rich fruits [b]	–	0	0	0	10	15	19	33	14	100	–	–	–
All other fruits and vegetables	–	50	88	100	95	97	98	100	100	100	–	–	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g.

Table 7f. Percent of Observation Days on Which Different Food Groups Were Consumed, by Food Group Diversity Score, All Women, R1 (FGI-13R - 15 g Minimum)

	Number of food groups eaten												
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
Percent (number) of observation days at each diversity score	2 (6)	16 (67)	28 (114)	28 (117)	19 (78)	4 (18)	3 (11)	0 (1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Food groups	**Percent of observation days on which each food group was consumed**												
All starchy staples	100	100	100	100	100	100	100	100	–	–	–	–	–
All legumes and nuts	0	6	15	33	67	89	64	100	–	–	–	–	–
All dairy	0	0	6	25	27	50	73	100	–	–	–	–	–
Organ meat	0	0	0	0	0	0	0	0	–	–	–	–	–
Eggs	0	2	2	2	8	6	18	0	–	–	–	–	–
Small fish eaten whole with bones	0	5	7	19	24	33	46	0	–	–	–	–	–
All other flesh foods and miscellaneous small animal protein	0	16	45	55	53	50	82	100	–	–	–	–	–
Vitamin A-rich dark green leafy vegetables [a]	0	27	47	46	67	72	100	100	–	–	–	–	–
Vitamin A-rich deep yellow/orange/red vegetables [a]	0	3	2	9	13	11	0	0	–	–	–	–	–
Vitamin C-rich vegetables [b]	0	2	6	19	26	39	64	100	–	–	–	–	–
Vitamin A-rich fruits [a]	0	5	9	9	14	17	18	0	–	–	–	–	–
Vitamin C-rich fruits [b]	0	2	6	14	17	33	36	100	–	–	–	–	–
All other fruits and vegetables	0	34	55	72	86	100	100	100	–	–	–	–	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g.

Table 7g. Percent of Observation Days on Which Different Food Groups Were Consumed, by Food Group Diversity Score, All Women, R1 (FGI-21 - 1 g Minimum)

	Number of food groups eaten																				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**
Percent (number) of observation days at each diversity score	0 (0)	1 (2)	3 (11)	6 (24)	17 (68)	28 (116)	20 (84)	15 (61)	9 (35)	2 (8)	1 (3)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Food groups	**Percent of observation days on which each food group was consumed**																				
Grains and grain products	–	100	100	100	100	100	100	100	100	100	100	–	–	–	–	–	–	–	–	–	–
All other starchy staples	–	0	0	13	32	44	57	71	69	63	67	–	–	–	–	–	–	–	–	–	–
Cooked dry beans and peas	–	0	9	0	15	15	24	38	40	75	33	–	–	–	–	–	–	–	–	–	–
Soybeans and soy products	–	0	0	0	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–
Nuts and seeds	–	0	0	0	4	16	18	25	40	75	100	–	–	–	–	–	–	–	–	–	–
Milk/yogurt	–	0	0	0	6	13	20	41	40	38	67	–	–	–	–	–	–	–	–	–	–
Cheese	–	0	0	0	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–
Beef, pork, veal, lamb, goat, game meat	–	0	0	0	6	4	6	8	29	13	0	–	–	–	–	–	–	–	–	–	–
Organ meat	–	0	0	0	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–
Chicken, duck, turkey, pigeon, guinea hen, game birds	–	0	0	0	0	6	10	13	6	13	0	–	–	–	–	–	–	–	–	–	–
Large whole fish/dried fish/shellfish and other seafood	–	0	9	21	31	54	61	66	66	75	100	–	–	–	–	–	–	–	–	–	–
Small fish eaten whole with bones	–	0	0	8	19	13	38	38	51	75	100	–	–	–	–	–	–	–	–	–	–
Insects, grubs, snakes, rodents and other small animal	–	0	0	0	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–
Eggs	–	0	0	0	4	3	12	7	20	13	0	–	–	–	–	–	–	–	–	–	–
Vitamin A-rich dark green leafy vegetables [a]	–	50	0	42	37	53	51	57	69	75	100	–	–	–	–	–	–	–	–	–	–
Vitamin A-rich deep yellow/orange/red vegetables [a]	–	0	0	29	47	48	69	75	83	100	100	–	–	–	–	–	–	–	–	–	–
Vitamin C-rich vegetables [b]	–	0	82	88	85	92	98	95	97	88	100	–	–	–	–	–	–	–	–	–	–
All other vegetables	–	50	91	96	94	97	96	97	100	100	100	–	–	–	–	–	–	–	–	–	–
Vitamin A-rich fruits [a]	–	0	9	0	6	13	7	13	14	13	0	–	–	–	–	–	–	–	–	–	–
Vitamin C-rich fruits [b]	–	0	0	0	7	8	18	21	23	38	33	–	–	–	–	–	–	–	–	–	–
All other fruits	–	0	0	4	6	21	16	36	54	50	100	–	–	–	–	–	–	–	–	–	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g.

Table 7h. Percent of Observation Days on Which Different Food Groups Were Consumed, by Food Group Diversity Score, All Women, R1 (FGI-21R - 15 g Minimum)

	Number of food groups eaten																				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**
Percent (number) of observation days at each diversity score	1 (3)	9 (36)	20 (82)	27 (113)	23 (95)	12 (49)	6 (24)	2 (6)	1 (4)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Food groups	**Percent of observation days on which each food group was consumed**																				
Grains and grain products	100	100	100	100	100	100	100	100	100	–	–	–	–	–	–	–	–	–	–	–	–
All other starchy staples	0	8	37	43	55	69	50	67	100	–	–	–	–	–	–	–	–	–	–	–	–
Cooked dry beans and peas	0	3	9	13	34	29	42	50	25	–	–	–	–	–	–	–	–	–	–	–	–
Soybeans and soy products	0	0	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Nuts and seeds	0	0	5	9	18	35	63	67	75	–	–	–	–	–	–	–	–	–	–	–	–
Milk/yogurt	0	0	2	15	22	43	42	33	50	–	–	–	–	–	–	–	–	–	–	–	–
Cheese	0	0	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Beef, pork, veal, lamb, goat, game meat	0	3	4	5	10	10	21	17	0	–	–	–	–	–	–	–	–	–	–	–	–
Organ meat	0	0	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Chicken, duck, turkey, pigeon, guinea hen, game birds	0	0	5	3	5	16	0	33	0	–	–	–	–	–	–	–	–	–	–	–	–
Large whole fish/dried fish/shellfish and other seafood	0	6	27	39	41	45	63	50	50	–	–	–	–	–	–	–	–	–	–	–	–
Small fish eaten whole with bones	0	0	9	11	23	27	17	50	50	–	–	–	–	–	–	–	–	–	–	–	–
Insects, grubs, snakes, rodents and other small animal	0	0	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Eggs	0	0	1	4	4	2	4	50	0	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin A-rich dark green leafy vegetables [a]	0	39	35	50	53	53	83	67	100	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin A-rich deep yellow/orange/red vegetables [a]	0	6	0	8	6	16	4	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin C-rich vegetables [b]	0	3	6	15	16	22	42	33	100	–	–	–	–	–	–	–	–	–	–	–	–
All other vegetables	0	22	43	55	74	71	71	83	100	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin A-rich fruits [a]	0	8	9	6	13	12	13	17	0	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin C-rich fruits [b]	0	3	6	10	14	12	29	50	50	–	–	–	–	–	–	–	–	–	–	–	–
All other fruits	0	0	4	15	14	37	58	33	100	–	–	–	–	–	–	–	–	–	–	–	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g.

Table 8. Mean and Median Nutrient Intake and PA, All Women [a]

Nutrient	Mean	SD	Median	EAR [b]	SD [b]	PA (Mean)	PA (Median)	Lambda (Box-Cox transformation) [c]
Energy	2,188	529	2,163					
Protein (All Sources) (% of kcal)	10	2	9					
Protein from animal sources (% of kcal)	2	2	1					
Total carbohydrate (% of kcal)	82	4	83					
Sugars (% of kcal)	2	2	1					
Total fat (% of kcal)	6	4	5					
Saturated fat (% of kcal)	2	1	1					
Thiamin (mg/d)	0.68	0.28	0.63	0.9	0.09	0.07	0.00	-0.099
Riboflavin (mg/d)	0.75	0.40	0.66	0.9	0.09	0.11	0.00	-0.179
Niacin (mg/d)	10.72	4.22	9.86	11.0	1.6	0.28	0.14	-0.084
Vitamin B6 (mg/d)	1.54	0.60	1.45	1.1	0.11	0.67	0.94	0.181
Folate (μg/d)	171.93	131.83	132.50	320	32	0.01	0.00	-0.160
Vitamin B12 (μg/d)	1.56	2.30	0.57	2.0	0.2	0.19	0.00	0.318
Vitamin C (mg/d)	58.53	62.27	41.40	38	3.8	0.44	0.24	0.072
Vitamin A (RE/d)	491.92	497.04	322.36	270	54	0.49	0.41	0.250
Calcium (mg/d)	441.54	390.82	307.96	1,000 [d]	[d]	0.22	0.25	0.039
Iron (mg/d)	9.96	5.54	8.53	See Table A6-2		0.14	0.07	-0.157
Zinc (mg/d)	8.45	2.54	7.97	6	0.75	0.93	1.00	0.347
MPA across 11 micronutrients	0.32	0.17	0.31					

[a] Mean and median nutrient intakes are for first observation day; PA are based on estimated usual intake, calculated using repeat observations for a subset of the sample. Thus, PA incorporate information from both rounds of data collection.
[b] See Table A6-1 for sources for each EAR and SD. Requirements for NPNL women are presented here; see Tables A6-1 and L8 for requirements for lactating women. There were no pregnant women in the study sample.
[c] This documents the transformation parameters selected for each nutrient. The power transformations result in approximately normal distributions.
[d] There is no EAR and no SD for calcium; 1,000 mg is the Adequate Intake (AI) for NPNL women.

Table 9a. Percent Contribution of Food Groups (FGI-6) to Intake of Energy, Protein and Nutrients, All Women, R1 [a]

Food groups (%)	Energy	Protein	CHO	Total fat	Thiamin	Riboflavin	Niacin	Vitamin B6	Folate	Vitamin B12	Vitamin C	Vitamin A	Calcium	Iron	Zinc
All starchy staples	86.3	69.7	92.4	27.6	62.0	52.8	67.0	61.9	34.2	0.0	15.6	0.9	23.1	43.1	74.5
All legumes and nuts	1.9	3.9	1.8	2.1	6.2	3.7	2.7	3.9	14.8	0.0	4.3	0.6	2.9	6.9	3.9
All dairy	0.6	1.2	0.2	4.5	1.2	4.0	0.2	0.8	0.9	11.4	0.6	4.3	5.7	0.2	0.9
Other animal source foods	3.0	16.7	0.0	13.3	6.5	7.6	13.0	6.7	4.8	88.6	0.5	3.8	23.9	6.1	8.8
Vitamin A-rich fruits/vegetables [b]	1.7	5.2	1.6	4.2	14.4	22.9	9.9	12.8	28.4	0.0	40.6	75.3	29.8	22.1	4.9
Other fruits and vegetables	2.5	2.5	2.5	5.7	8.4	7.7	5.5	10.1	13.5	0.0	35.9	14.2	9.7	6.3	4.8

[a] Percents may not sum to 100 due to nutrient contributions from foods not included in any of the groups comprising the diversity indicators (e.g., fats, sweets, alcohol).
[b] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.

Table 9b. Percent Contribution of Food Groups (FGI-9) to Intake of Energy, Protein and Nutrients, All Women, R1 [a]

Food groups (%)	Energy	Protein	CHO	Total fat	Thiamin	Riboflavin	Niacin	Vitamin B6	Folate	Vitamin B12	Vitamin C	Vitamin A	Calcium	Iron	Zinc
All starchy staples	86.3	69.7	92.4	27.6	62.0	52.8	67.0	61.9	34.2	0.0	15.6	0.9	23.1	43.1	74.5
All legumes and nuts	1.9	3.9	1.8	2.1	6.2	3.7	2.7	3.9	14.8	0.0	4.3	0.6	2.9	6.9	3.9
All dairy	0.6	1.2	0.2	4.5	1.2	4.0	0.2	0.8	0.9	11.4	0.6	4.3	5.7	0.2	0.9
Organ meat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eggs	0.1	0.3	0.0	0.9	0.3	0.9	0.0	0.2	0.6	4.6	0.0	1.8	0.4	0.4	0.2
Flesh foods and other miscellaneous small animal protein	2.9	16.3	0.0	12.4	6.2	6.6	13.0	6.5	4.2	84.0	0.5	2.0	23.5	5.7	8.6
Vitamin A-rich dark green leafy vegetables	1.1	4.6	1.0	1.5	12.1	19.6	7.7	10.1	22.7	0.0	27.6	39.5	26.9	20.1	4.0
Other vitamin A-rich vegetables and fruits [b]	0.6	0.6	0.6	2.7	2.3	3.3	2.2	2.7	5.6	0.0	13.0	35.8	2.8	2.0	0.9
Other fruits and vegetables	2.5	2.5	2.5	5.7	8.4	7.7	5.5	10.1	13.5	0.0	35.9	14.2	9.7	6.3	4.8

[a] Percents may not sum to 100 due to nutrient contributions from foods not included in any of the groups comprising the diversity indicators (e.g., fats, sweets, alcohol).
[b] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.

Table 9c. Percent Contribution of Food Groups (FGI-13) to Intake of Energy, Protein and Nutrients, All Women, R1 [a]

Food groups (%)	Energy	Protein	CHO	Total fat	Thiamin	Riboflavin	Niacin	Vitamin B6	Folate	Vitamin B12	Vitamin C	Vitamin A	Calcium	Iron	Zinc
All starchy staples	86.3	69.7	92.4	27.6	62.0	52.8	67.0	61.9	34.2	0.0	15.6	0.9	23.1	43.1	74.5
All legumes and nuts	1.9	3.9	1.8	2.1	6.2	3.7	2.7	3.9	14.8	0.0	4.3	0.6	2.9	6.9	3.9
All dairy	0.6	1.2	0.2	4.5	1.2	4.0	0.2	0.8	0.9	11.4	0.6	4.3	5.7	0.2	0.9
Organ meat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eggs	0.1	0.3	0.0	0.9	0.3	0.9	0.0	0.2	0.6	4.6	0.0	1.8	0.4	0.4	0.2
Small fish eaten whole w/bones	0.7	3.9	0.0	3.0	0.7	1.7	3.0	1.2	1.1	23.4	0.0	0.0	10.7	1.3	2.4
All other flesh foods misc. small animal protein	2.3	12.4	0.0	9.4	5.5	4.9	9.9	5.3	3.1	60.6	0.5	2.0	12.9	4.5	6.1
Vitamin A-rich dark green leafy vegetables [b]	1.1	4.6	1.0	1.5	12.1	19.6	7.7	10.1	22.7	0.0	27.6	39.5	26.9	20.1	4.0
Vitamin A-rich deep yellow/orange/red vegetables [b]	0.4	0.5	0.3	2.6	1.7	2.7	1.8	2.5	2.7	0.0	6.5	31.5	1.4	1.8	0.7
Vitamin C-rich vegetables [c]	0.3	0.6	0.3	0.3	1.9	1.5	1.3	2.9	2.0	0.0	20.6	4.1	2.6	1.6	1.0
Vitamin A-rich fruits [b]	0.2	0.1	0.3	0.1	0.6	0.6	0.4	0.2	2.9	0.0	6.5	4.3	1.5	0.2	0.2
Vitamin C-rich fruits [c]	0.4	0.2	0.5	0.5	1.1	1.2	0.8	2.3	1.3	0.0	4.8	1.3	0.5	0.5	0.3
All other fruits and vegetables	1.8	1.7	1.7	4.8	5.4	4.9	3.3	4.9	10.1	0.0	10.5	8.8	6.6	4.2	3.5

[a] Percents may not sum to 100 due to nutrient contributions from foods not included in any of the groups comprising the diversity indicators (e.g., fats, sweets, alcohol).
[b] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.
[c] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g.

Table 9d. Percent Contribution of Food Groups (FGI-21) to Intake of Energy, Protein and Nutrients, All Women, R1[a]

Food groups (%)	Energy	Protein	CHO	Total fat	Thiamin	Riboflavin	Niacin	Vitamin B6	Folate	Vitamin B12	Vitamin C	Vitamin A	Calcium	Iron	Zinc
Grains and grain products	84.2	67.9	90.0	27.1	55.0	50.0	63.0	53.1	28.1	0.0	0.0	0.0	21.3	39.5	72.2
All other starchy staples	2.1	1.8	2.4	0.6	7.0	2.8	4.0	8.7	6.1	0.0	15.6	0.9	1.8	3.6	2.3
Cooked dry beans and peas	1.2	3.3	1.0	0.9	4.7	2.4	2.1	2.3	12.4	0.0	1.3	0.2	2.2	5.7	3.0
Soybeans and soy products	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nuts and seeds	0.7	0.6	0.7	1.2	1.5	1.3	0.5	1.6	2.5	0.0	3.0	0.4	0.8	1.1	0.8
Milk/yogurt	0.6	1.2	0.2	4.5	1.2	4.0	0.2	0.8	0.9	11.4	0.6	4.3	5.7	0.2	0.9
Cheese	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Beef, pork, veal, lamb, goat, game meat	0.4	1.2	0.0	1.6	0.4	0.7	0.9	0.6	0.2	5.3	0.0	0.0	0.1	0.6	1.2
Organ meat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Chicken, duck, turkey, pigeon, guinea hen, game birds	0.2	0.9	0.0	0.9	0.2	0.5	0.8	0.5	0.1	4.3	0.0	0.0	0.2	0.4	0.6
Large whole fish/dried fish/shellfish, other seafood	1.7	10.3	0.0	6.9	4.9	3.7	8.2	4.2	2.8	51.0	0.5	2.0	12.6	3.5	4.4
Small fish eaten whole w/bones	0.7	3.9	0.0	3.0	0.7	1.7	3.0	1.2	1.1	23.4	0.0	0.0	10.7	1.3	2.4
Insects, grubs, snakes, rodents and other small animal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eggs	0.1	0.3	0.0	0.9	0.3	0.9	0.0	0.2	0.6	4.6	0.0	1.8	0.4	0.4	0.2
Vitamin A-rich dark green leafy vegetables [b]	1.1	4.6	1.0	1.5	12.1	19.6	7.7	10.1	22.7	0.0	27.6	39.5	26.9	20.1	4.0
Vitamin A-rich deep yellow/orange/red vegetables [b]	0.4	0.5	0.3	2.6	1.7	2.7	1.8	2.5	2.7	0.0	6.5	31.5	1.4	1.8	0.7
Vitamin C-rich vegetables [c]	0.3	0.6	0.3	0.3	1.9	1.5	1.3	2.9	2.0	0.0	20.6	4.1	2.6	1.6	1.0
All other vegetables	0.7	1.1	0.8	1.2	4.5	3.1	2.6	3.8	8.4	0.0	8.3	7.5	5.2	2.7	2.5
Vitamin A-rich fruits [b]	0.2	0.1	0.3	0.1	0.6	0.6	0.4	0.2	2.9	0.0	6.5	4.3	1.5	0.2	0.2
Vitamin C-rich fruits [c]	0.4	0.2	0.5	0.5	1.1	1.2	0.8	2.3	1.3	0.0	4.8	1.3	0.5	0.5	0.3
All other fruits	1.0	0.6	0.9	3.6	0.9	1.8	0.7	1.1	1.7	0.0	2.1	1.3	1.5	1.5	1.0

[a] Percents may not sum to 100 due to nutrient contributions from foods not included in any of the groups comprising the diversity indicators (e.g., fats, sweets, alcohol).
[b] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.
[c] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g.

Table 10. Correlations between Food Group Diversity Scores and Estimated Usual Intakes of Individual Nutrients, All Women [a, b]

	FGI-6		FGI-6R		FGI-9		FGI-9R		FGI-13		FGI-13R		FGI-21		FGI-21R	
Nutrients	**Not controlling for energy**	**Controlling for energy**	**Not controlling for energy**	**Controlling for energy**	**Not controlling for energy**	**Controlling for energy**	**Not controlling for energy**	**Controlling for energy**	**Not controlling for energy**	**Controlling for energy**	**Not controlling for energy**	**Controlling for energy**	**Not controlling for energy**	**Controlling for energy**	**Not controlling for energy**	**Controlling for energy**
Total energy	0.275 ***		0.242 ***		0.254 ***		0.235 ***		0.272 ***		0.264 ***		0.302 ***		0.303 ***	
Thiamin	0.309 ***	0.191 ***	0.401 ***	0.330 ***	0.329 ***	0.231 ***	0.406 ***	0.341 ***	0.325 ***	0.214 ***	0.407 ***	0.323 ***	0.385 ***	0.270 ***	0.458 ***	0.363 ***
Riboflavin	0.389 ***	0.306 ***	0.498 ***	0.449 ***	0.455 ***	0.393 ***	0.500 ***	0.454 ***	0.435 ***	0.362 ***	0.478 ***	0.416 ***	0.417 ***	0.327 ***	0.460 ***	0.378 ***
Niacin	0.266 ***	0.106 *	0.319 ***	0.215 ***	0.303 ***	0.180 ***	0.329 ***	0.237 ***	0.308 ***	0.170 ***	0.336 ***	0.220 ***	0.326 ***	0.168 ***	0.366 ***	0.225 ***
Vitamin B6	0.309 ***	0.173 ***	0.353 ***	0.265 ***	0.329 ***	0.219 ***	0.365 ***	0.287 ***	0.351 ***	0.234 ***	0.383 ***	0.288 ***	0.425 ***	0.315 ***	0.470 ***	0.378 ***
Folate	0.398 ***	0.336 ***	0.467 ***	0.421 ***	0.432 ***	0.379 ***	0.480 ***	0.437 ***	0.396 ***	0.335 ***	0.448 ***	0.394 ***	0.393 ***	0.323 ***	0.434 ***	0.368 ***
Vitamin B12	0.481 ***	0.441 ***	0.338 ***	0.293 ***	0.455 ***	0.416 ***	0.312 ***	0.266 ***	0.453 ***	0.410 ***	0.336 ***	0.286 ***	0.419 ***	0.369 ***	0.336 ***	0.278 ***
Vitamin C	0.164 ***	0.122 *	0.320 ***	0.290 ***	0.238 ***	0.203 ***	0.347 ***	0.319 ***	0.292 ***	0.258 ***	0.351 ***	0.321 ***	0.300 ***	0.262 ***	0.356 ***	0.323 ***
Vitamin A	0.284 ***	0.246 ***	0.396 ***	0.367 ***	0.412 ***	0.382 ***	0.432 ***	0.406 ***	0.374 ***	0.341 ***	0.369 ***	0.337 ***	0.276 ***	0.233 ***	0.284 ***	0.241 ***
Calcium	0.411 ***	0.364 ***	0.453 ***	0.415 ***	0.474 ***	0.435 ***	0.444 ***	0.406 ***	0.454 ***	0.410 ***	0.439 ***	0.396 ***	0.381 ***	0.326 ***	0.397 ***	0.343 ***
Iron	0.362 ***	0.281 ***	0.443 ***	0.386 ***	0.415 ***	0.350 ***	0.437 ***	0.383 ***	0.384 ***	0.308 ***	0.420 ***	0.352 ***	0.404 ***	0.318 ***	0.424 ***	0.341 ***
Zinc	0.361 ***	0.254 ***	0.349 ***	0.282 ***	0.342 ***	0.250 ***	0.337 ***	0.270 ***	0.342 ***	0.220 ***	0.367 ***	0.284 ***	0.372 ***	0.231 ***	0.395 ***	0.276 ***

[a] Usual intake of energy and individual nutrients are estimated by the BLUP following the method described in Arimond et al. 2008**.** Diversity scores are from R1 data; BLUP calculation incorporates information from both rounds.
[b] A "*" indicates a coefficient that is statistically significant at $p < 0.05$; ** indicates $p < 0.01$, and *** indicates $p < 0.001$.

Table 11a. Correlation between Energy from 6 Major Food Groups and MPA, With and Without Controlling for Total Energy Intake, All Women [a, b]

Major food groups	**Correlation between MPA and energy from each food group:**	**Partial correlation coefficients for energy from each food group (controlling for total energy)**
All starchy staples	**0.263** ***	**-0.375** ***
All legumes and nuts	0.159 **	0.084
All dairy	0.172 ***	0.143 **
Other animal source foods	0.273 ***	0.195 ***
Vitamin A-rich fruits and vegetables [c]	0.490 ***	0.492 ***
Other fruits and vegetables	0.199 ***	0.172 ***

[a] Numbers in bold indicate coefficients that changed direction when total energy was controlled for, with both coefficients being significant. A "*" indicates a coefficient that is statistically significant at $p < 0.05$; ** indicates $p < 0.01$, and *** indicates $p < 0.001$.
[b] Energy from food groups is from R1; MPA is based on estimated usual intake, calculated using repeat observations for a subset of the sample. MPA was transformed to approximate normality, and the transformed variable was used in the correlations.
[c] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.

Table 11b. Correlation between Energy from 9 Sub-Food Groups and MPA, With and Without Controlling for Total Energy Intake, All Women [a, b]

Major food groups	Correlation between MPA and energy from each food group:	Partial correlation coefficients for energy from each food group (controlling for total energy)
All starchy staples	**0.263** ***	**-0.375** ***
All legumes and nuts	0.159 **	0.084
All dairy	0.172 ***	0.143 **
Organ meat	–	–
Eggs	0.096	0.093
Flesh foods and other miscellaneous small animal protein	0.266 ***	0.185 ***
Vitamin A-rich dark green leafy vegetables [c]	0.460 ***	0.497 ***
Other vitamin A-rich vegetables and fruits [c]	0.154 **	0.098 *
Other fruits and vegetables	0.199 ***	0.172 ***

[a] Numbers in bold indicate coefficients that changed direction when total energy was controlled for, with both coefficients being significant. A "*" indicates a coefficient that is statistically significant at p < 0.05; ** indicates p < 0.01, and *** indicates p < 0.001. A "-" indicates the food group was not consumed.
[b] Energy from food groups is from R1; MPA is based on estimated usual intake, calculated using repeat observations for a subset of the sample. MPA was transformed to approximate normality, and the transformed variable was used in the correlations.
[c] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.

Table 11c. Correlation between Energy From 13 Sub-Food Groups and MPA, With And Without Controlling For Total Energy Intake, All Women [a, b]

Major food groups	Correlation between MPA and energy from each food group	Partial correlation coefficients for energy from each food group (controlling for total energy)
All starchy staples	**0.263** ***	**-0.375** ***
All legumes and nuts	0.159 **	0.084
All dairy	0.172 ***	0.143 **
Organ meat	–	–
Eggs	0.096	0.093
Small fish eaten whole with bones	0.232 ***	0.175 ***
All other flesh foods and miscellaneous small animal protein	0.158 **	0.099 *
Vitamin A-rich dark green leafy vegetables [c]	0.460 ***	0.497 ***
Vitamin A-rich deep yellow/orange/red vegetables [c]	0.142 **	0.080
Vitamin C-rich vegetables [d]	0.147 **	0.117 *
Vitamin A-rich fruits [c]	0.087	0.062
Vitamin C-rich fruits [d]	0.141 **	0.152 **
All other fruits and vegetables	0.140 **	0.110 *

[a] Numbers in bold indicate coefficients that changed direction when total energy was controlled for, with both coefficients being significant. A "*" indicates a coefficient that is statistically significant at p < 0.05; ** indicates p < 0.01, and *** indicates p < 0.001. A "-" indicates the food group was not consumed.
[b] Energy from food groups is from R1; MPA is based on estimated usual intake, calculated using repeat observations for a subset of the sample. MPA was transformed to approximate normality, and the transformed variable was used in the correlations.
[c] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.
[d] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100g in the form eaten.

Table 11d. Correlation between Energy from 21 Sub-Food Groups and MPA, With and Without Controlling for Total Energy Intake, All Women [a, b]

Major food groups	Correlation between MPA and energy from each food group	Partial correlation coefficients for energy from each food group (controlling for total energy)
Grains and grain products	**0.267** ***	**-0.330** ***
All other starchy staples	0.022	-0.078
Cooked dry beans and peas	0.023	-0.037
Soybeans and soy products	–	–
Nuts and seeds	0.234 ***	0.191 ***
Milk/yogurt	0.172 ***	0.143 **
Cheese	–	–
Beef, pork, veal, lamb, goat, game meat	0.011	-0.004
Organ meat	–	–
Chicken, duck, turkey, pigeon, guinea hen, game birds	-0.034	-0.031
Large whole fish/dried fish/shellfish and other seafood	0.180 ***	0.121 *
Small fish eaten whole with bones	0.232 ***	0.175 ***
Insects, grubs, snakes, rodents and other small animal	–	–
Eggs	0.096	0.093
Vitamin A-rich dark green leafy vegetables [c]	0.460 ***	0.497 ***
Vitamin A-rich deep yellow/orange/red vegetables	0.142 **	0.080
Vitamin C-rich vegetables [d]	0.147 **	0.117 *
All other vegetables	0.097 *	0.020
Vitamin A-rich fruits [c]	0.087	0.062
Vitamin C-rich fruits [d]	0.141 **	0.152 **
All other fruits	0.118 *	0.110 *

[a] Numbers in bold indicate coefficients that changed direction when total energy was controlled for, with both coefficients being significant. A "*" indicates a coefficient that is statistically significant at $p < 0.05$; ** indicates $p < 0.01$, and *** indicates $p < 0.001$. A "-" indicates the food group was not consumed.
[b] Energy from food groups is from R1; MPA is based on estimated usual intake, calculated using repeat observations for a subset of the sample. MPA was transformed to approximate normality, and the transformed variable was used in the correlations.
[c] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.
[d] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100g in the form eaten.

Table 12. Total Energy Intake (kcal) by Food Group Diversity Scores, All Women, R1 [a]

Number of food groups eaten	Diversity indicators															
	FGI-6		FGI-6R		FGI-9		FGI-9R		FGI-13		FGI-13R		FGI-21		FGI-21R	
	Median total energy intake (range)															
1	–	–	–	–	–	–	–	–	–	–	1708	(1479-2290)	–	–	–	–
2	1647	(1011-2625)	1870	(1011-3122)	1647	(1011-2625)	1863	(1011-3122)	–	–	1871	(1011-3561)	–	–	1779	(1011-3161)
3	1968	(1084-3161)	2115	(1122-3561)	1991	(1084-3122)	2115	(1122-3561)	1764	(1011-3122)	2052	(1122-3442)	1490	(1011-2278)	1974	(1084-3561)
4	2135	(1103-3561)	2298	(1103-3599)	2097	(1122-3561)	2268	(1126-3599)	1923	(1084-3442)	2319	(1126-3445)	1968	(1182-3122)	2163	(1122-3442)
5	2346	(1266-3599)	2422	(1335-3532)	2177	(1103-3599)	2431	(1103-3532)	2053	(1122-3561)	2361	(1103-3599)	1937	(1170-3442)	2346	(1103-3372)
6	2367	(1683-3003)	2114	(1683-2747)	2479	(1266-3532)	2080	(1683-3341)	2261	(1126-3599)	2373	(1410-3532)	2172	(1084-3561)	2247	(1460-3459)
7					2114	(1683-3341)	–	–	2344	(1103-3445)	2336	(1611-3341)	2100	(1103-3303)	2536	(1410-3599)
8					–	–	–	–	2425	(1266-3532)	–	–	2378	(1266-3599)	2874	(1683-3532)
9					–	–	–	–	2446	(1683-3341)	–	–	2471	(1611-3459)	–	–
10									–	–	–	–	2621	(1410-3532)	–	–
11									–	–	–	–	–	–	–	–
12									–	–	–	–	–	–	–	–
13									–	–	–	–	–	–	–	–
14													–	–	–	–
15													–	–	–	–
16													–	–	–	–
17													–	–	–	–
18													–	–	–	–
19													–	–	–	–
20													–	–	–	–
21													–	–	–	–

[a] Light shading indicates impossible values (beyond range of possible scores). A "–" indicates that a cell has fewer than 5 observations. Cells with fewer than 10 observations have dark shading.

Table 13. Relationship between Food Group Diversity Scores and Total Energy Intake, All Women [a]

	Food group diversity score		Total energy intake		Correlation Coefficient [b]
	(mean)	(median)	(mean)	(median)	(median)
FGI-6	4.1	4.0	2188	2163	0.275***
FGI-6R [c]	3.5	3.0	2188	2163	0.242***
FGI-9	4.5	4.0	2188	2163	0.254***
FGI-9R [c]	3.6	4.0	2188	2163	0.235***
FGI-13	5.7	6.0	2188	2163	0.272***
FGI-13R [c]	3.7	4.0	2188	2163	0.264***
FGI-21	6.5	6.0	2188	2163	0.302***
FGI-21R [c]	4.4	4.0	2188	2163	0.303***

[a] Food group diversity scores and mean and median energy intakes are from first observation day; BLUP for energy intake (calculated using repeat observations for a subset of the sample) is used for correlation analysis.
[b] A "*" indicates a coefficient that is statistically significant at $p < 0.05$; ** indicates $p < 0.01$, and *** indicates $p < 0.001$.
[c] Refers to minimum intake of 15 g for each of the food groups/sub-food groups.

Table 14. MPA by Food Group Diversity Scores, All Women [a, b]

Number of food groups eaten	Diversity indicators															
	FGI-6		FGI-6R		FGI-9		FGI-9R		FGI-13		FGI-13R		FGI-21		FGI-21R	
	Median MPA (range)															
1	–	–	–	–	–	–	–	–	–	–	0.09	(0.09-0.22)	–	–	–	–
2	0.13	(0.00-0.33)	0.17	(0.00-0.42)	0.13	(0.00-0.33)	0.17	(0.00-0.42)	–	–	0.17	(0.00-0.59)	–	–	0.15	(0.00-0.59)
3	0.22	(0.01-0.59)	0.29	(0.02-0.70)	0.22	(0.01-0.50)	0.29	(0.02-0.70)	0.10	(0.00-0.33)	0.29	(0.02-0.70)	0.09	(0.00-0.33)	0.21	(0.01-0.70)
4	0.31	(0.02-0.76)	0.36	(0.09-0.81)	0.26	(0.02-0.62)	0.34	(0.09-0.81)	0.20	(0.01-0.50)	0.32	(0.09-0.62)	0.22	(0.02-0.50)	0.32	(0.08-0.56)
5	0.38	(0.09-0.87)	0.42	(0.11-0.87)	0.38	(0.05-0.76)	0.43	(0.11-0.87)	0.27	(0.02-0.59)	0.40	(0.11-0.87)	0.22	(0.01-0.59)	0.32	(0.09-0.87)
6	0.30	(0.12-0.77)	0.41	(0.19-0.77)	0.38	(0.11-0.81)	0.43	(0.19-0.77)	0.37	(0.05-0.76)	0.45	(0.17-0.77)	0.32	(0.05-0.70)	0.42	(0.11-0.76)
7					0.41	(0.19-0.87)	–	–	0.38	(0.11-0.81)	0.42	(0.19-0.77)	0.37	(0.08-0.76)	0.39	(0.17-0.81)
8					–	–	–	–	0.43	(0.14-0.87)	–	–	0.36	(0.11-0.87)	0.55	(0.24-0.58)
9					–	–	–	–	0.39	(0.24-0.75)	–	–	0.43	(0.12-0.81)	–	–
10									–	–	–	–	0.42	(0.18-0.75)	–	–
11									–	–	–	–	–	–	–	–
12									–	–	–	–	–	–	–	–
13									–	–	–	–	–	–	–	–
14													–	–	–	–
15													–	–	–	–
16													–	–	–	–
17													–	–	–	–
18													–	–	–	–
19													–	–	–	–
20													–	–	–	–
21													–	–	–	–

[a] Food group diversity scores are from first observation day; MPA is based on estimated usual intake, calculated using repeat observations for a subset of the sample.
[b] Light shading indicates impossible values (beyond range of possible scores). A "–" indicates that a cell has fewer than 5 observations. Cells with fewer than 10 observations have dark shading.

Table 15. Relationship between MPA and Food Group Diversity Scores, All Women [a]

	Food group diversity score		MPA		Correlation Coefficient [b]	Partial correlation controlling for total energy intake [b]
	(mean)	(median)	(mean)	(median)	(median)	
FGI-6	4.1	4.0	0.32	0.31	0.346 ***	0.262 ***
FGI-6R [c]	3.5	3.0	0.32	0.31	0.465 ***	0.411 ***
FGI-9	4.5	4.0	0.32	0.31	0.422 ***	0.357 ***
FGI-9R [c]	3.6	4.0	0.32	0.31	0.489 ***	0.441 ***
FGI-13	5.7	6.0	0.32	0.31	0.429 ***	0.359 ***
FGI-13R [c]	3.7	4.0	0.32	0.31	0.481 ***	0.421 ***
FGI-21	6.5	6.0	0.32	0.31	0.402 ***	0.316 ***
FGI-21R [c]	4.4	4.0	0.32	0.31	0.465 ***	0.388 ***

[a] Food group diversity scores are from first observation day, MPA is based on the first observation day and repeat observations for a subset of the sample. MPA was transformed to approximate normality, and transformed MPA and BLUP for total energy intake were used for correlation analysis.
[b] A "*" indicates a coefficient that is statistically significant at $p < 0.05$; ** indicates $p < 0.01$, and *** indicates $p < 0.001$.
[c] Refers to minimum intake of 15 g for each of the food groups/sub-food groups.

Table 16. Results of Ordinary Least Squares Regression Analysis of the Determinants of MPA, All Women [a, b]

	FGI-6		FGI-6R		FGI-9		FGI-9R		FGI-13		FGI-13R		FGI-21		FGI-21R	
	Not controlling for energy															
	B	Standard error	B	Standard error	B	Standard error	B	Standard error	B	Standard error	B	Standard error	B	Standard error	B	Standard error
Constant	-1.313 ***	0.366	-1.366 ***	0.347	-1.404 ***	0.353	-1.289 ***	0.342	-1.468 ***	0.353	-1.348 ***	0.344	-1.327 ***	0.358	-1.222 ***	0.347
Woman's height	0.001	0.002	0.001	0.002	0.001	0.002	0.000	0.002	0.001	0.002	0.001	0.002	0.001	0.002	0.000	0.002
Age	-0.001	0.001	-0.001	0.001	-0.001	0.001	-0.001	0.001	-0.001	0.001	-0.001	0.001	0.000	0.001	0.000	0.001
Lactating (0/1)	-0.174 ***	0.028	-0.160 ***	0.026	-0.174 ***	0.027	-0.153 ***	0.026	-0.166 ***	0.027	-0.152 ***	0.026	-0.167 ***	0.027	-0.155 ***	0.026
Dietary diversity score	0.109 ***	0.014	0.123 ***	0.011	0.105 ***	0.011	0.120 ***	0.011	0.086 ***	0.009	0.099 ***	0.009	0.068 ***	0.007	0.083 ***	0.008
Adjusted R^2	0.190 ***		0.274 ***		0.248 ***		0.291 ***		0.247 ***		0.284 ***		0.227 ***		0.272 ***	
	Controlling for energy															
	B	Standard error	B	Standard error	B	Standard error	B	Standard error	B	Standard error	B	Standard error	B	Standard error	B	Standard error
Constant	-1.553 ***	0.331	-1.574 ***	0.316	-1.613 ***	0.320	-1.511 ***	0.313	-1.654 ***	0.322	-1.556 ***	0.315	-1.546 ***	0.328	-1.456 ***	0.321
Woman's height	0.000	0.002	0.000	0.002	0.000	0.002	0.000	0.002	0.001	0.002	0.001	0.002	0.000	0.002	0.000	0.002
Age	-0.002	0.001	-0.002	0.001	-0.002	0.001	-0.001	0.001	-0.001	0.001	-0.001	0.001	-0.001	0.001	-0.001	0.001
Lactating (0/1)	-0.219 ***	0.026	-0.204 ***	0.025	-0.217 ***	0.025	-0.198 ***	0.024	-0.210 ***	0.025	-0.197 ***	0.024	-0.210 ***	0.025	-0.199 ***	0.025
Dietary diversity score	0.077 ***	0.013	0.095 ***	0.011	0.082 ***	0.010	0.094 ***	0.010	0.065 ***	0.008	0.076 ***	0.009	0.047 ***	0.007	0.061 ***	0.008
Total energy intake [c]	0.209 ***	0.022	0.191 ***	0.021	0.199 ***	0.021	0.188 ***	0.021	0.196 ***	0.021	0.187 ***	0.021	0.195 ***	0.022	0.183 ***	0.022
Adjusted R^2	0.341 ***		0.398 ***		0.386 ***		0.412 ***		0.378 ***		0.402 ***		0.353 ***		0.380 ***	

[a] A "*" indicates a coefficient that is statistically significant at $p < 0.05$; ** indicates $p < 0.01$, and *** indicates $p < 0.001$. For the adjusted R^2, the stars indicate the significance level of the F statistic of the regression.
[b] MPA was transformed to approximate a normal distribution and the transformed variable was used in the regressions.
[c] Energy was divided by 1,000 before running the regressions. Otherwise, while being highly significant, all coefficients showed as 0.000 due to the large scale of the energy variable (range 1,011-3,599 kcal) and the small scale of MPA (range 0.00-0.87).

Table 17. Percent of Observation Days above Selected Cutoff(s) for MPA, All Women [a]

	Percent (number)	
Women with MPA >50%	16	(64)
Women with MPA >60%	5	(22)
Women with MPA >70%	3	(12)
Women with MPA >80%	1	(2)
Women with MPA >90%	0	(0)

[a] MPA is calculated based on both observation days.

Table 18. MPA: Performance of Diversity Scores, All Women [a]

	Range	AUC	p-value [b]	SEM [c]	95% CI [d]
			MPA >50% (first cutoff)		
FGI-6	2.0-6.0	0.593	0.018	0.031	0.532-0.655
FGI-6R [e]	1.0-6.0	0.722	0.000	0.027	0.670-0.775
FGI-9	2.0-7.0	0.684	0.000	0.032	0.622-0.746
FGI-9R [e]	1.0-7.0	0.746	0.000	0.028	0.691-0.801
FGI-13	2.0-10.0	0.689	0.000	0.031	0.628-0.749
FGI-13R [e]	1.0-8.0	0.745	0.000	0.030	0.687-0.804
FGI-21	2.0-11.0	0.671	0.000	0.034	0.604-0.738
FGI-21R [e]	1.0-9.0	0.711	0.000	0.034	0.644-0.779
			MPA > 60% (second cutoff)		
FGI-6	2.0-6.0	0.665	0.009	0.046	0.574-0.755
FGI-6R [e]	1.0-6.0	0.790	0.000	0.036	0.721-0.860
FGI-9	2.0-7.0	0.764	0.000	0.035	0.695-0.833
FGI-9R [e]	1.0-7.0	0.822	0.000	0.036	0.753-0.892
FGI-13	2.0-10.0	0.764	0.000	0.034	0.697-0.831
FGI-13R [e]	1.0-8.0	0.839	0.000	0.031	0.778-0.900
FGI-21	2.0-11.0	0.740	0.000	0.044	0.654-0.826
FGI-21R [e]	1.0-9.0	0.809	0.000	0.038	0.735-0.883

[a] Diversity scores are from a single (R1) observation day. MPA is calculated based on both observation days.
[b] P-value for test of null hypothesis that area = 0.5 ("neutral" diagonal line on ROC graph).
[c] Standard error of the mean.
[d] Confidence interval.
[e] Refers to minimum intake of 15 g for each food groups/sub-food groups.

Table 19. MPA: Tests Comparing AUC for Various Diversity Scores, All Women [a, b]

		FGI-6	FGI-6R	FGI-9	FGI-9R	FGI-13	FGI-13R	FGI-21	FGI-21R
					MPA > 50% (first cutoff)				
	AUC [c]	0.593	0.722	0.684	0.746	0.689	0.745	0.671	0.711
						P-values			
FGI-6	0.593								
FGI-6R [d]	0.722	**0.000**							
FGI-9	0.684	**0.000**	0.153						
FGI-9R [d]	0.746	**0.000**	**0.032**	**0.013**					
FGI-13	0.689	**0.000**	0.228	0.784	**0.036**				
FGI-13R [d]	0.745	**0.000**	0.184	**0.044**	0.961	0.053			
FGI-21	0.671	**0.005**	0.088	0.626	**0.012**	0.372	**0.011**		
FGI-21R [d]	0.711	**0.000**	0.636	0.437	0.100	0.504	**0.023**	0.137	
					MPA > 60% (second cutoff)				
		FGI-6	**FGI-6R**	**FGI-9**	**FGI-9R**	**FGI-13**	**FGI-13R**	**FGI-21**	**FGI-21R**
	AUC [c]	0.665	0.790	0.764	0.822	0.764	0.839	0.740	0.809
						P-values			
FGI-6	0.665								
FGI-6R [d]	0.790	**0.000**							
FGI-9	0.764	**0.002**	0.420						
FGI-9R [d]	0.822	**0.000**	0.127	0.110					
FGI-13	0.764	**0.008**	0.405	0.990	0.152				
FGI-13R [d]	0.839	**0.000**	**0.042**	0.053	0.456	**0.047**			
FGI-21	0.740	0.063	0.134	0.484	**0.048**	0.437	**0.016**		
FGI-21R [d]	0.809	**0.002**	0.526	0.306	0.613	0.303	0.124	**0.044**	

[a] Diversity scores are from a single (R1) observation day. MPA is calculated based on both observation days.
[b] P-value for test of null hypothesis that area under the curve is equal for the 2 indicators. P-values <0.05 are in bold type.
[c] Area under the curve.
[d] Refers to minimum intake of 15 g for each food groups/sub-food groups.

Table 20a. Sensitivity/Specificity Analysis of the Relationship between Food Group Diversity (FGI-6) and MPA, by Diversity Cutoffs, All Women [a]

n	Cutoff	Sensitivity	Specificity	Proportion of false positives	Proportion of false negatives	Total proportion misclassified
			MPA > 50%			
412	≥ 1	100.0	0.0	84.5	0.0	84.5
412	≥ 2	100.0	0.0	84.5	0.0	84.5
398	≥ 3	100.0	4.0	81.1	0.0	81.1
326	≥ 4	95.3	23.9	64.3	0.7	65.0
137	≥ 5	39.1	67.8	27.2	9.5	36.7
20	6	6.3	95.4	3.9	14.6	18.4
			MPA > 60%			
412	≥ 1	100.0	0.0	94.7	0.0	94.7
412	≥ 2	100.0	0.0	94.7	0.0	94.7
398	≥ 3	100.0	3.6	91.3	0.0	91.3
326	≥ 4	100.0	22.1	73.8	0.0	73.8
137	≥ 5	54.5	67.9	30.3	2.4	32.8
20	6	9.1	95.4	4.4	4.9	9.2

[a] Diversity scores are from a single (R1) observation day. MPA is calculated based on both observation days.

Table 20b. Sensitivity/Specificity Analysis of the Relationship between Food Group Diversity (FGI-6R) and MPA, by Diversity Cutoffs, All Women [a]

n	Cutoff	Sensitivity	Specificity	Proportion of false positives	Proportion of false negatives	Total proportion misclassified
			MPA > 50%			
412	≥ 1	100.0	0.0	84.5	0.0	84.5
409	≥ 2	100.0	0.9	83.7	0.0	83.7
344	≥ 3	100.0	19.5	68.0	0.0	68.0
205	≥ 4	84.4	56.6	36.7	2.4	39.1
62	≥ 5	26.6	87.1	10.9	11.4	22.3
10	6	3.1	97.7	1.9	15.0	17.0
			MPA > 60%			
412	≥ 1	100.0	0.0	94.7	0.0	94.7
409	≥ 2	100.0	0.8	93.9	0.0	93.9
344	≥ 3	100.0	17.4	78.2	0.0	78.2
205	≥ 4	95.5	52.8	44.7	0.2	44.9
62	≥ 5	45.5	86.7	12.6	2.9	15.5
10	6	9.1	97.9	1.9	4.9	6.8

[a] Diversity scores are from a single (R1) observation day. MPA is calculated based on both observation days.

Table 20c. Sensitivity/Specificity Analysis of the Relationship between Food Group Diversity (FGI-9) and MPA, by Diversity Cutoffs, All Women [a]

n	Cutoff	Sensitivity	Specificity	Proportion of false positives	Proportion of false negatives	Total proportion misclassified
				MPA > 50%		
412	≥ 1	100.0	0.0	84.5	0.0	84.5
412	≥ 2	100.0	0.0	84.5	0.0	84.5
398	≥ 3	100.0	4.0	81.1	0.0	81.1
341	≥ 4	98.4	20.1	67.5	0.2	67.7
197	≥ 5	71.9	56.6	36.7	4.4	41.0
74	≥ 6	32.8	84.8	12.9	10.4	23.3
12	≥ 7	6.3	97.7	1.9	14.6	16.5
0	≥ 8	–	–	–	–	–
0	9	–	–	–	–	–
				MPA > 60%		
412	≥ 1	100.0	0.0	94.7	0.0	94.7
412	≥ 2	100.0	0.0	94.7	0.0	94.7
398	≥ 3	100.0	3.6	91.3	0.0	91.3
341	≥ 4	100.0	18.2	77.4	0.0	77.4
197	≥ 5	95.5	54.9	42.7	0.2	43.0
74	≥ 6	36.4	83.1	16.0	3.4	19.4
12	≥ 7	13.6	97.7	2.2	4.6	6.8
0	≥ 8	–	–	–	–	–
0	9	–	–	–	–	–

[a] Diversity scores are from a single (R1) observation day. MPA is calculated based on both observation days.

Table 20d. Sensitivity/Specificity Analysis of the Relationship between Food Group Diversity (FGI-9R) and MPA, by Diversity Cutoffs, All Women [a]

n	Cutoff	Sensitivity	Specificity	Proportion of false positives	Proportion of false negatives	Total proportion misclassified
				MPA > 50%		
412	≥ 1	100.0	0.0	84.5	0.0	84.5
409	≥ 2	100.0	0.9	83.7	0.0	83.7
345	≥ 3	100.0	19.3	68.2	0.0	68.2
212	≥ 4	84.4	54.6	38.3	2.4	40.8
82	≥ 5	45.3	84.8	12.9	8.5	21.4
15	≥ 6	6.3	96.8	2.7	14.6	17.2
1	≥ 7	0.0	99.7	0.2	15.5	15.8
0	≥ 8	–	–	–	–	–
0	9	–	–	–	–	–
				MPA > 60%		
412	≥ 1	100.0	0.0	94.7	0.0	94.7
409	≥ 2	100.0	0.8	93.9	0.0	93.9
345	≥ 3	100.0	17.2	78.4	0.0	78.4
212	≥ 4	95.5	51.0	46.4	0.2	46.6
82	≥ 5	68.2	82.8	16.3	1.7	18.0
15	≥ 6	13.6	96.9	2.9	4.6	7.5
1	≥ 7	0.0	99.7	0.2	5.3	5.6
0	≥ 8	–	–	–	–	–
0	9	–	–	–	–	–

[a] Diversity scores are from a single (R1) observation day. MPA is calculated based on both observation days.

Table 20e. Sensitivity/Specificity Analysis of the Relationship between Food Group Diversity (FGI-13) and MPA, by Diversity Cutoffs, All Women [a]

n	Cutoff	Sensitivity	Specificity	Proportion of false positives	Proportion of false negatives	Total proportion misclassified
				MPA > 50%		
412	≥ 1	100.0	0.0	84.5	0.0	84.5
412	≥ 2	100.0	0.0	84.5	0.0	84.5
410	≥ 3	100.0	0.6	84.0	0.0	84.0
394	≥ 4	100.0	5.2	80.1	0.0	80.1
338	≥ 5	98.4	21.0	66.7	0.2	67.0
229	≥ 6	81.3	49.1	43.0	2.9	45.9
102	≥ 7	42.2	78.4	18.2	9.0	27.2
38	≥ 8	15.6	92.0	6.8	13.1	19.9
8	≥ 9	4.7	98.6	1.2	14.8	16.0
1	≥10	1.6	100.0	0.0	15.3	15.3
0	≥ 11	–	–	–	–	–
0	≥ 12	–	–	–	–	–
0	13	–	–	–	–	–
				MPA > 60%		
412	≥ 1	100.0	0.0	94.7	0.0	94.7
412	≥ 2	100.0	0.0	94.7	0.0	94.7
410	≥ 3	100.0	0.5	94.2	0.0	94.2
394	≥ 4	100.0	4.6	90.3	0.0	90.3
338	≥ 5	100.0	19.0	76.7	0.0	76.7
229	≥ 6	100.0	46.9	50.2	0.0	50.2
102	≥ 7	54.5	76.9	21.8	2.4	24.3
38	≥ 8	18.2	91.3	8.3	4.4	12.6
8	≥ 9	9.1	98.5	1.5	4.9	6.3
1	≥10	4.5	100.0	0.0	5.1	5.1
0	≥ 11	–	–	–	–	–
0	≥ 12	–	–	–	–	–
0	13	–	–	–	–	–

[a] Diversity scores are from a single (R1) observation day. MPA is calculated based on both observation days.

Table 20f. Sensitivity/Specificity Analysis of the Relationship between Food Group Diversity (FGI-13R) and MPA, by Diversity Cutoffs, All Women [a]

n	Cutoff	Sensitivity	Specificity	Proportion of false positives	Proportion of false negatives	Total proportion misclassified
			MPA > 50%			
412	≥ 1	100.0	0.0	84.5	0.0	84.5
406	≥ 2	100.0	1.7	83.0	0.0	83.0
339	≥ 3	98.4	20.7	67.0	0.2	67.2
225	≥ 4	84.4	50.9	41.5	2.4	43.9
108	≥ 5	59.4	79.9	17.0	6.3	23.3
30	≥ 6	14.1	94.0	5.1	13.3	18.4
12	≥ 7	4.7	97.4	2.2	14.8	17.0
1	≥ 8	0.0	99.7	0.2	15.5	15.8
0	≥ 9	–	–	–	–	–
0	≥ 10	–	–	–	–	–
0	≥ 11	–	–	–	–	–
0	≥ 12	–	–	–	–	–
0	13	–	–	–	–	–
			MPA > 60%			
412	≥ 1	100.0	0.0	94.7	0.0	94.7
406	≥ 2	100.0	1.5	93.2	0.0	93.2
339	≥ 3	100.0	18.7	76.9	0.0	76.9
225	≥ 4	95.5	47.7	49.5	0.2	49.8
108	≥ 5	90.9	77.4	21.4	0.5	21.8
30	≥ 6	18.2	93.3	6.3	4.4	10.7
12	≥ 7	4.5	97.2	2.7	5.1	7.8
1	≥ 8	0.0	99.7	0.2	5.3	5.6
0	≥ 9	–	–	–	–	–
0	≥ 10	–	–	–	–	–
0	≥ 11	–	–	–	–	–
0	≥ 12	–	–	–	–	–
0	13	–	–	–	–	–

[a] Diversity scores are from a single (R1) observation day. MPA is calculated based on both observation days.

Table 20g. Sensitivity/Specificity Analysis of the Relationship between Food Group Diversity (FGI-21) and MPA, by Diversity Cutoffs, All Women [a]

n	Cutoff	Sensitivity	Specificity	Proportion of false positives	Proportion of false negatives	Total proportion misclassified
				MPA > 50%		
412	≥ 1	100.0	0.0	84.5	0.0	84.5
412	≥ 2	100.0	0.0	84.5	0.0	84.5
410	≥ 3	100.0	0.6	84.0	0.0	84.0
399	≥ 4	100.0	3.7	81.3	0.0	81.3
375	≥ 5	98.4	10.3	75.7	0.2	76.0
307	≥ 6	92.2	28.7	60.2	1.2	61.4
191	≥ 7	67.2	57.5	35.9	5.1	41.0
107	≥ 8	42.2	77.0	19.4	9.0	28.4
46	≥ 9	23.4	91.1	7.5	11.9	19.4
11	≥ 10	6.3	98.0	1.7	14.6	16.3
3	≥ 11	1.6	99.4	0.5	15.3	15.8
0	≥ 12	–	–	–	–	–
0	≥ 13	–	–	–	–	–
0	≥ 14	–	–	–	–	–
0	≥ 15	–	–	–	–	–
0	≥ 16	–	–	–	–	–
0	≥ 17	–	–	–	–	–
0	≥ 18	–	–	–	–	–
0	≥ 19	–	–	–	–	–
0	≥ 20	–	–	–	–	–
0	21	–	–	–	–	–
				MPA > 60%		
412	≥ 1	100.0	0.0	94.7	0.0	94.7
412	≥ 2	100.0	0.0	94.7	0.0	94.7
410	≥ 3	100.0	0.5	94.2	0.0	94.2
399	≥ 4	100.0	3.3	91.5	0.0	91.5
375	≥ 5	100.0	9.5	85.7	0.0	85.7
307	≥ 6	100.0	26.9	69.2	0.0	69.2
191	≥ 7	81.8	55.6	42.0	1.0	43.0
107	≥ 8	54.5	75.6	23.1	2.4	25.5
46	≥ 9	27.3	89.7	9.7	3.9	13.6
11	≥ 10	9.1	97.7	2.2	4.9	7.0
3	≥ 11	4.5	99.5	0.5	5.1	5.6
0	≥ 12	–	–	–	–	–
0	≥ 13	–	–	–	–	–
0	≥ 14	–	–	–	–	–
0	≥ 15	–	–	–	–	–
0	≥ 16	–	–	–	–	–
0	≥ 17	–	–	–	–	–
0	≥ 18	–	–	–	–	–
0	≥ 19	–	–	–	–	–
0	≥ 20	–	–	–	–	–
0	21	–	–	–	–	–

[a] Diversity scores are from a single (R1) observation day. MPA is calculated based on both observation days.

Table 20h. Sensitivity/Specificity Analysis of the Relationship between Food Group Diversity (FGI-21R) and MPA, by Diversity Cutoffs, All Women [a]

n	Cutoff	Sensitivity	Specificity	Proportion of false positives	Proportion of false negatives	Total proportion misclassified
				MPA > 50%		
412	≥ 1	100.0	0.0	84.5	0.0	84.5
409	≥ 2	100.0	0.9	83.7	0.0	83.7
373	≥ 3	98.4	10.9	75.2	0.2	75.5
291	≥ 4	87.5	32.5	57.0	1.9	59.0
178	≥ 5	71.9	62.1	32.0	4.4	36.4
83	≥ 6	45.3	84.5	13.1	8.5	21.6
34	≥ 7	18.8	93.7	5.3	12.6	18.0
10	≥ 8	6.3	98.3	1.5	14.6	16.0
4	≥ 9	0.0	98.9	1.0	15.5	16.5
0	≥ 10	–	–	–	–	–
0	≥ 11	–	–	–	–	–
0	≥ 12	–	–	–	–	–
0	≥ 13	–	–	–	–	–
0	≥ 14	–	–	–	–	–
0	≥ 15	–	–	–	–	–
0	≥ 16	–	–	–	–	–
0	≥ 17	–	–	–	–	–
0	≥ 18	–	–	–	–	–
0	≥ 19	–	–	–	–	–
0	≥ 20	–	–	–	–	–
0	21	–	–	–	–	–
				MPA > 60%		
412	≥ 1	100.0	0.0	94.7	0.0	94.7
409	≥ 2	100.0	0.8	93.9	0.0	93.9
373	≥ 3	100.0	10.0	85.2	0.0	85.2
291	≥ 4	95.5	30.8	65.5	0.2	65.8
178	≥ 5	95.5	59.7	38.1	0.2	38.3
83	≥ 6	63.6	82.3	16.7	1.9	18.7
34	≥ 7	22.7	92.6	7.0	4.1	11.2
10	≥ 8	0.0	97.4	2.4	5.3	7.8
4	≥ 9	0.0	99.0	1.0	5.3	6.3
0	≥ 10	–	–	–	–	–
0	≥ 11	–	–	–	–	–
0	≥ 12	–	–	–	–	–
0	≥ 13	–	–	–	–	–
0	≥ 14	–	–	–	–	–
0	≥ 15	–	–	–	–	–
0	≥ 16	–	–	–	–	–
0	≥ 17	–	–	–	–	–
0	≥ 18	–	–	–	–	–
0	≥ 19	–	–	–	–	–
0	≥ 20	–	–	–	–	–
0	21	–	–	–	–	–

[a] Diversity scores are from a single (R1) observation day. MPA is calculated based on both observation days.

FIGURES

Histograms of intakes for 11 micronutrients (R1 data): Figures 1-11

Histograms for intra-individual SDs of intake, based on data from two rounds: Figures 12-22

Histograms for FGIs (R1 data): Figures 23-30

Histograms of PA for 11 micronutrients, based on data from two rounds: Figures 31-41

Histogram of MPA, based on data from two rounds: Figure 42

Figure 1. Distribution of Thiamin Intakes, All Women

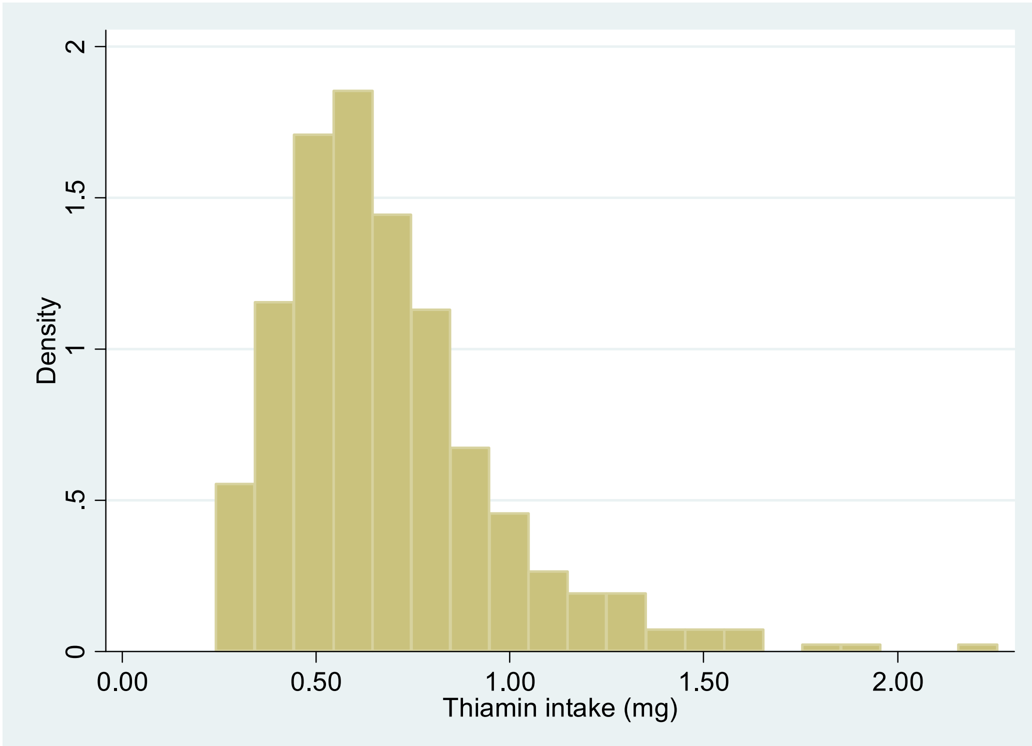


Figure 2. Distribution of Riboflavin Intakes, All Women

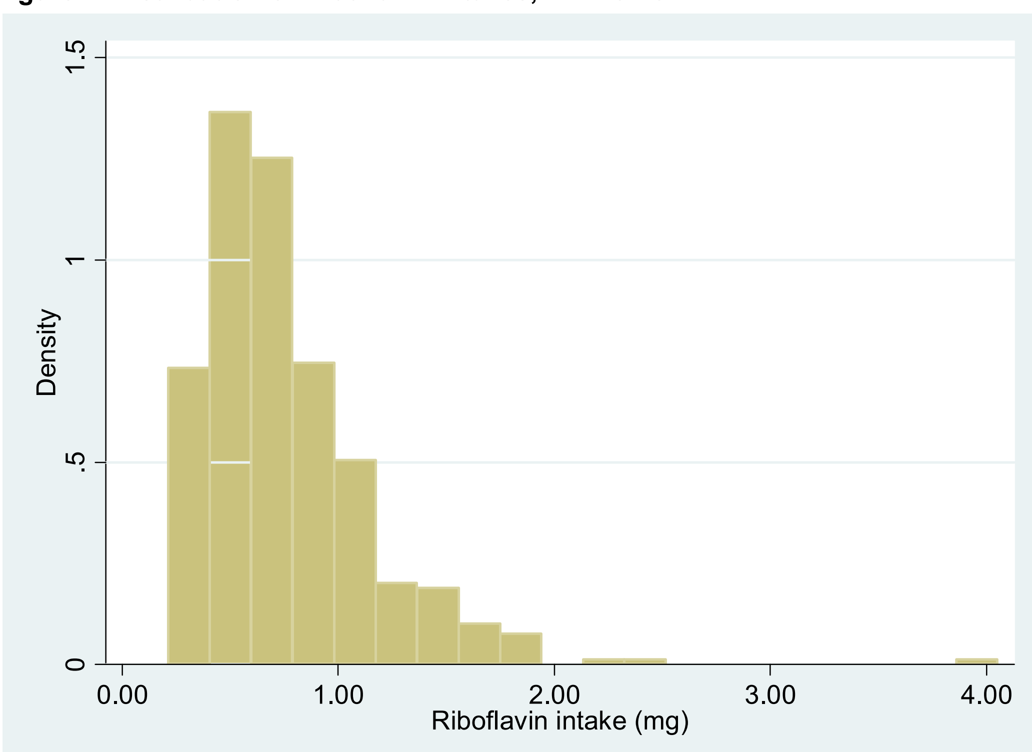


Figure 3. Distribution of Niacin Intakes, All Women

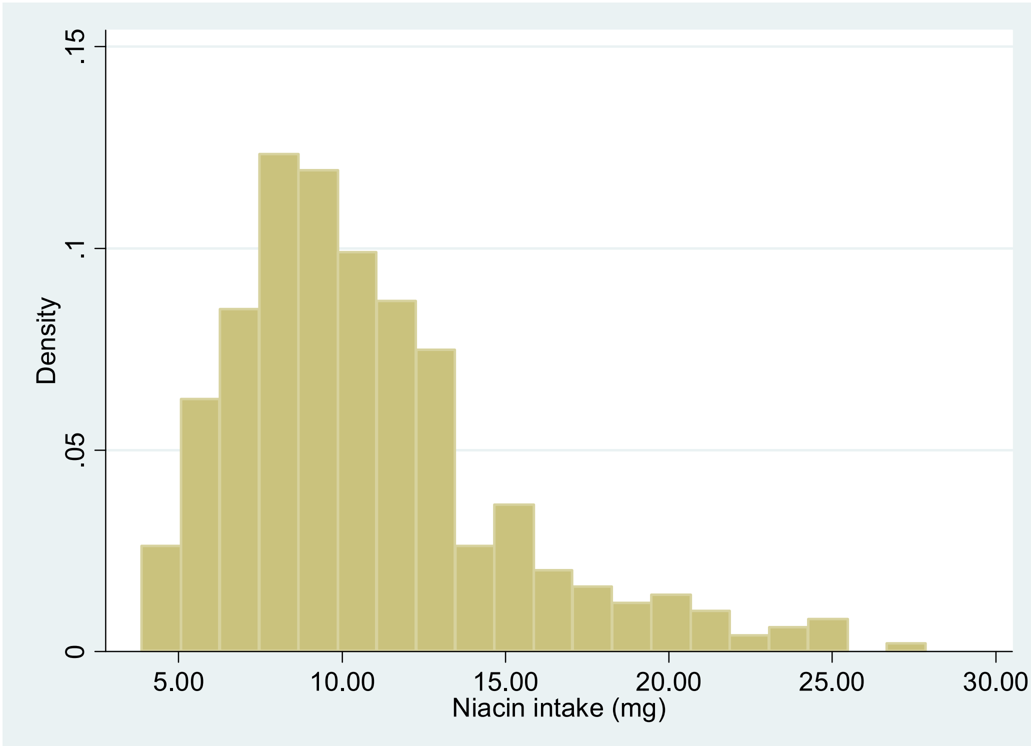


Figure 4. Distribution of Vitamin B6 Intakes, All Women

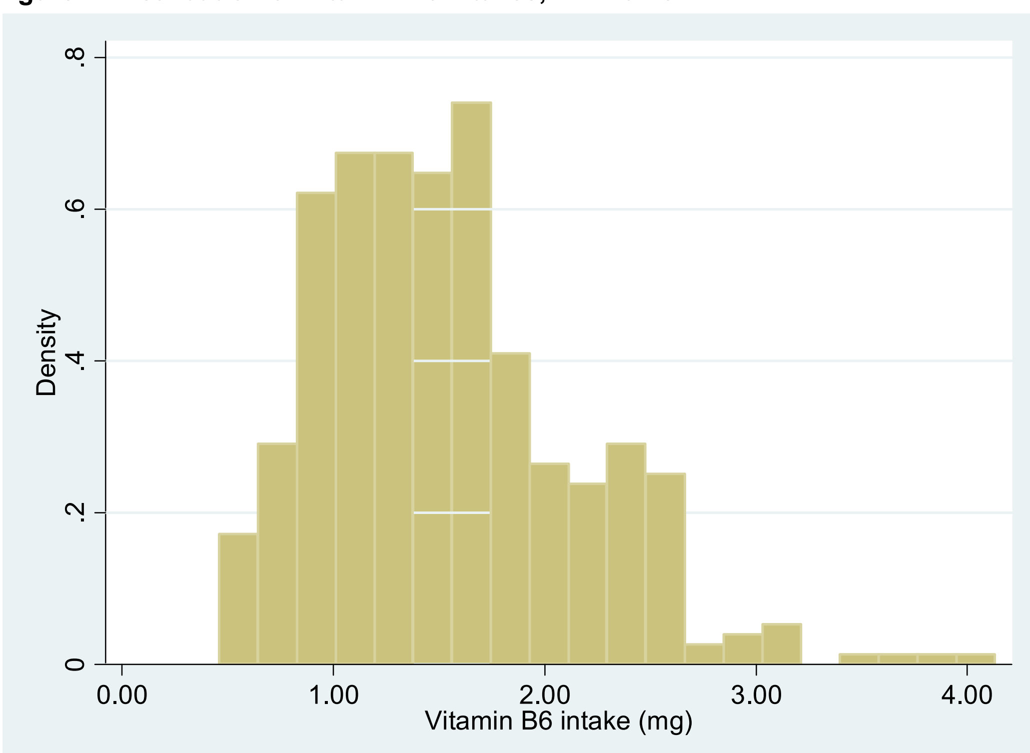


Figure 5. Distribution of Folate Intakes, All Women

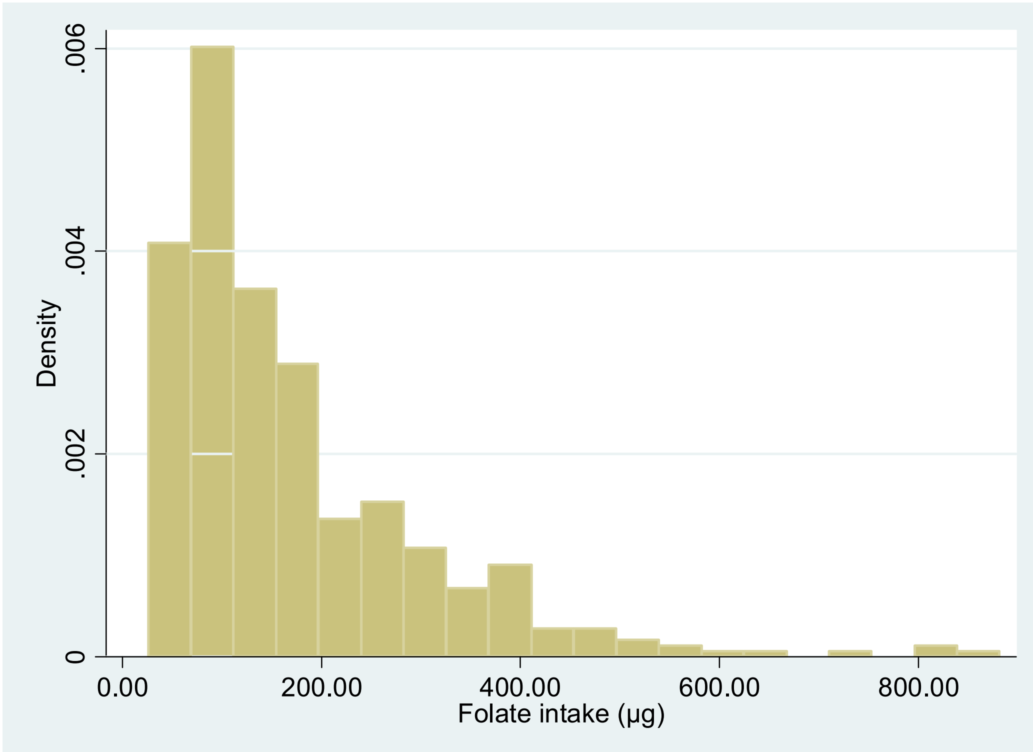


Figure 6. Distribution of Vitamin B12 Intakes, All Women

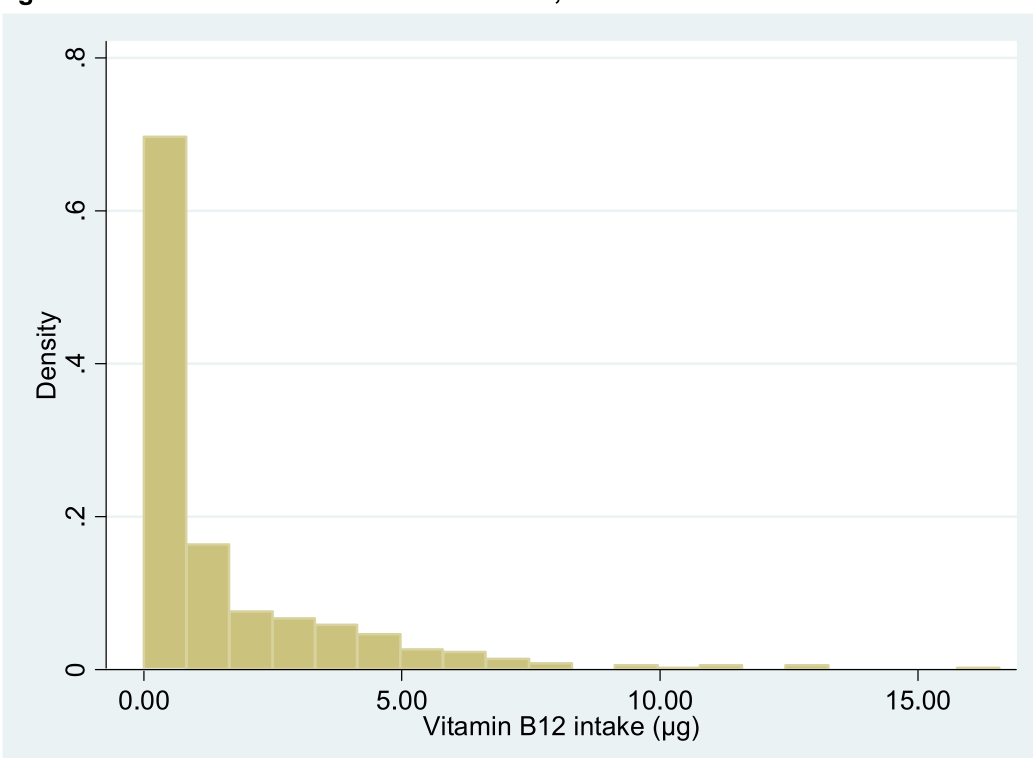


Figure 7. Distribution of Vitamin C Intakes, All Women

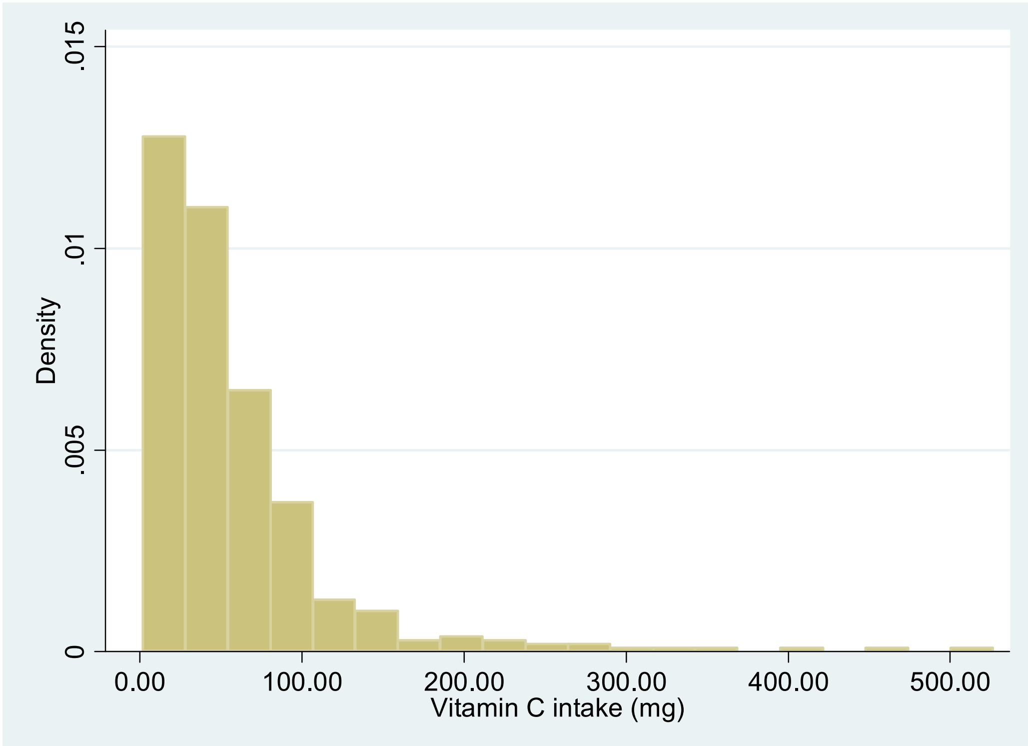


Figure 8. Distribution of Vitamin A Intakes, All Women

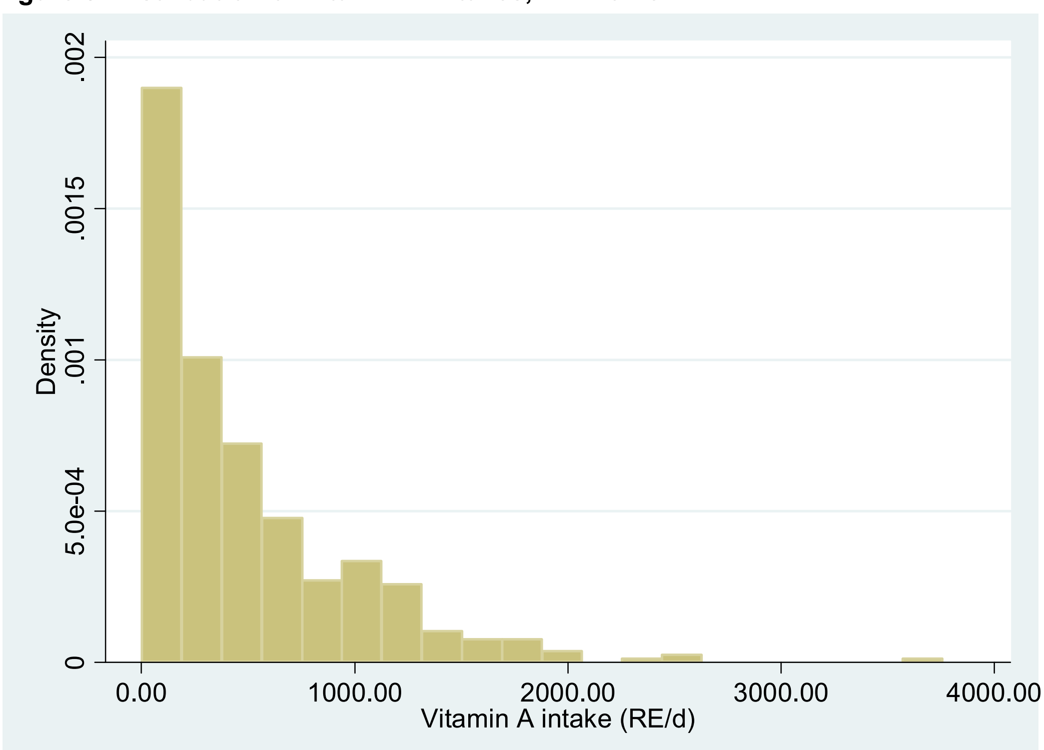


Figure 9. Distribution of Calcium Intakes, All Women

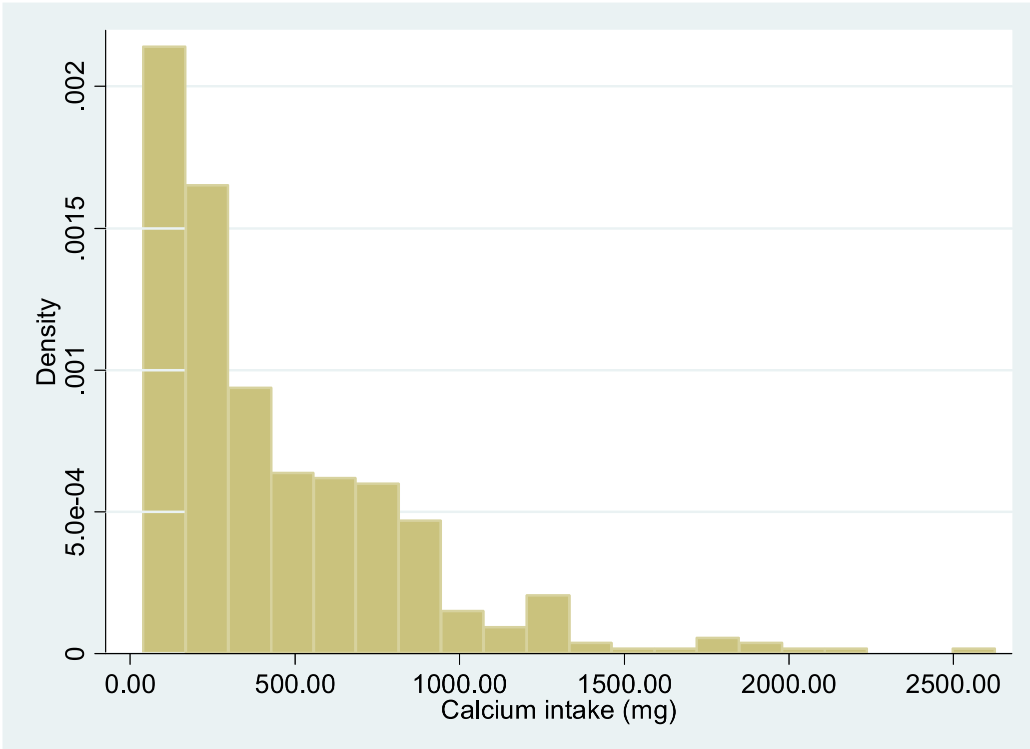


Figure 10. Distribution of Iron Intakes, All Women

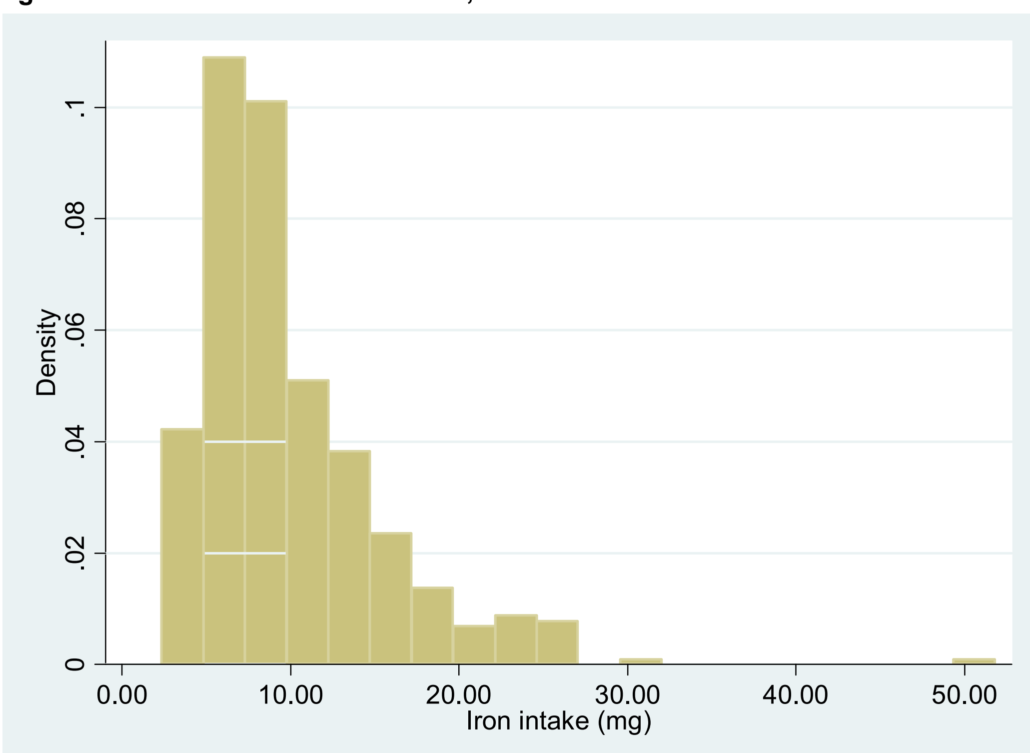


Figure 11. Distribution of Zinc Intake, All Women

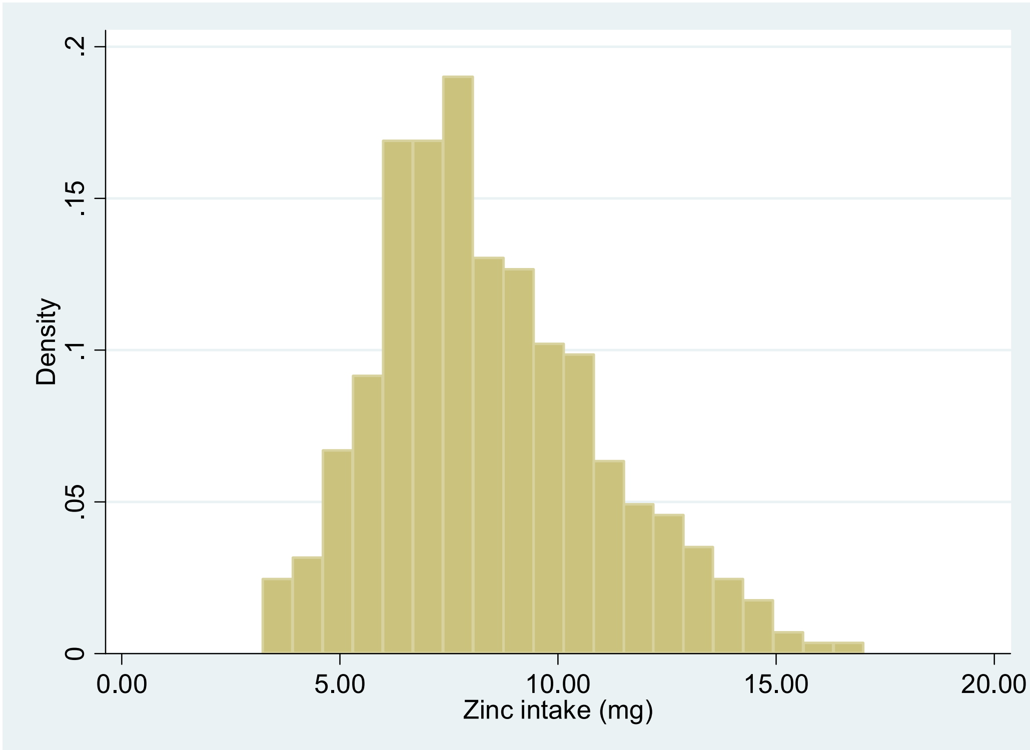


Figure 12. Intra-Individual SD of Thiamin Intakes, All Women

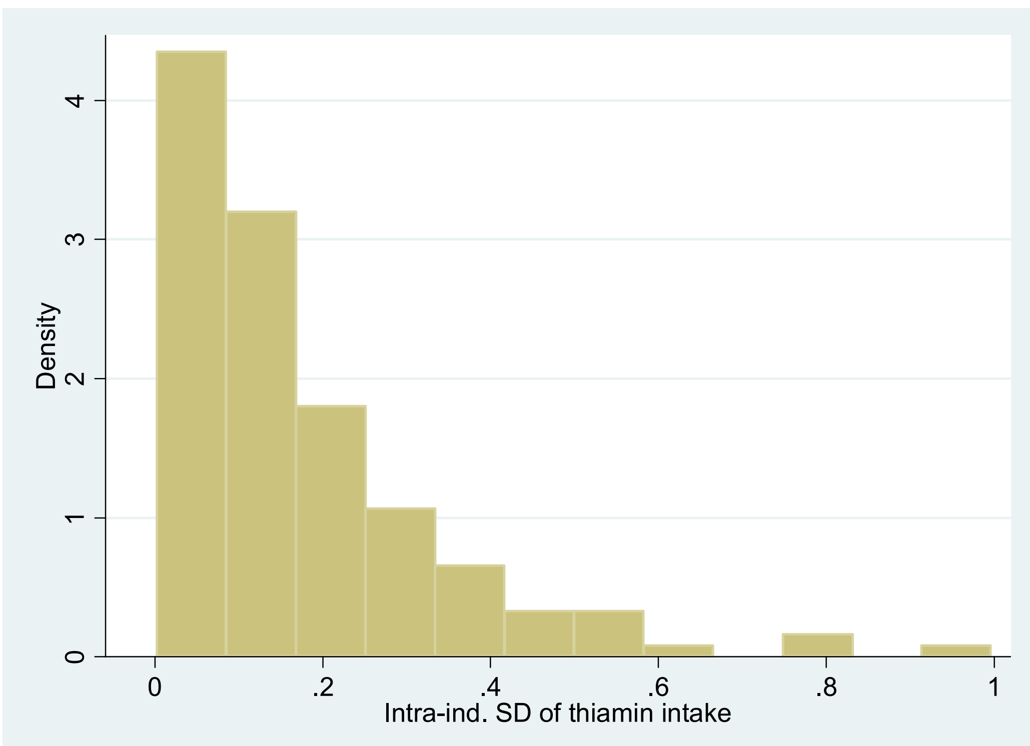


Figure 13. Intra-Individual SD of Riboflavin Intakes, All Women

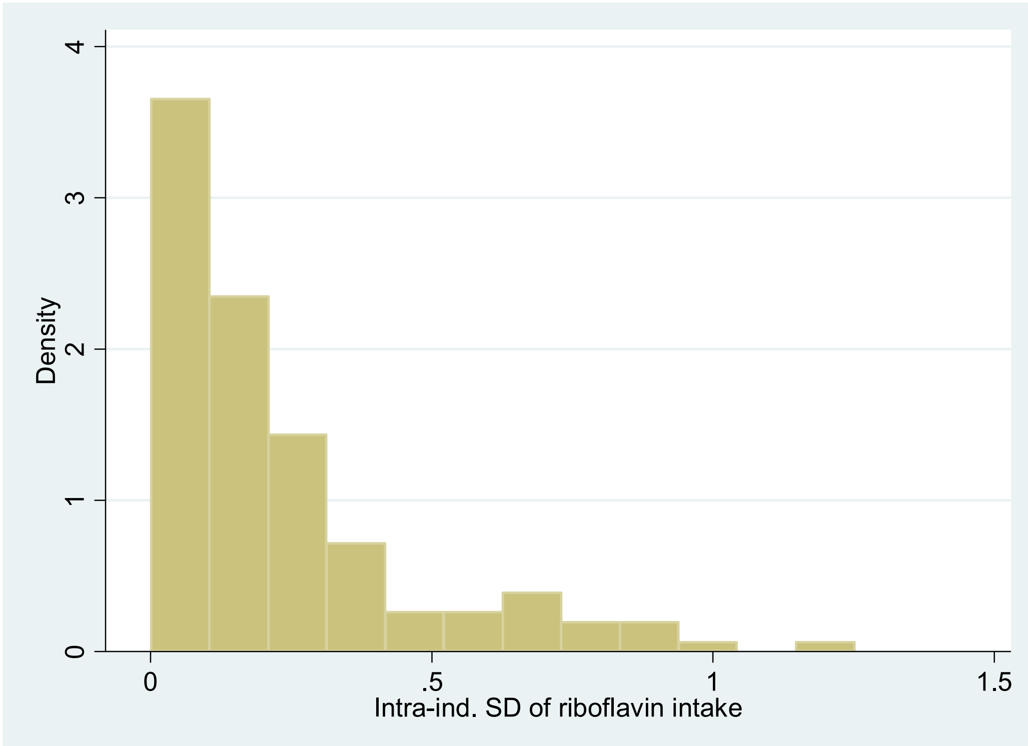


Figure 14. Intra-Individual SD of Niacin Intakes, All Women

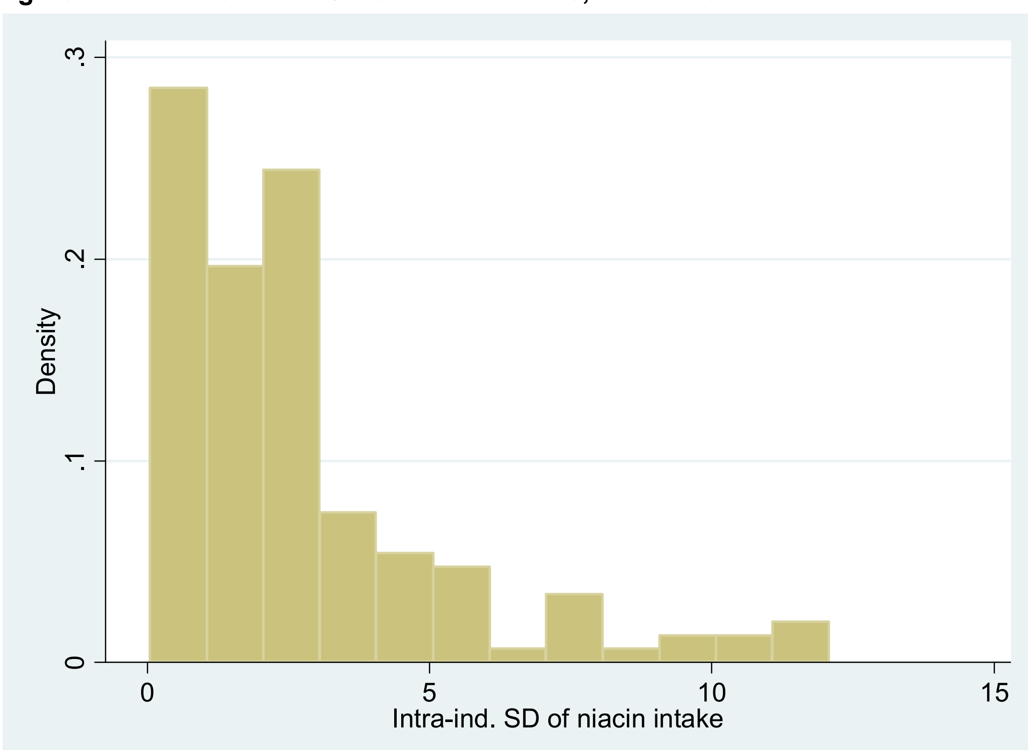


Figure 15. Intra-Individual SD of Vitamin B6 Intakes, All Women

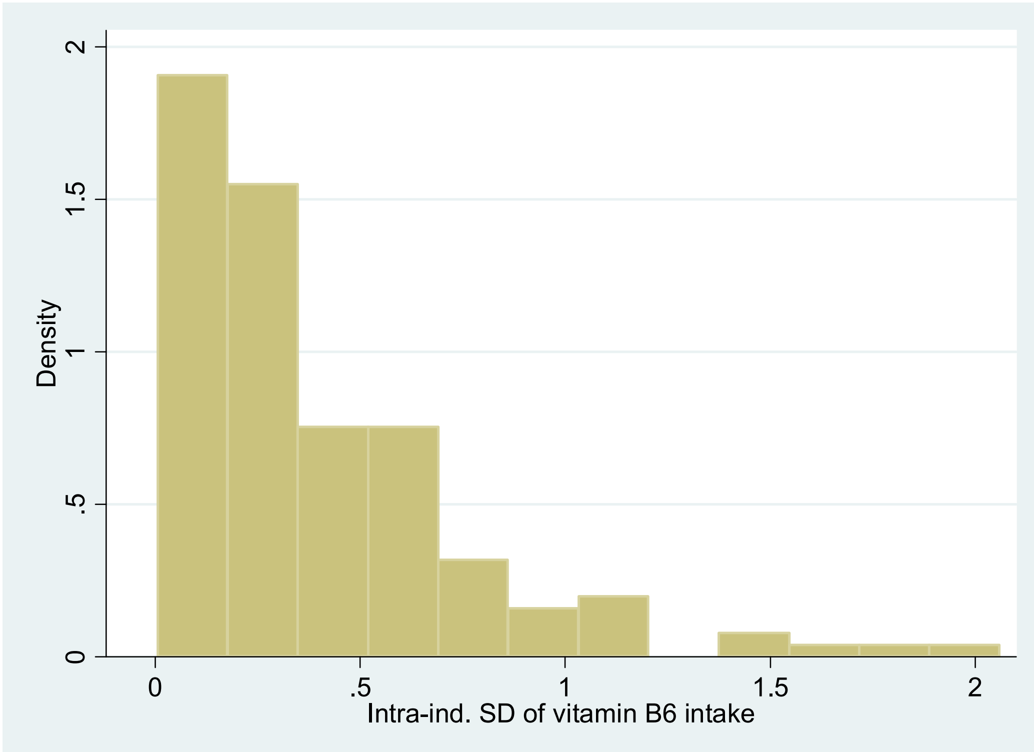


Figure 16. Intra-Individual SD of Folate Intakes, All Women

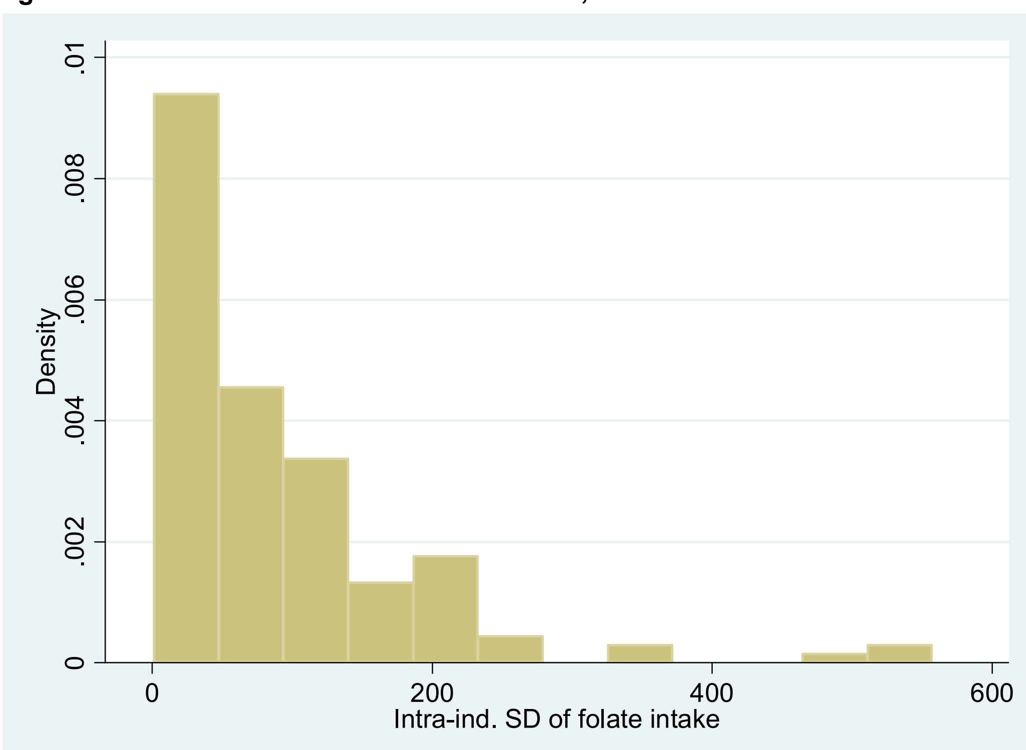


Figure 17. Intra-Individual SD of Vitamin B12 Intakes, All Women

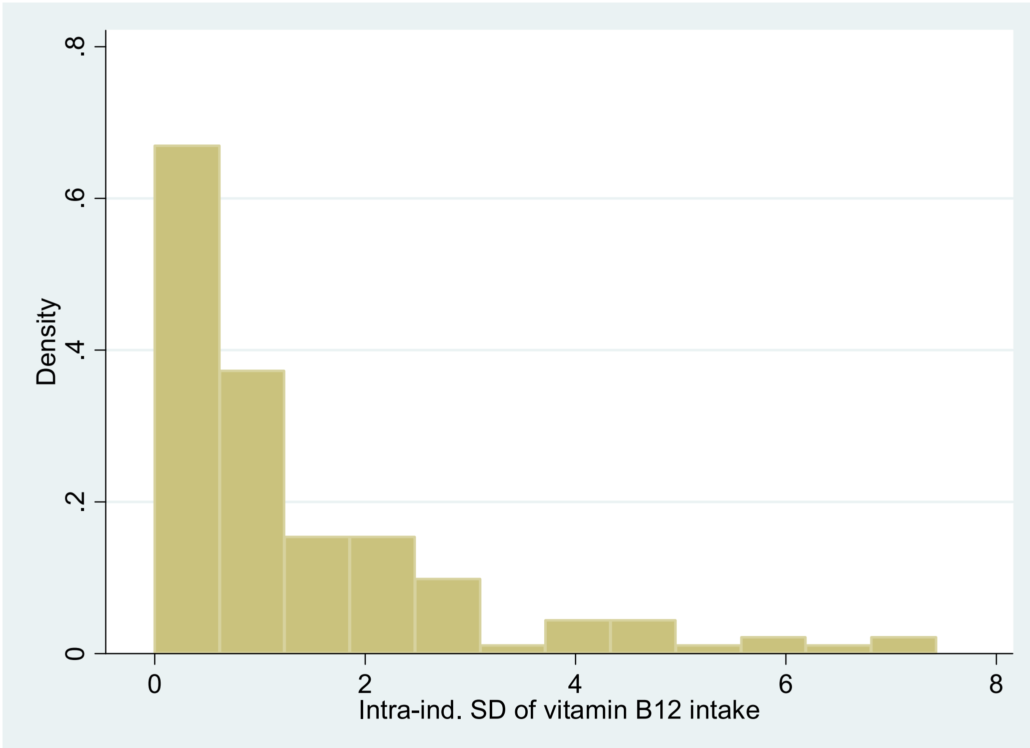


Figure 18. Intra-Individual SD of Vitamin C Intakes, All Women

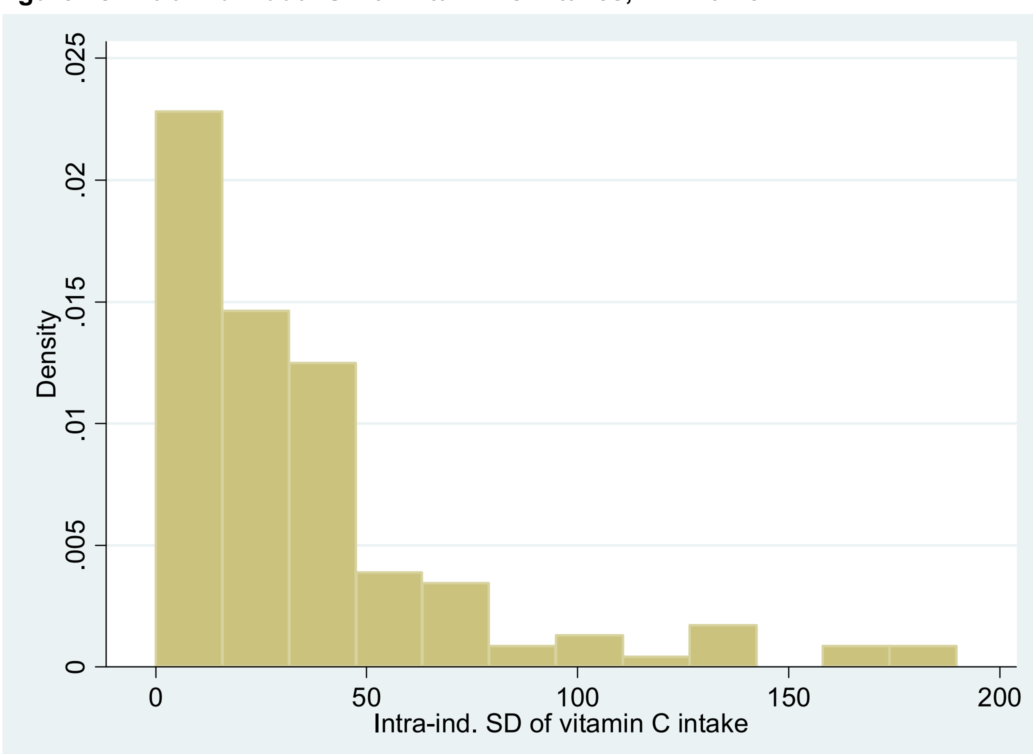


Figure 19. Intra-Individual SD of Vitamin A Intakes, All Women

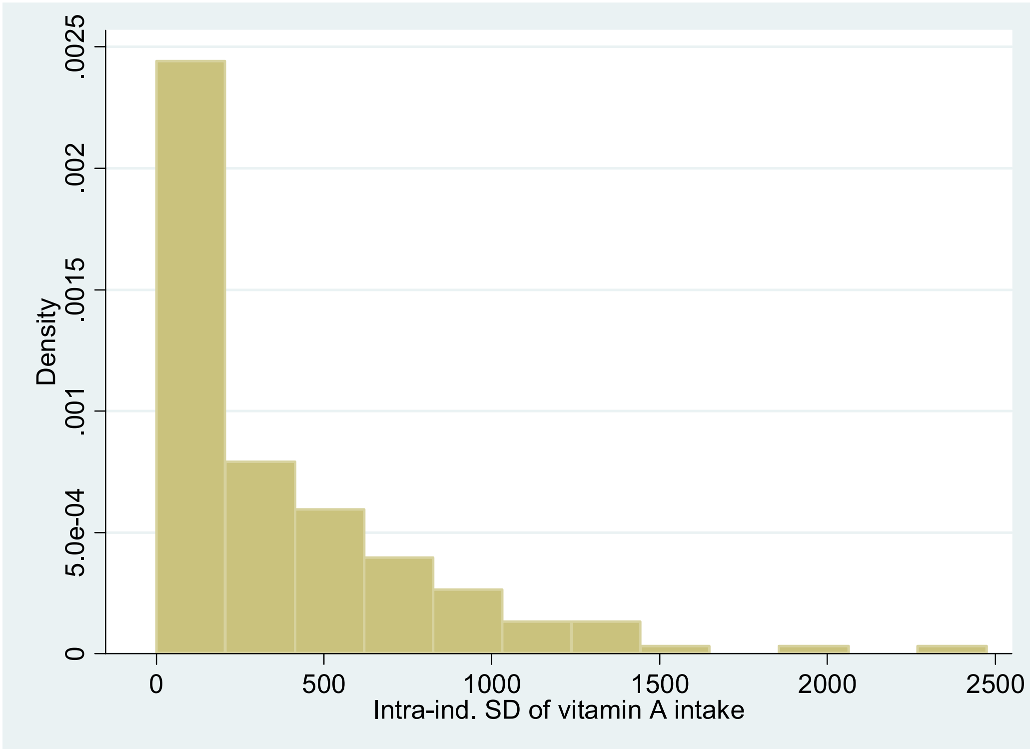


Figure 20. Intra-Individual SD of Calcium Intakes, All Women

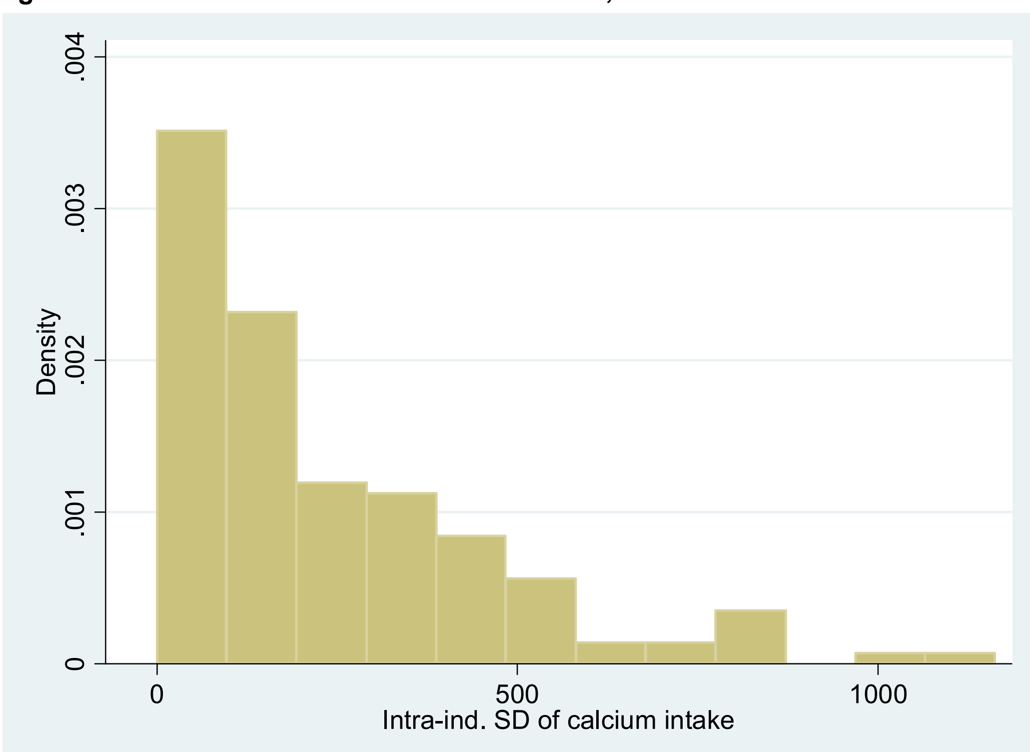


Figure 21. Intra-Individual SD of Iron Intakes, All Women

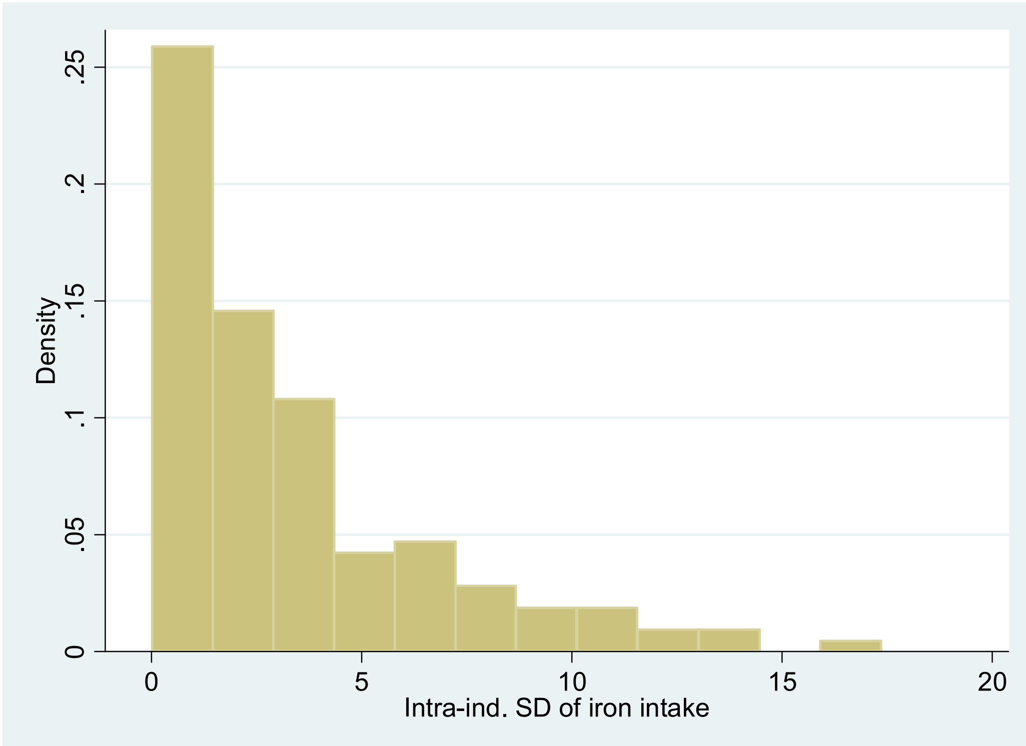


Figure 22. Intra-Individual SD of Zinc Intakes, All Women

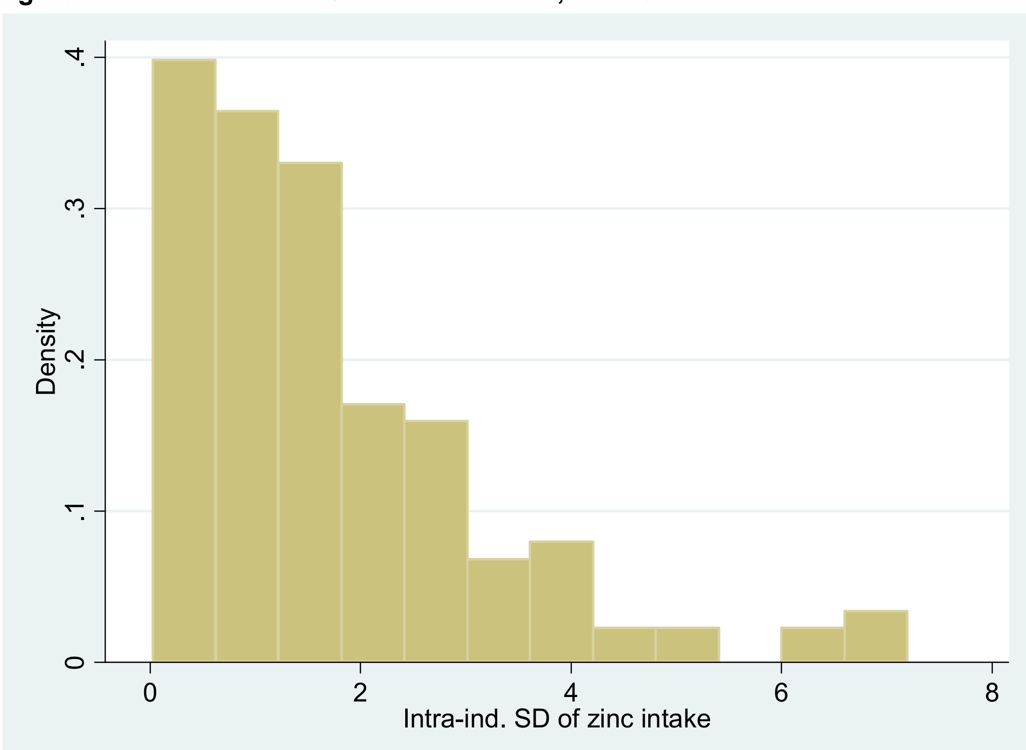


Figure 23. Distribution of Scores for FGI-6, All Women

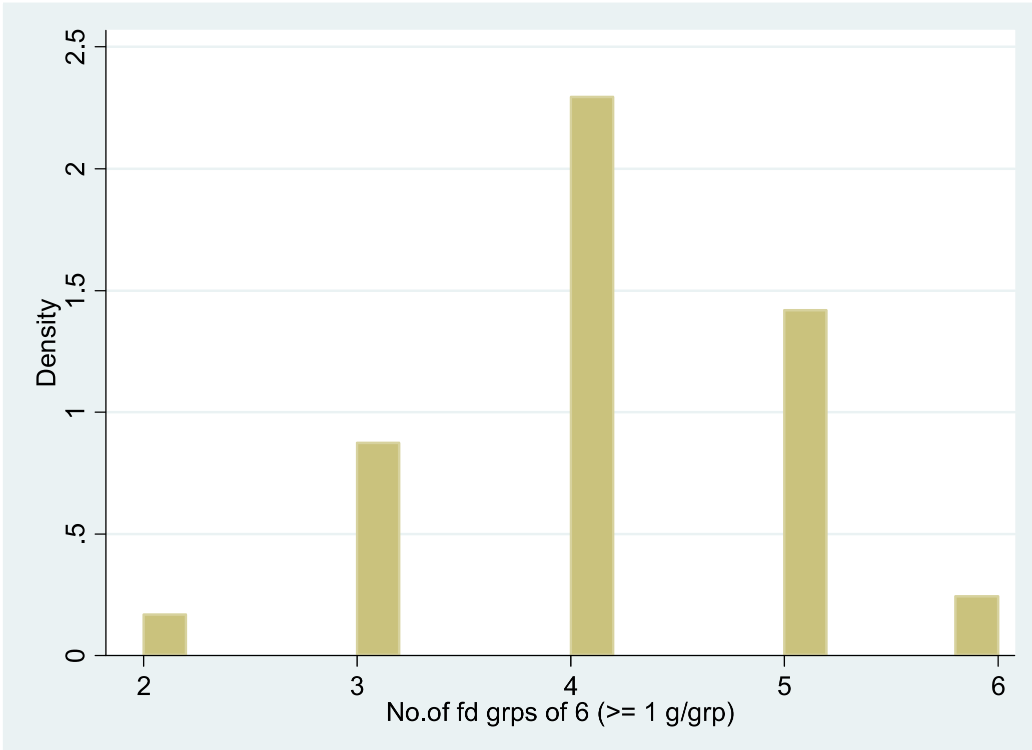


Figure 24. Distribution of Scores for FGI-6R, All Women

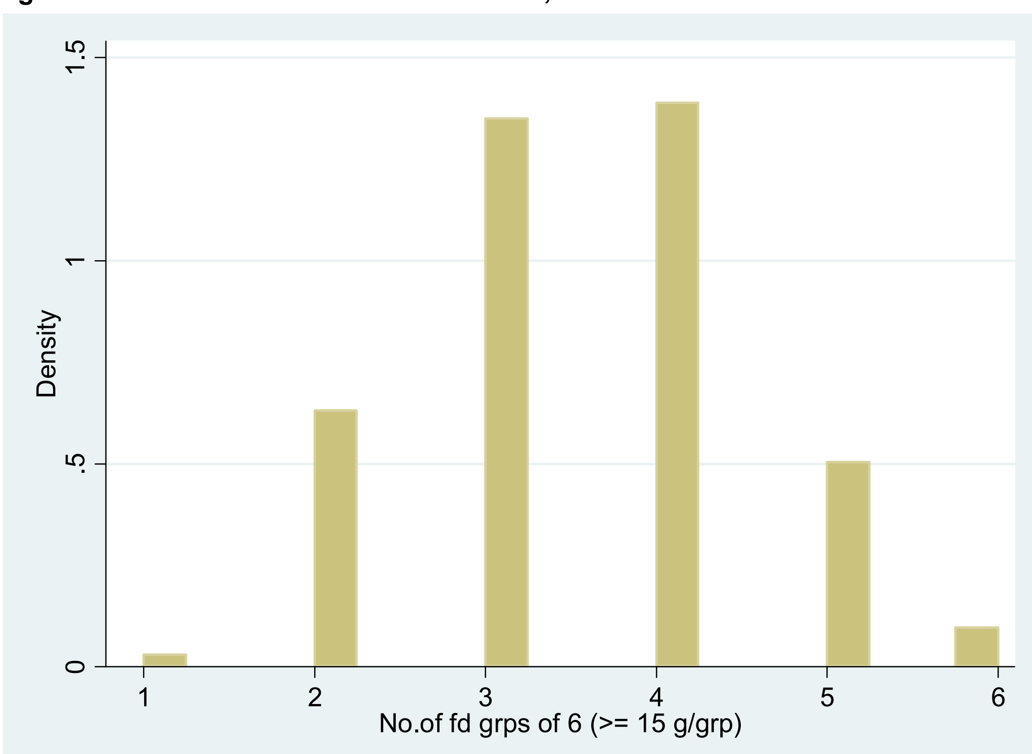


Figure 25. Distribution of Scores for FGI-9, All Women

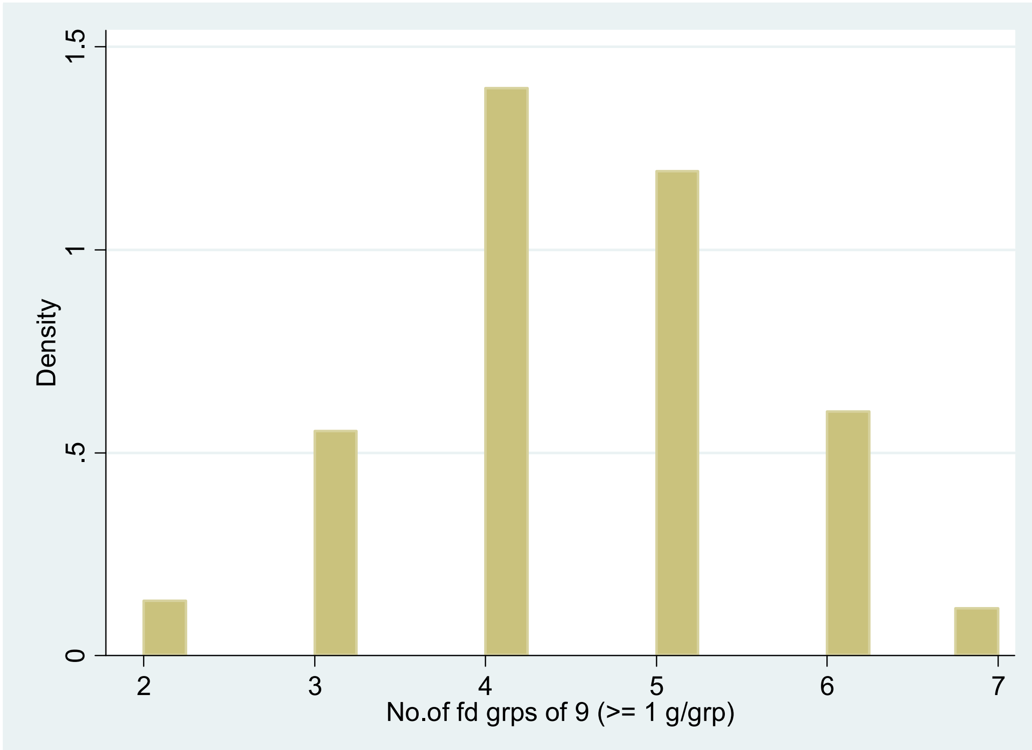


Figure 26. Distribution of Scores for FGI-9R, All Women

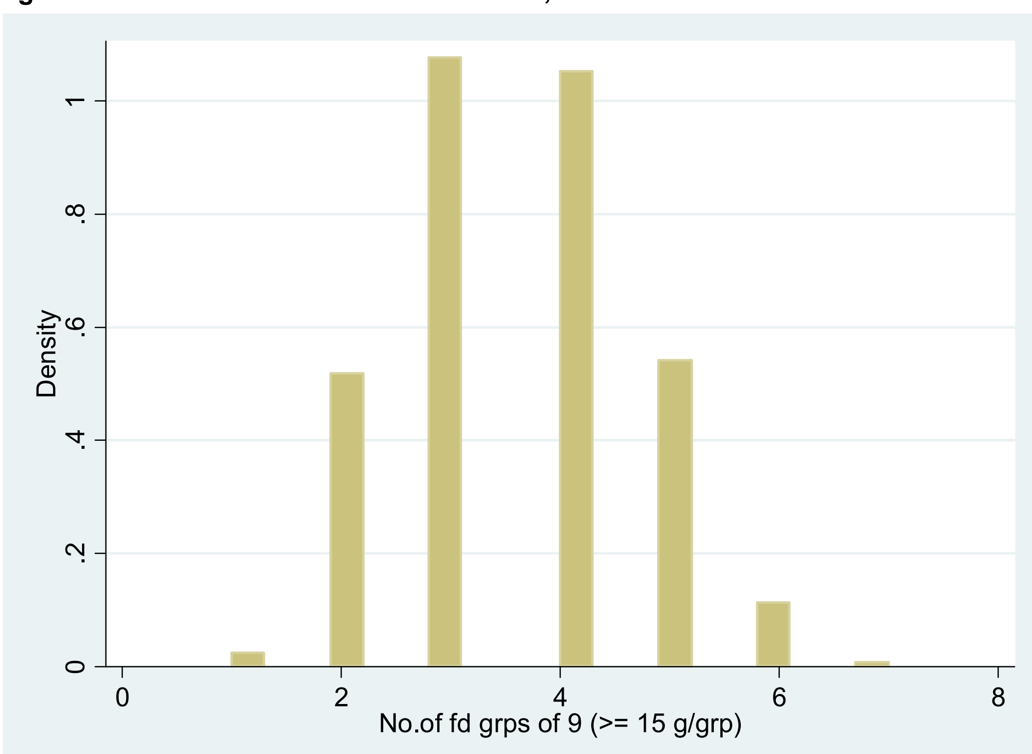


Figure 27. Distribution of Scores for FGI-13, All Women

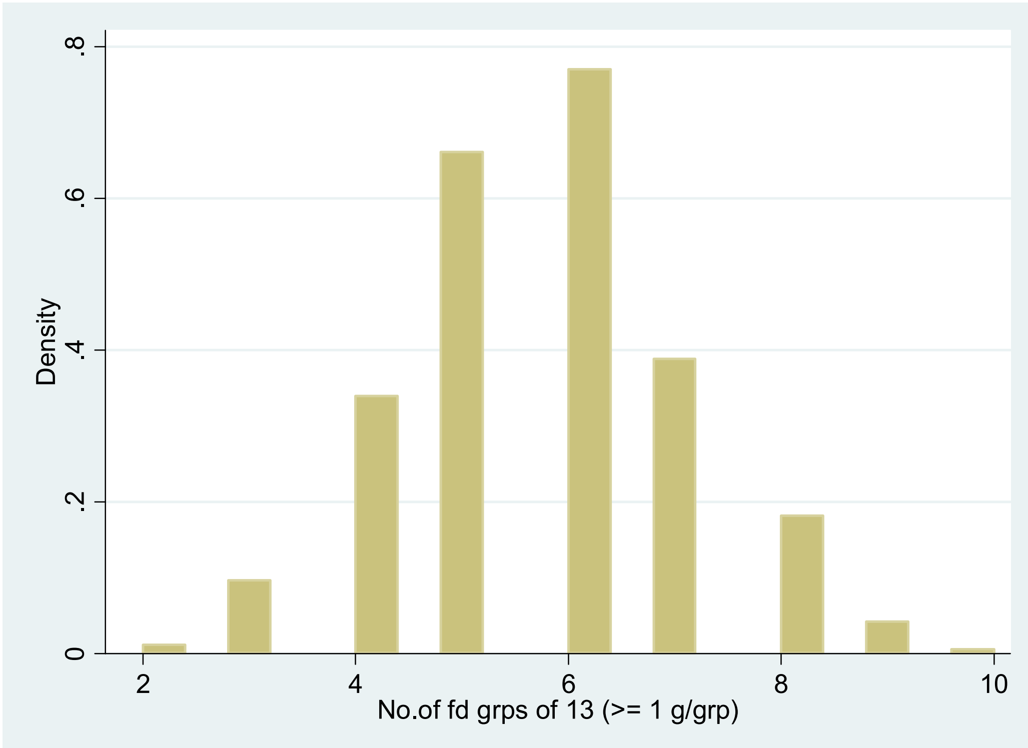


Figure 28. Distribution of Scores for FGI-13R, All Women

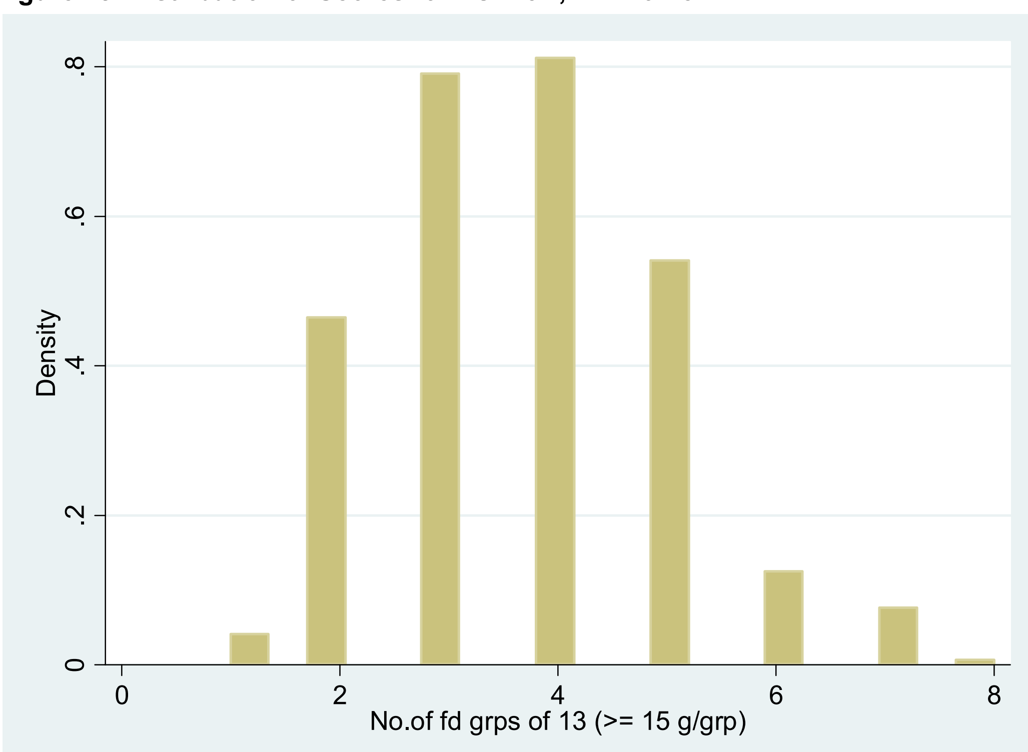


Figure 29. Distribution of Scores for FGI-21, All Women

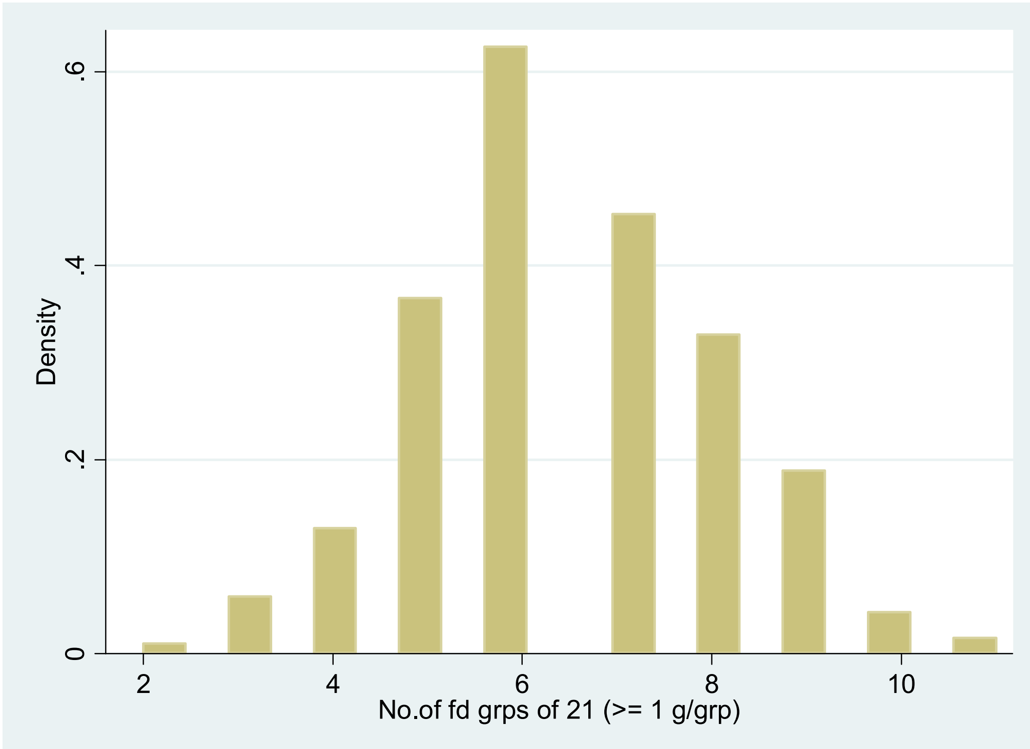


Figure 30. Distribution of Scores for FGI-21R, All Women

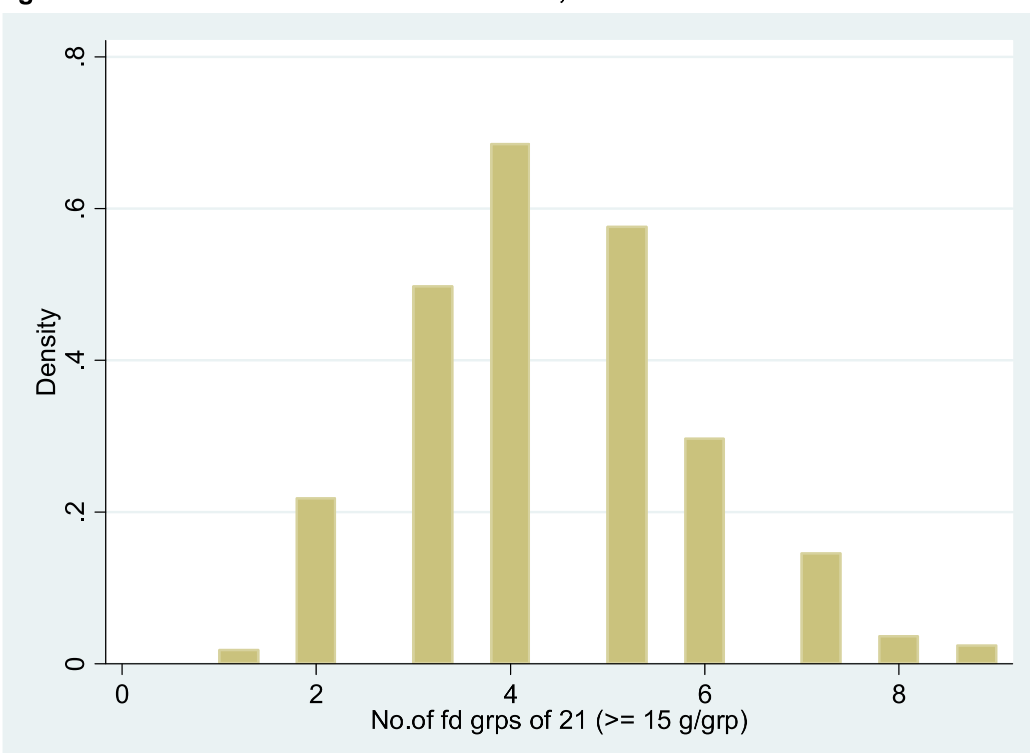


Table 6. Percent of Observation Days at Each Food Group Diversity Score, All Women, R1

Number of food groups eaten	Diversity Indicators							
	FGI-6	FGI-6R	FGI-9	FGI-9R	FGI-13	FGI-13R	FGI-21	FGI-21R
1	0	1	0	1	0	2	0	1
2	3	16	3	16	1	16	1	9
3	18	34	14	32	4	28	3	20
4	46	35	35	32	14	28	6	27
5	28	13	30	16	27	19	17	23
6	5	2	15	3	31	4	28	12
7			3	0	16	3	20	6
8			0	0	7	0	15	2
9			0	0	2	0	9	1
10					0	0	2	0
11					0	0	1	0
12					0	0	0	0
13					0	0	0	0
14							0	0
15							0	0
16							0	0
17							0	0
18							0	0
19							0	0
20							0	0
21							0	0

Figure 31. Distribution of PA for Thiamin, All Women

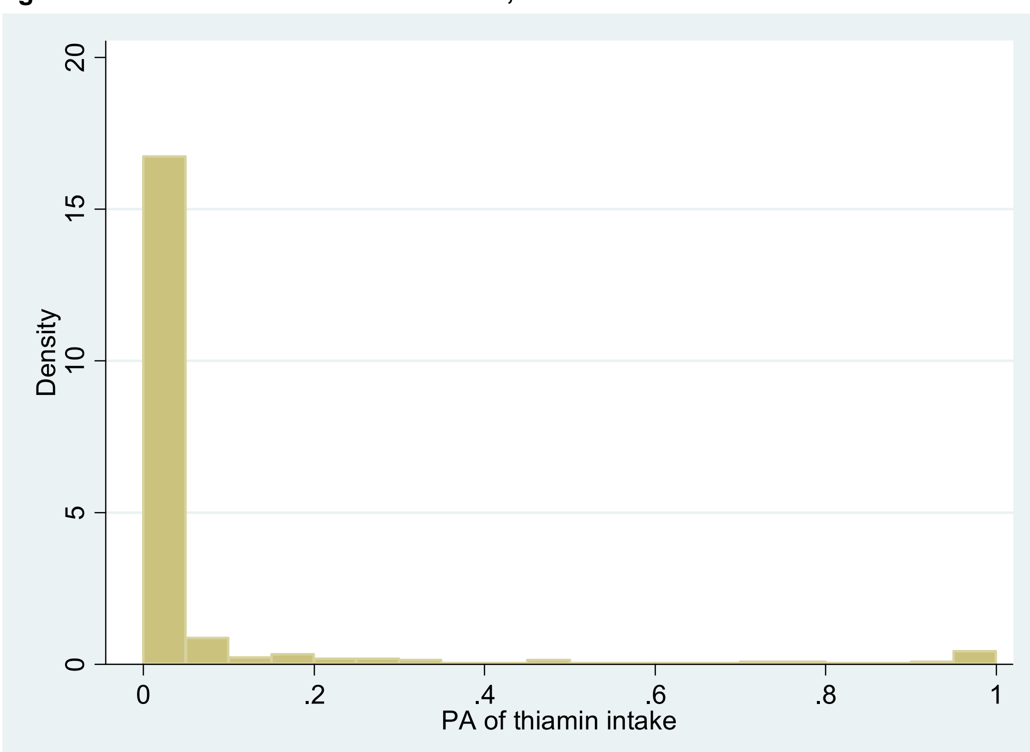


Figure 32. Distribution of PA for Riboflavin, All Women

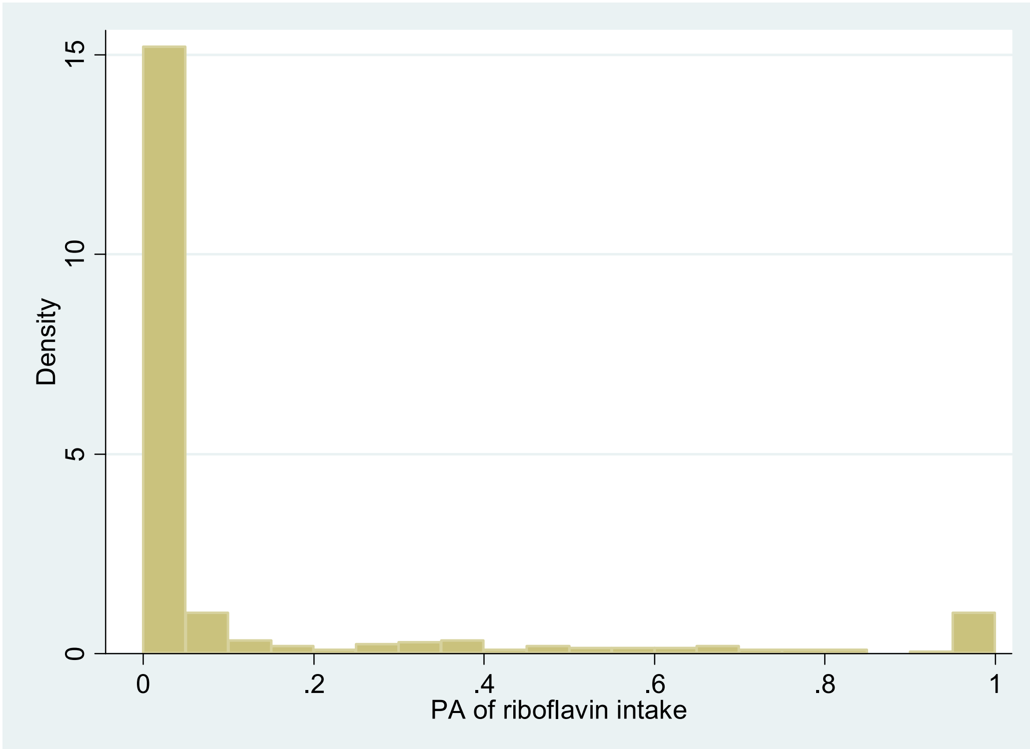


Figure 33. Distribution of PA for Niacin, All Women

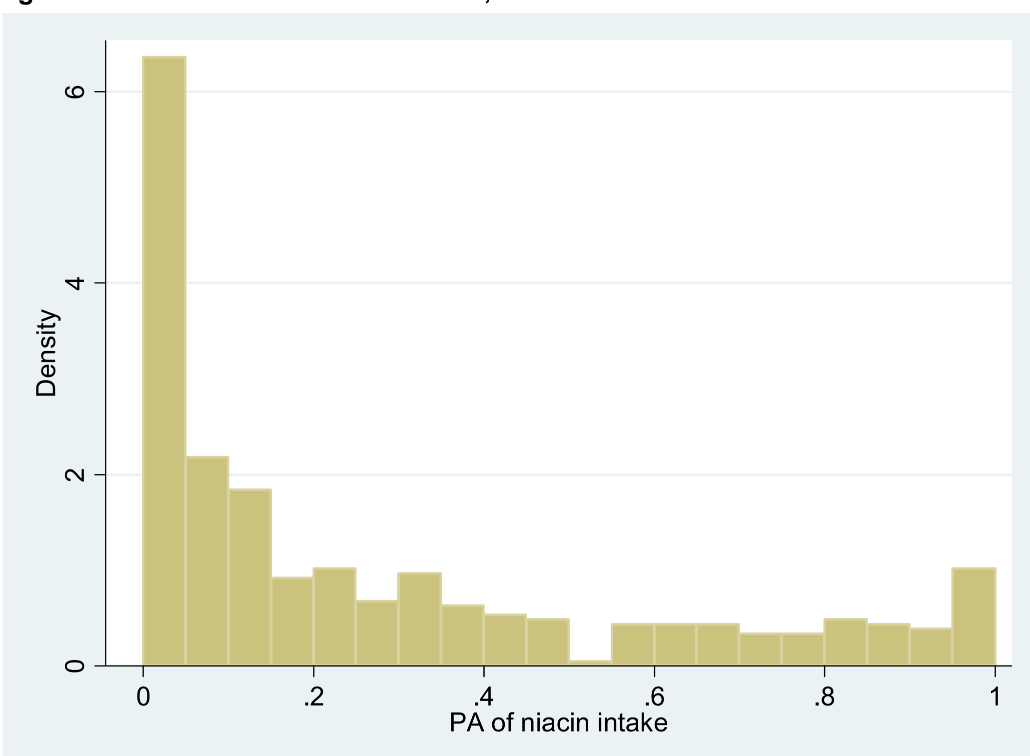


Figure 34. Distribution of PA for Vitamin B6, All Women

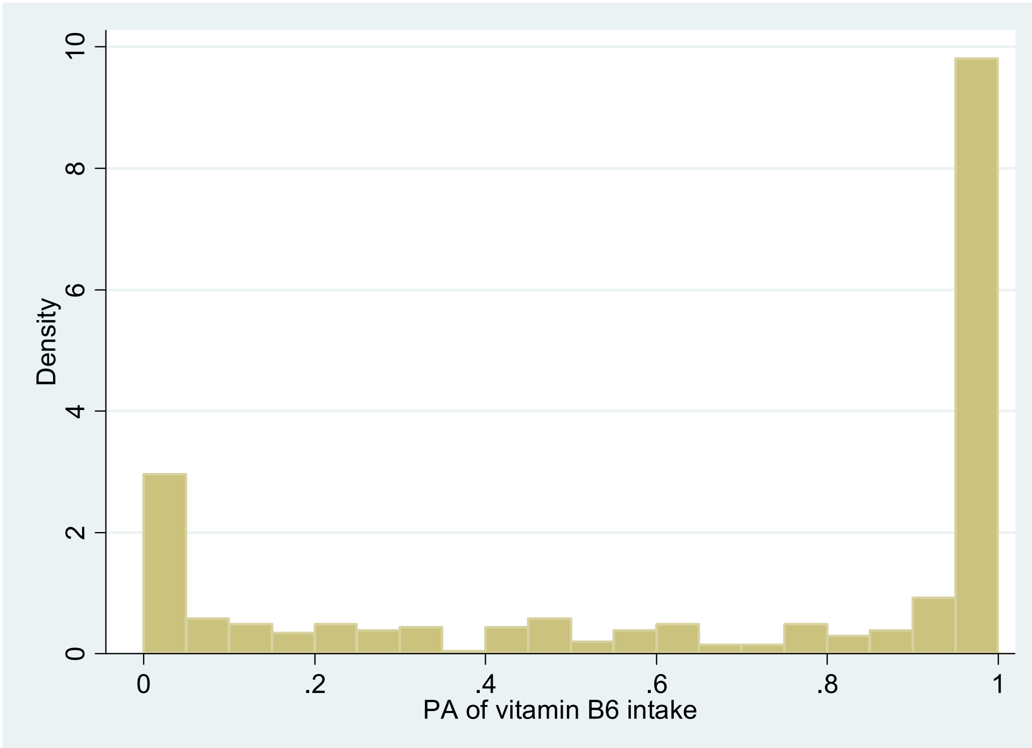


Figure 35. Distribution of PA for Folate, All Women

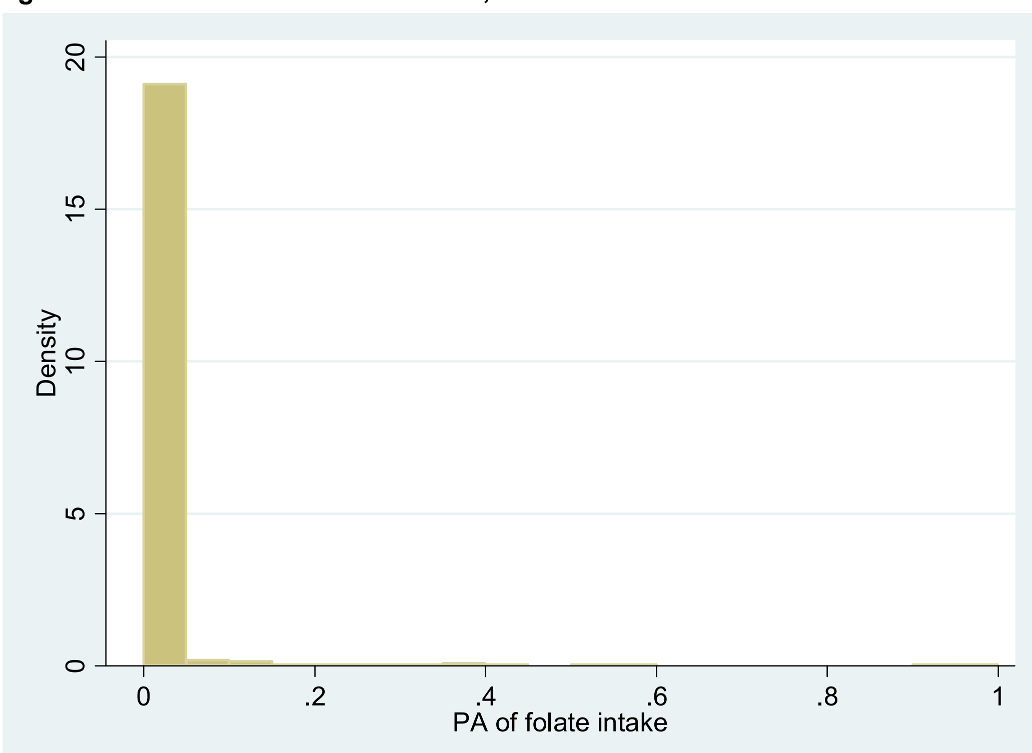


Figure 36. Distribution of PA for Vitamin B12, All Women

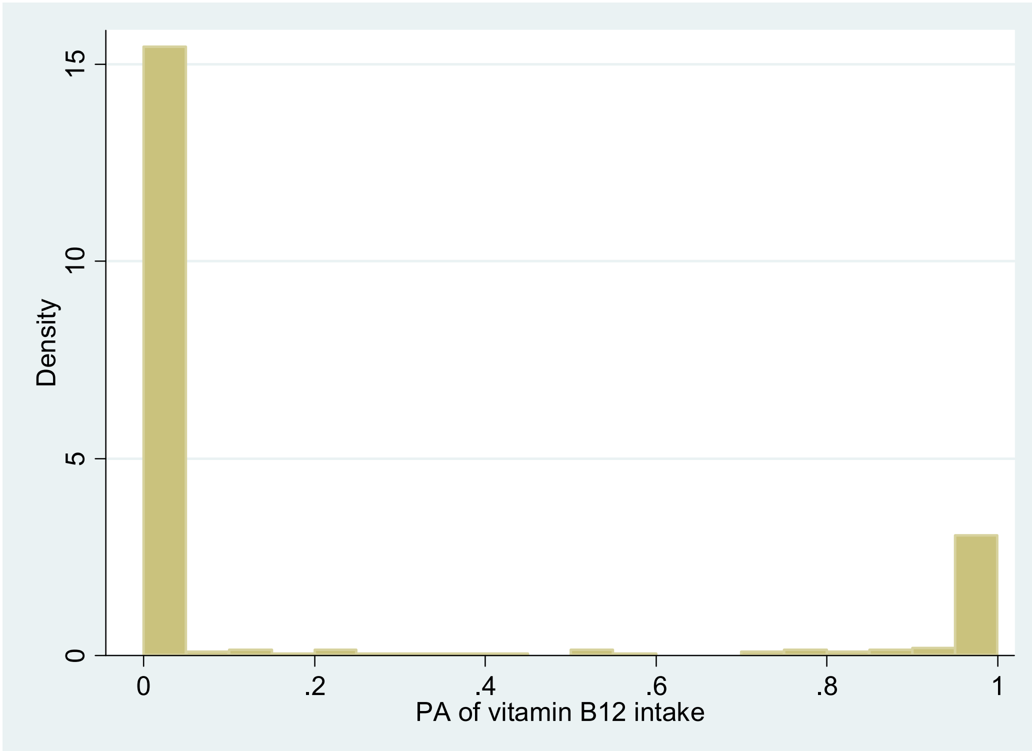


Figure 37. Distribution of PA for Vitamin C, All Women

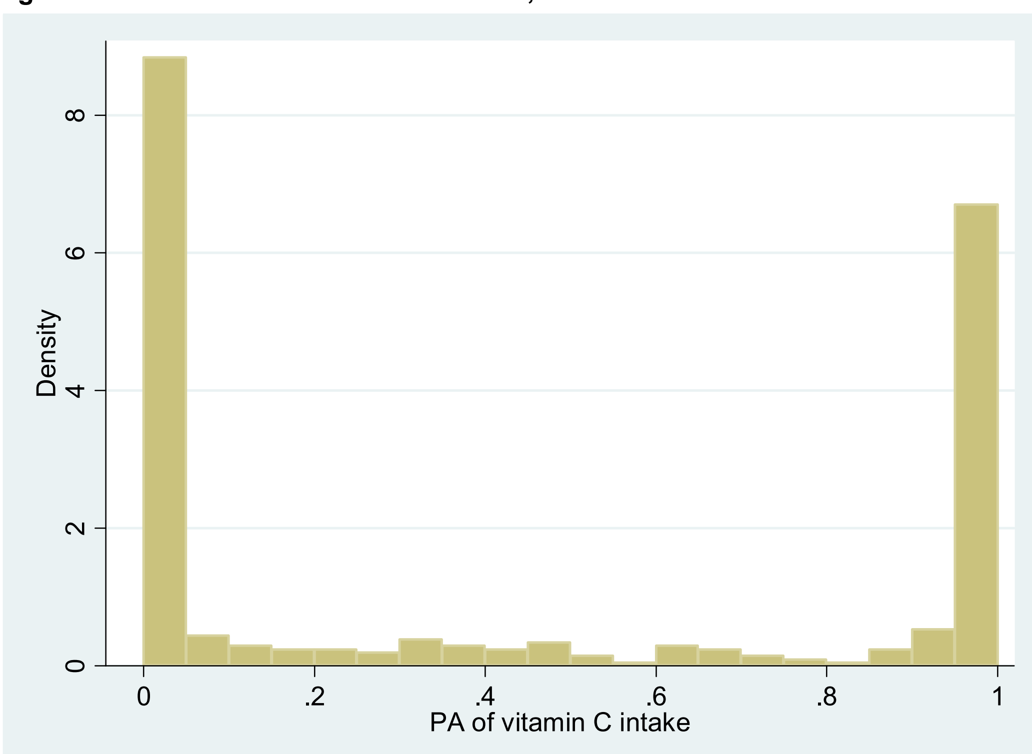


Figure 38. Distribution of PA for Vitamin A, All Women

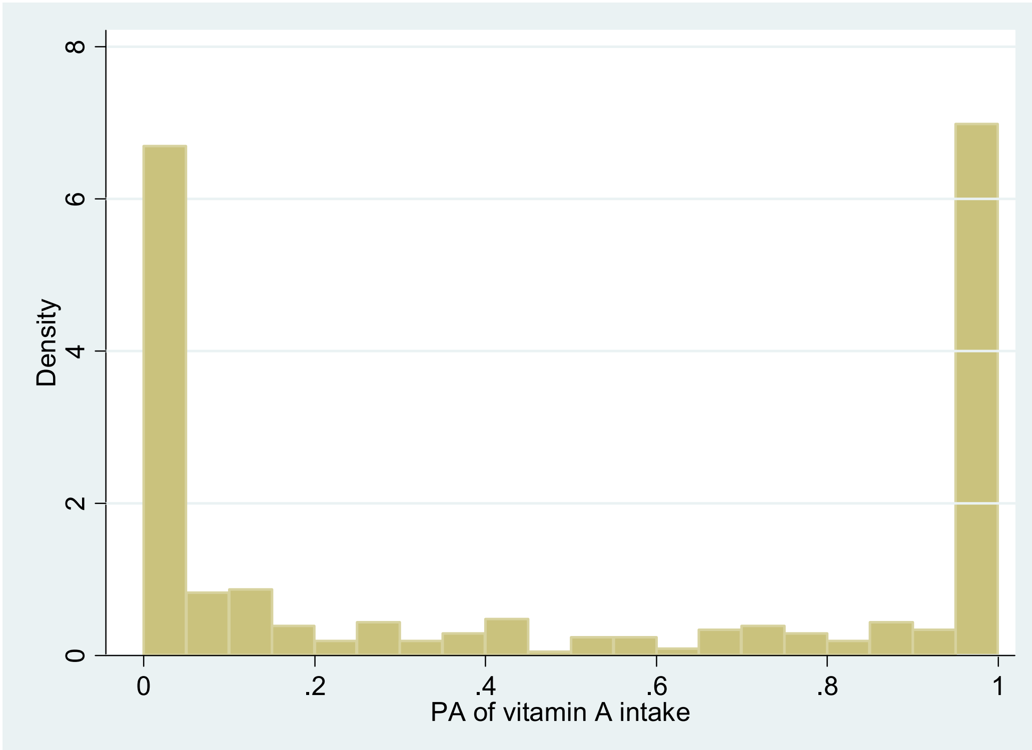


Figure 39. Distribution of PA for Calcium, All Women

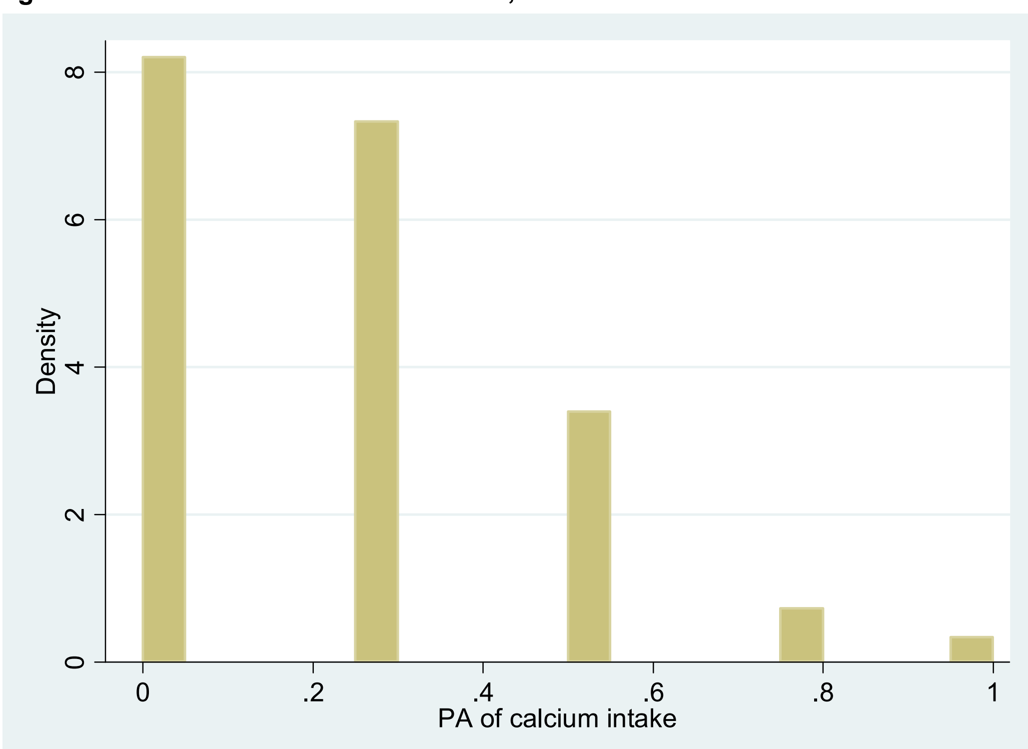


Figure 40. Distribution of PA for Iron, All Women

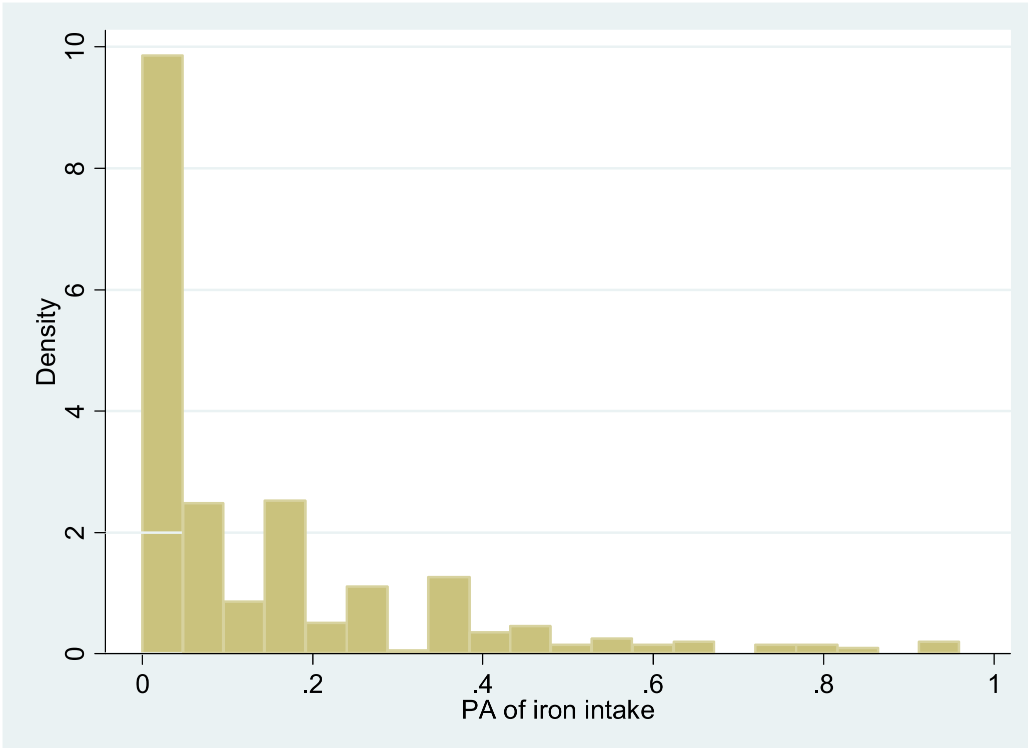


Figure 41. Distribution of PA for Zinc, All Women

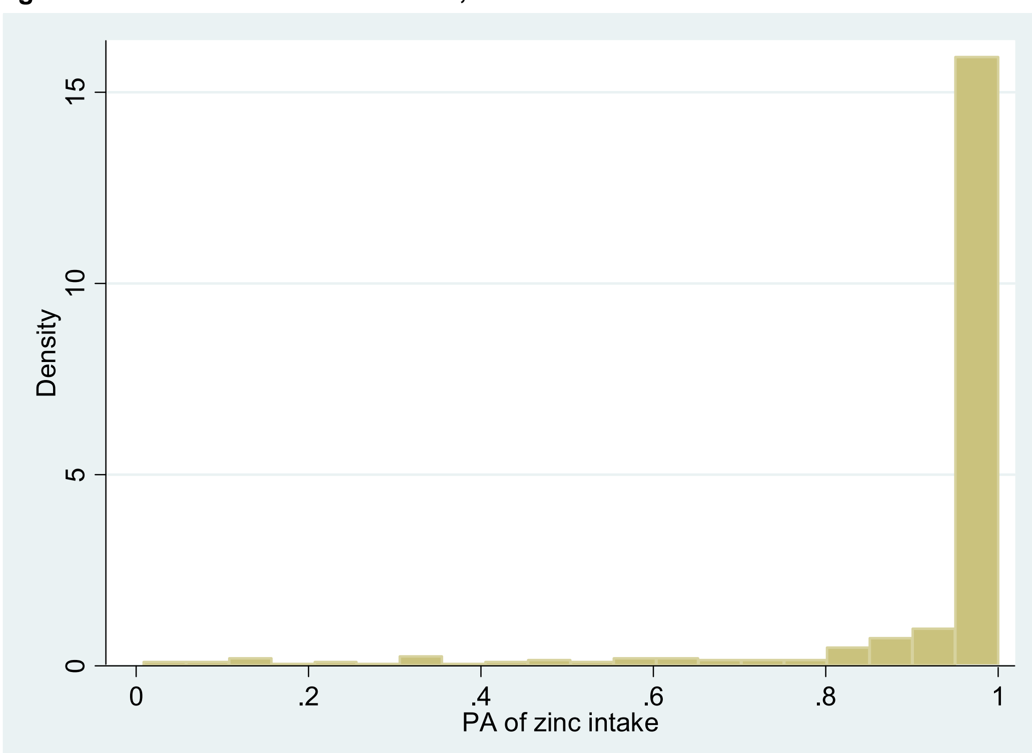
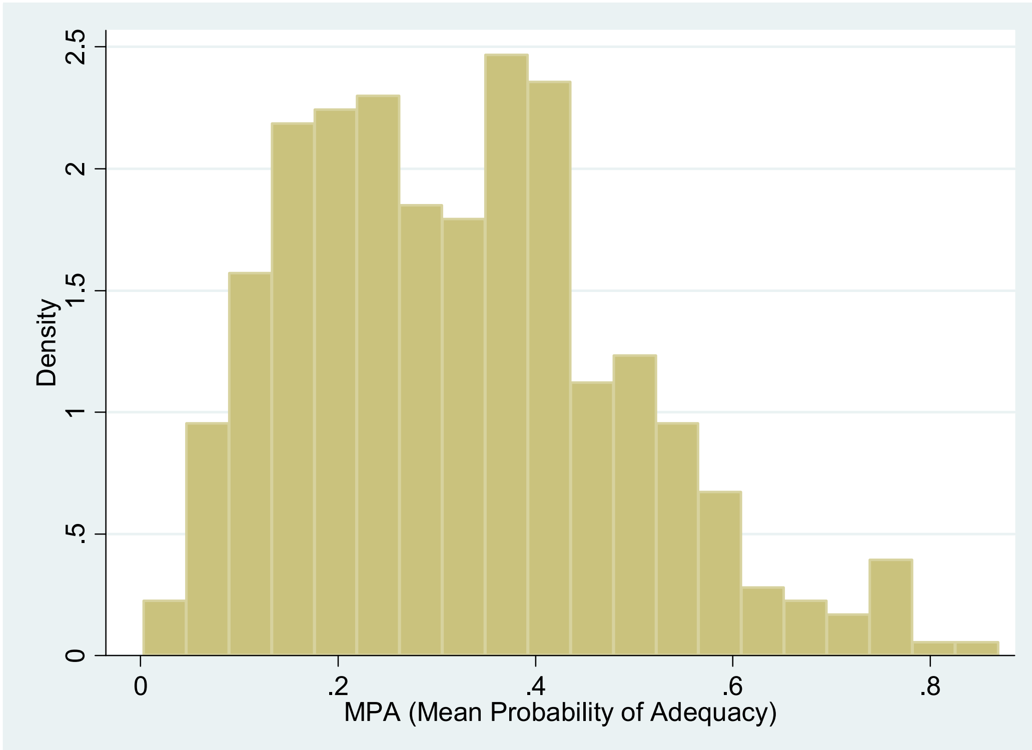


Figure 42. Distribution of MPA across 11 Micronutrients, All Women



Appendix 2. Tables and Figures, Lactating Women

Table L1. Description of Sample, Lactating Women, R1

	n	Mean	SD	Median	Range
Age (year)	111	27.6	6.6	27.0	17.0-46.0
Height (cm)	111	150.4	4.9	150.2	137.4-162.0
Weight (kg)	111	42.1	4.1	42.5	31.5-53.5
BMI	111	18.6	1.5	18.5	15.2-22.7
% Illiterate	111	64.0			
% Lactating	111	100.0			
% Pregnant	111	0.0			
	n	**Percent**			
BMI <16	3	2.7			
BMI 16-16.9	12	10.8			
BMI 17-18.49	41	36.9			
BMI 18.5-24.9	55	49.5			
BMI 25-29.9	0	0.0			
BMI ≥ 30	0	0.0			

Table L2. Energy and Macronutrient Intakes, Lactating Women, R1

	Mean	SD	Median	Range	Percent of kcal
Energy (kcal)	2,339.7	545.4	2,359.6	1,170.3-3,598.8	
Protein (g)	59.1	21.3	57.3	27.0-128.4	10
Animal source (g)	13.7	16.9	7.9	0.0-83.1	2
Plant source (g)	45.4	11.2	44.9	20.4-67.8	8
Total carbohydrate (g)	481.5	110.6	489.5	233.6-733.7	83
Sugars (g)	8.4	12.2	3.6	1.0-65.9	2
Total fat (g)	15.0	8.1	12.8	3.3-48.3	6
Saturated fat (g)	3.7	1.8	3.3	0.9-11.2	1

Table L3a. Percent of Women Who Consumed 6 Major Food Groups, Lactating Women, R1

	≥ 1 g	≥ 15 g
All starchy staples	100	100
All legumes and nuts	36	33
All dairy	16	15
Other animal source foods	76	63
Vitamin A-rich fruits and vegetables [a]	90	56
Other fruits and vegetables	99	78

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.

Table L3b. Percent of Women Who Consumed 9 Sub-Food Groups, Lactating Women, R1

	≥ 1 g	≥ 15 g
All starchy staples	100	100
All legumes and nuts	36	33
All dairy	16	15
Organ meat	0	0
Eggs	4	3
Flesh foods and other miscellaneous small animal protein	74	61
Vitamin A-rich dark green leafy vegetables [a]	50	49
Other vitamin A-rich vegetables and fruits [a]	73	11
Other fruits and vegetables	99	78

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.

Table L3c. Percent of Women Who Consumed 13 Sub-Food Groups, Lactating Women, R1

	≥ 1 g	≥ 15 g
All starchy staples	100	100
All legumes and nuts	36	33
All dairy	16	15
Organ meat	0	0
Eggs	4	3
Small fish eaten whole with bones	37	23
All other flesh foods and miscellaneous small animal protein	55	45
Vitamin A-rich dark green leafy vegetables [a]	50	49
Vitamin A-rich deep yellow/orange/red vegetables [a]	70	5
Vitamin C-rich vegetables [b]	91	16
Vitamin A-rich fruits [a]	6	6
Vitamin C-rich fruits [b]	8	7
All other fruits and vegetables	95	60

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g.

Table L3d. Percent of Women Who Consumed 21 Sub-Food Groups, Lactating Women, R1

	≥ 1 g	≥ 15 g
Grains and grain products	100	100
All other starchy staples	49	46
Cooked dry beans and peas	22	20
Soybeans and soy products	0	0
Nuts and seeds	19	18
Milk/yogurt	16	15
Cheese	0	0
Beef, pork, veal, lamb, goat, game meat	10	10
Organ meat	0	0
Chicken, duck, turkey, pigeon, guinea hen, game birds	5	5
Large whole fish/dried fish/shellfish and other seafood	48	35
Small fish eaten whole with bones	37	23
Insects, grubs, snakes, rodents and other small animal	0	0
Eggs	4	3
Vitamin A-rich dark green leafy vegetables [a]	50	49
Vitamin A-rich deep yellow/orange/red vegetables [a]	70	5
Vitamin C-rich vegetables [b]	91	16
All other vegetables	95	51
Vitamin A-rich fruits [a]	6	6
Vitamin C-rich fruits [b]	8	7
All other fruits	23	20

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g.

Table L4a. Summary of Food Group Intake (FGI-6), for Lactating Women, for All R1 Observation Days and for Days When the Food Was Consumed

Food group	All (n = 111)					Among those who consume			
	Mean amount (g)	Mean energy (kcal)	Median amount (g)	Median energy (kcal)	Percent consuming	Mean amount (g)	Mean energy (kcal)	Median amount (g)	Median energy (kcal)
All starchy staples	1,791.5	2,033.2	1,823.3	2,056.8	100	1,791.5	2,033.2	1,823.3	2,056.8
All legumes and nuts	22.7	40.2	0.0	0.0	36	62.9	111.6	58.8	102.0
All dairy	15.0	10.1	0.0	0.0	16	92.8	62.2	88.9	59.6
Other animal source foods	31.8	77.3	25.7	48.3	76	42.1	102.2	34.3	76.4
Vitamin A-rich fruits and vegetables [a]	71.3	38.4	44.1	24.4	90	79.1	42.6	50.9	28.6
Other fruits and vegetables	103.9	51.6	62.7	22.1	99	104.8	52.1	62.8	22.2

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.

Table L4b. Summary of Food Group Intake (FGI-9), for Lactating Women, for All R1 Observation Days and for Days When the Food Was Consumed

Food group	All (n = 111)					Among those who consume			
	Mean amount (g)	Mean energy (kcal)	Median amount (g)	Median energy (kcal)	Percent consuming	Mean amount (g)	Mean energy (kcal)	Median amount (g)	Median energy (kcal)
All starchy staples	1,791.5	2,033.2	1,823.3	2,056.8	100	1,791.5	2,033.2	1,823.3	2,056.8
All legumes and nuts	22.7	40.2	0.0	0.0	36	62.9	111.6	58.8	102.0
All dairy	15.0	10.1	0.0	0.0	16	92.8	62.2	88.9	59.6
Organ meat	0.0	0.0	0.0	0.0	0				
Eggs	0.8	1.5	0.0	0.0	4	23.2	41.2	22.5	40.0
Flesh foods and other miscellaneous small animal protein	31.0	75.9	24.0	48.2	74	41.9	102.7	34.6	77.5
Vitamin A-rich dark green leafy vegetables [a]	51.0	25.2	0.0	0.0	50	102.9	50.8	72.6	36.4
Other vitamin A-rich vegetables and fruits [a]	20.3	13.3	2.7	6.6	73	27.7	18.0	4.3	10.6
Other fruits and vegetables	103.9	51.6	62.7	22.1	99	104.8	52.1	62.8	22.2

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.

Table L4c. Summary of Food Group Intake (FGI-13), for Lactating Women, for All R1 Observation Days and for Days When the Food Was Consumed

Food group	All (n = 111)					Among those who consume			
	Mean amount (g)	Mean energy (kcal)	Median amount (g)	Median energy (kcal)	Percent consuming	Mean amount (g)	Mean energy (kcal)	Median amount (g)	Median energy (kcal)
All starchy staples	1,791.5	2,033.2	1,823.3	2,056.8	100	1,791.5	2,033.2	1,823.3	2,056.8
All legumes and nuts	22.7	40.2	0.0	0.0	36	62.9	111.6	58.8	102.0
All dairy	15.0	10.1	0.0	0.0	16	92.8	62.2	88.9	59.6
Organ meat	0.0	0.0	0.0	0.0	0				
Eggs	0.8	1.5	0.0	0.0	4	23.2	41.2	22.5	40.0
Small fish eaten whole with bones	9.7	23.6	0.0	0.0	37	26.3	63.9	18.4	17.7
All other flesh foods and miscellaneous small animal protein	21.3	52.3	10.9	23.6	55	38.7	95.1	32.9	77.2
Vitamin A-rich dark green leafy vegetables [a]	51.0	25.2	0.0	0.0	50	102.9	50.8	72.6	36.4
Vitamin A-rich deep yellow/orange/red vegetables [a]	12.2	10.3	2.4	5.9	70	17.2	14.5	3.9	9.6
Vitamin C-rich vegetables [b]	16.7	5.8	5.4	3.6	91	18.4	6.4	5.6	4.2
Vitamin A-rich fruits [a]	8.1	2.9	0.0	0.0	6	128.4	46.2	141.0	50.8
Vitamin C-rich fruits [b]	6.1	4.2	0.0	0.0	8	75.6	51.9	71.0	58.9
All other fruits and vegetables	81.0	41.6	35.5	15.1	95	85.6	43.9	45.5	15.2

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g.

Table L4d. Summary of Food Group Intake (FGI-21), for Lactating Women, for All R1 Observation Days and for Days When the Food Was Consumed

Food group	All (n = 111)					Among those who consume			
	Mean amount	Mean energy	Median amount	Median energy	Percent consuming	Mean amount	Mean energy	Median amount	Median energy
	(g)	(kcal)	(g)	(kcal)		(g)	(kcal)	(g)	(kcal)
Grains and grain products	1,747.2	1,978.9	1,773.1	2,046.4	100	1,747.2	1,978.9	1,773.1	2,046.4
All other starchy staples	44.3	54.3	0.0	0.0	49	91.2	111.7	56.9	76.9
Cooked dry beans and peas	10.8	23.1	0.0	0.0	22	49.7	106.7	36.2	96.1
Soybeans and soy products	0.0	0.0	0.0	0.0	0				
Nuts and seeds	11.9	17.1	0.0	0.0	19	62.9	90.6	61.6	85.3
Milk/yogurt	15.0	10.1	0.0	0.0	16	92.8	62.2	88.9	59.6
Cheese	0.0	0.0	0.0	0.0	0				
Beef, pork, veal, lamb, goat, game meat	5.1	7.9	0.0	0.0	10	51.9	79.4	37.5	57.0
Organ meat	0.0	0.0	0.0	0.0	0				
Chicken, duck, turkey, pigeon, guinea hen, game birds	2.5	3.6	0.0	0.0	5	46.4	66.6	45.1	64.7
Large whole fish/dried fish/shellfish and other seafood	13.6	40.8	0.0	0.0	48	28.5	85.4	26.3	52.9
Small fish eaten whole with bones	9.7	23.6	0.0	0.0	37	26.3	63.9	18.4	17.7
Insects, grubs, snakes, rodents and other small animal	0.0	0.0	0.0	0.0	0				
Eggs	0.8	1.5	0.0	0.0	4	23.2	41.2	22.5	40.0
Vitamin A-rich dark green leafy vegetables [a]	51.0	25.2	0.0	0.0	50	102.9	50.8	72.6	36.4
Vitamin A-rich deep yellow/orange/red vegetables [a]	12.2	10.3	2.4	5.9	70	17.2	14.5	3.9	9.6
Vitamin C-rich vegetables [b]	16.7	5.8	5.4	3.6	91	18.4	6.4	5.6	4.2
All other vegetables	55.9	14.2	17.1	7.3	95	59.1	15.0	20.8	10.2
Vitamin A-rich fruits [a]	8.1	2.9	0.0	0.0	6	128.4	46.2	141.0	50.8
Vitamin C-rich fruits [b]	6.1	4.2	0.0	0.0	8	75.6	51.9	71.0	58.9
All other fruits	25.1	27.4	0.0	0.0	23	111.5	121.6	66.0	76.0

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g.

Table L5. Diversity Scores for Various Diversity Indicators, Lactating Women, R1

Indicator	Number of food groups and level	Mean	SD	Median	Range
FGI-6	6 major food groups	4.2	0.9	4.0	2-6
FGI-6R [a]	6 major food groups	3.5	1.0	3.0	1-6
FGI-9	9 food subgroups	4.5	1.1	4.0	2-7
FGI-9R [a]	9 food subgroups	3.5	1.1	3.0	1-6
FGI-13	13 food subgroups	5.7	1.4	6.0	2-9
FGI-13R [a]	13 food subgroups	3.6	1.3	4.0	1-7
FGI-21	21 food subgroups	6.5	1.7	6.0	2-11
FGI-21R [a]	21 food subgroups	4.3	1.5	4.0	1-9

[a] "R" indicates that at least 15 g must be consumed in order for the food group/subgroup to "count" in the score.

Table L6. Percent of Observation Days at Each Food Group Diversity Score, Lactating Women, R1

Number of food groups eaten	Diversity indicators							
	FGI-6	FGI-6R	FGI-9	FGI-9R	FGI-13	FGI-13R	FGI-21	FGI-21R
1	0	1	0	1	0	2	0	1
2	2	15	2	15	1	19	1	9
3	22	38	17	38	3	26	1	19
4	39	32	35	29	18	31	6	31
5	33	13	23	14	23	16	20	27
6	5	2	19	4	30	4	27	5
7			4	0	14	3	20	5
8			0	0	8	0	11	1
9			0	0	3	0	11	2
10					0	0	2	0
11					0	0	2	0
12					0	0	0	0
13					0	0	0	0
14							0	0
15							0	0
16							0	0
17							0	0
18							0	0
19							0	0
20							0	0
21							0	0

Table L7a. Percent of Observation Days on Which Different Food Groups Were Consumed, by Food Group Diversity Score (FGI-6 - 1 g Minimum), Lactating Women, R1

	Number of food groups eaten					
	1	**2**	**3**	**4**	**5**	**6**
Percent (number) of observation days at each diversity score	0 (0)	2 (2)	22 (24)	39 (43)	33 (37)	5 (5)
Food groups	**Percent of observation days on which each food group was consumed**					
All starchy staples	–	100	100	100	100	100
All legumes and nuts	–	0	8	9	78	100
All dairy	–	0	0	5	30	100
Other animal source foods	–	0	25	91	92	100
Vitamin A-rich fruits and vegetables [a]	–	50	67	95	100	100
Other fruits and vegetables	–	50	100	100	100	100

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.

Table L7b. Percent of Observation Days on Which Different Food Groups Were Consumed, by Food Group Diversity Score (FGI-6R -15 g Minimum), Lactating Women, R1

	Number of food groups eaten					
	1	**2**	**3**	**4**	**5**	**6**
Percent (number) of observation days at each diversity score	1 (1)	15 (17)	38 (42)	32 (35)	13 (14)	2 (2)
Food groups	**Percent of observation days on which each food group was consumed**					
All starchy staples	100	100	100	100	100	100
All legumes and nuts	0	0	10	54	86	100
All dairy	0	0	2	31	21	100
Other animal source foods	0	41	55	71	93	100
Vitamin A-rich fruits and vegetables [a]	0	29	55	51	100	100
Other fruits and vegetables	0	29	79	91	100	100

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.

Table L7c. Percent of Observation Days on Which Different Food Groups Were Consumed, by Food Group Diversity Score (FGI-9 - 1 g Minimum), Lactating Women, R1

	Number of food groups eaten								
	1	2	3	4	5	6	7	8	9
Percent (number) of observation days at each diversity score	0 (0)	2 (2)	17 (19)	35 (39)	23 (26)	19 (21)	4 (4)	0 (0)	0 (0)
Food groups	**Percent of observation days on which each food group was consumed**								
All starchy staples	–	100	100	100	100	100	100	–	–
All legumes and nuts	–	0	11	10	46	91	75	–	–
All dairy	–	0	0	5	31	24	75	–	–
Organ meat	–	0	0	0	0	0	0	–	–
Eggs	–	0	5	0	0	5	50	–	–
Flesh foods and other miscellaneous small animal protein	–	0	26	77	89	95	100	–	–
Vitamin A-rich dark green leafy vegetables [a]	–	50	32	36	46	86	100	–	–
Other vitamin A-rich vegetables and fruits [a]	–	0	26	72	89	100	100	–	–
Other fruits and vegetables	–	50	100	100	100	100	100	–	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.

Table L7d. Percent of Observation Days on Which Different Food Groups Were Consumed, by Food Group Diversity Score (FGI-9R - 15 g Minimum), Lactating Women, R1

	Number of food groups eaten								
	1	2	3	4	5	6	7	8	9
Percent (number) of observation days at each diversity score	1 (1)	15 (17)	38 (42)	29 (32)	14 (15)	4 (4)	0 (0)	0 (0)	0 (0)
Food groups	**Percent of observation days on which each food group was consumed**								
All starchy staples	100	100	100	100	100	100	–	–	–
All legumes and nuts	0	0	10	53	87	75	–	–	–
All dairy	0	0	2	34	13	75	–	–	–
Organ meat	0	0	0	0	0	0	–	–	–
Eggs	0	6	0	0	7	25	–	–	–
Flesh foods and other miscellaneous small animal protein	0	35	55	72	80	100	–	–	–
Vitamin A-rich dark green leafy vegetables [a]	0	18	48	38	100	100	–	–	–
Other vitamin A-rich vegetables and fruits [a]	0	12	7	9	20	25	–	–	–
Other fruits and vegetables	0	29	79	94	93	100	–	–	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.

Table L7e. Percent of Observation Days on Which Different Food Groups Were Consumed, by Food Group Diversity Score (FGI-13 - 1 g Minimum), Lactating Women, R1

	Number of food groups eaten												
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
Percent (number) of observation days at each diversity score	0 (0)	1 (1)	3 (3)	18 (20)	23 (26)	30 (33)	14 (16)	8 (9)	3 (3)	0 (0)	0 (0)	0 (0)	0 (0)
Food groups	**Percent of observation days on which each food group was consumed**												
All starchy staples	–	100	100	100	100	100	100	100	100	–	–	–	–
All legumes and nuts	–	0	0	10	12	39	75	89	67	–	–	–	–
All dairy	–	0	0	0	8	21	31	22	67	–	–	–	–
Organ meat	–	0	0	0	0	0	0	0	0	–	–	–	–
Eggs	–	0	0	5	0	0	6	0	67	–	–	–	–
Small fish eaten whole with bones	–	0	0	10	23	46	56	78	67	–	–	–	–
All other flesh foods and miscellaneous small animal protein	–	0	33	35	39	73	50	89	100	–	–	–	–
Vitamin A-rich dark green leafy vegetables [a]	–	100	0	25	58	36	63	100	100	–	–	–	–
Vitamin A-rich deep yellow/orange/red vegetables [a]	–	0	0	40	54	88	94	100	100	–	–	–	–
Vitamin C-rich vegetables [b]	–	0	67	75	96	94	100	100	100	–	–	–	–
Vitamin A-rich fruits [a]	–	0	33	0	4	6	6	11	33	–	–	–	–
Vitamin C-rich fruits [b]	–	0	0	0	8	9	19	11	0	–	–	–	–
All other fruits and vegetables	–	0	67	100	100	88	100	100	100	–	–	–	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g.

Table L7f. Percent of Observation Days on Which Different Food Groups Were Consumed, by Food Group Diversity Score (FGI-13R - 15g Minimum), Lactating Women, R1

	Number of food groups eaten												
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
Percent (number) of observation days at each diversity score	2 (2)	19 (21)	26 (29)	31 (34)	16 (18)	4 (4)	3 (3)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Food groups	**Percent of observation days on which each food group was consumed**												
All starchy staples	100	100	100	100	100	100	100	–	–	–	–	–	–
All legumes and nuts	0	0	14	44	61	100	100	–	–	–	–	–	–
All dairy	0	0	3	27	28	0	67	–	–	–	–	–	–
Organ meat	0	0	0	0	0	0	0	–	–	–	–	–	–
Eggs	0	5	0	0	6	0	33	–	–	–	–	–	–
Small fish eaten whole with bones	0	10	10	29	33	50	67	–	–	–	–	–	–
All other flesh foods and miscellaneous small animal protein	0	24	45	50	61	50	67	–	–	–	–	–	–
Vitamin A-rich dark green leafy vegetables [a]	0	29	55	38	67	100	100	–	–	–	–	–	–
Vitamin A-rich deep yellow/orange/red vegetables [a]	0	5	0	9	6	0	0	–	–	–	–	–	–
Vitamin C-rich vegetables [b]	0	5	0	18	33	75	67	–	–	–	–	–	–
Vitamin A-rich fruits [a]	0	5	7	3	17	0	0	–	–	–	–	–	–
Vitamin C-rich fruits [b]	0	0	3	6	22	25	0	–	–	–	–	–	–
All other fruits and vegetables	0	19	62	77	67	100	100	–	–	–	–	–	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g.

Table L7g. Percent of Observation Days on Which Different Food Groups Were Consumed, by Food Group Diversity Score (FGI-21 - 1 g Minimum), Lactating Women, R1

	Number of food groups eaten																				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**
Percent (number) of observation days at each diversity score	0 (0)	1 (1)	1 (1)	6 (7)	20 (22)	27 (30)	20 (22)	11 (12)	11 (12)	2 (2)	2 (2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Food groups	**Percent of observation days on which each food group was consumed**																				
Grains and grain products	–	100	100	100	100	100	100	100	100	100	100	–	–	–	–	–	–	–	–	–	–
All other starchy staples	–	0	0	29	32	47	55	67	58	100	100	–	–	–	–	–	–	–	–	–	–
Cooked dry beans and peas	–	0	0	0	5	13	23	50	50	50	50	–	–	–	–	–	–	–	–	–	–
Soybeans and soy products	–	0	0	0	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–
Nuts and seeds	–	0	0	0	5	10	18	25	58	50	100	–	–	–	–	–	–	–	–	–	–
Milk/yogurt	–	0	0	0	5	17	23	25	25	0	50	–	–	–	–	–	–	–	–	–	–
Cheese	–	0	0	0	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–
Beef, pork, veal, lamb, goat, game meat	–	0	0	0	5	3	9	33	25	0	0	–	–	–	–	–	–	–	–	–	–
Organ meat	–	0	0	0	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–
Chicken, duck, turkey, pigeon, guinea hen, game birds	–	0	0	0	0	7	9	8	8	0	0	–	–	–	–	–	–	–	–	–	–
Large whole fish/dried fish/shellfish and other seafood	–	0	0	14	27	50	55	58	75	50	100	–	–	–	–	–	–	–	–	–	–
Small fish eaten whole with bones	–	0	0	0	27	20	55	50	58	100	100	–	–	–	–	–	–	–	–	–	–
Insects, grubs, snakes, rodents and other small animal	–	0	0	0	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–
Eggs	–	0	0	0	5	0	5	0	8	50	0	–	–	–	–	–	–	–	–	–	–
Vitamin A-rich dark green leafy vegetables [a]	–	100	0	43	41	47	55	25	75	100	100	–	–	–	–	–	–	–	–	–	–
Vitamin A-rich deep yellow/orange/red vegetables [a]	–	0	0	29	64	57	82	100	92	100	100	–	–	–	–	–	–	–	–	–	–
Vitamin C-rich vegetables [b]	–	0	0	100	77	93	100	92	100	100	100	–	–	–	–	–	–	–	–	–	–
All other vegetables	–	0	100	86	100	97	86	100	100	100	100	–	–	–	–	–	–	–	–	–	–
Vitamin A-rich fruits [a]	–	0	100	0	0	7	9	8	8	0	0	–	–	–	–	–	–	–	–	–	–
Vitamin C-rich fruits [b]	–	0	0	0	0	7	14	25	0	50	0	–	–	–	–	–	–	–	–	–	–
All other fruits	–	0	0	0	9	27	5	33	58	50	100	–	–	–	–	–	–	–	–	–	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g.

Table L7h. Percent of Observation Days on Which Different Food Groups Were Consumed, by Food Group Diversity Score (FGI-21R - 15 g Minimum), Lactating Women, R1

	Number of food groups eaten																				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**
Percent (number) of observation days at each diversity score	1 (1)	9 (10)	19 (21)	31 (34)	27 (30)	5 (6)	5 (6)	1 (1)	2 (2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Food groups	**Percent of observation days on which each food group was consumed**																				
Grains and grain products	100	100	100	100	100	100	100	100	100	–	–	–	–	–	–	–	–	–	–	–	–
All other starchy staples	0	10	52	41	50	83	33	100	100	–	–	–	–	–	–	–	–	–	–	–	–
Cooked dry beans and peas	0	0	0	15	40	33	17	100	50	–	–	–	–	–	–	–	–	–	–	–	–
Soybeans and soy products	0	0	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Nuts and seeds	0	0	5	9	23	33	83	0	100	–	–	–	–	–	–	–	–	–	–	–	–
Milk/yogurt	0	0	0	18	27	17	17	0	50	–	–	–	–	–	–	–	–	–	–	–	–
Cheese	0	0	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Beef, pork, veal, lamb, goat, game meat	0	0	5	9	10	33	33	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Organ meat	0	0	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Chicken, duck, turkey, pigeon, guinea hen, game birds	0	0	10	0	7	17	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Large whole fish/dried fish/shellfish and other seafood	0	0	33	35	40	33	83	100	0	–	–	–	–	–	–	–	–	–	–	–	–
Small fish eaten whole with bones	0	0	14	18	30	50	17	100	100	–	–	–	–	–	–	–	–	–	–	–	–
Insects, grubs, snakes, rodents and other small animal	0	0	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Eggs	0	0	5	0	3	0	0	100	0	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin A-rich dark green leafy vegetables [a]	0	60	29	53	47	33	83	100	100	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin A-rich deep yellow/orange/red vegetables [a]	0	10	0	6	3	17	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin C-rich vegetables [b]	0	10	0	15	10	67	50	0	100	–	–	–	–	–	–	–	–	–	–	–	–
All other vegetables	0	0	38	59	63	33	67	100	100	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin A-rich fruits [a]	0	10	5	3	13	0	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin C-rich fruits [b]	0	0	0	3	13	17	33	0	0	–	–	–	–	–	–	–	–	–	–	–	–
All other fruits	0	0	5	18	20	33	83	0	100	–	–	–	–	–	–	–	–	–	–	–	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g.

Table L8. Mean and Median Nutrient Intake and PA, Lactating Women [a]

Nutrient	Mean	SD	Median	EAR [b]	SD [b]	PA (Mean)	PA (Median)	Lambda (Box-Cox transformation) [c]
Energy	2,340	545	2,360					
Protein (All Sources) (% of kcal)	10	2	10					
Protein from animal sources (% of kcal)	2	3	1					
Total carbohydrate (% of kcal)	83	4	83					
Sugars (% of kcal)	1	2	1					
Total fat (% of kcal)	6	3	5					
Saturated fat (% of kcal)	1	1	1					
Thiamin (mg/d)	0.70	0.24	0.70	1.2	0.12	0.00	0.00	-0.099
Riboflavin (mg/d)	0.79	0.39	0.68	1.3	0.13	0.02	0.00	-0.179
Niacin (mg/d)	11.61	4.33	11.08	13	2.0	0.21	0.10	-0.084
Vitamin B6 (mg/d)	1.64	0.60	1.60	1.7	0.17	0.28	0.11	0.181
Folate (µg/d)	172.93	125.52	136.57	450	45.0	0.00	0.00	-0.160
Vitamin B12 (µg/d)	1.88	2.87	0.77	2.4	0.24	0.18	0.00	0.318
Vitamin C (mg/d)	56.65	50.53	42.26	58	5.8	0.23	0.00	0.072
Vitamin A (RE/d)	527.25	553.46	362.73	450	90	0.38	0.16	0.250
Calcium (mg/d)	505.62	455.67	357.99	1,000 [b]	[b]	0.26	0.25	0.039
Iron (mg/d)	10.57	5.40	9.39	11.7	3.51	0.26	0.18	-0.157
Zinc (mg/d)	8.98	2.56	8.98	7	0.88	0.94	1.00	0.347
MPA across 11 micronutrients	0.25	0.13	0.23					

[a] Mean and median nutrient intakes are for first observation day; PA are based on estimated usual intake, calculated using repeat observations for a subset of the sample. Thus, PA incorporate information from both rounds of data collection.
[b] See Table A6-1 for sources for each EAR and SD, requirements for lactating women. There is no EAR and no SD for calcium; 1,000 mg is the Adequate Intake (AI) for lactating women.
[c] This documents the transformation parameters selected for each nutrient. The power transformations result in approximately normal distributions.

Table L9a. Percent Contribution of Food Groups (FGI-6) to Intake of Energy, Protein and Nutrients, Lactating Women, R1 [a]

Food groups (%)	Energy	Protein	CHO	Total fat	Thiamin	Riboflavin	Niacin	Vitamin B6	Folate	Vitamin B12	Vitamin C	Vitamin A	Calcium	Iron	Zinc
All starchy staples	87.0	69.2	92.9	27.7	63.5	53.3	65.3	62.6	35.6	0.0	18.3	1.0	22.3	43.4	74.7
All legumes and nuts	1.7	3.3	1.5	2.4	5.6	3.2	2.3	3.5	14.0	0.0	4.2	0.6	2.6	6.4	3.4
All dairy	0.4	0.9	0.2	3.8	0.9	3.1	0.1	0.6	0.7	8.9	0.5	3.4	4.7	0.2	0.7
Other animal source foods	3.1	18.0	0.0	13.4	6.0	8.3	15.0	7.5	5.3	91.1	0.3	3.9	27.0	6.5	9.5
Vitamin A-rich fruits/vegetables [b]	1.7	5.5	1.6	5.3	15.2	23.6	10.7	13.3	28.9	0.0	40.6	79.5	29.4	22.5	5.1
Other fruits and vegetables	2.3	2.3	2.4	4.7	7.4	7.0	4.8	8.5	11.3	0.0	33.2	10.4	8.4	5.4	4.4

[a] Percents may not sum to 100 due to nutrient contributions from foods not included in any of the groups comprising the diversity indicators (e.g., fats, sweets, alcohol).
[b] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.

Table L9b. Percent Contribution of Food Groups (FGI-9) to Intake of Energy, Protein and Nutrients, Lactating Women, R1 [a]

Food groups (%)	Energy	Protein	CHO	Total fat	Thiamin	Riboflavin	Niacin	Vitamin B6	Folate	Vitamin B12	Vitamin C	Vitamin A	Calcium	Iron	Zinc
All starchy staples	87.0	69.2	92.9	27.7	63.5	53.3	65.3	62.6	35.6	0.0	18.3	1.0	22.3	43.4	74.7
All legumes and nuts	1.7	3.3	1.5	2.4	5.6	3.2	2.3	3.5	14.0	0.0	4.2	0.6	2.6	6.4	3.4
All dairy	0.4	0.9	0.2	3.8	0.9	3.1	0.1	0.6	0.7	8.9	0.5	3.4	4.7	0.2	0.7
Organ meat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eggs	0.1	0.2	0.0	0.5	0.2	0.5	0.0	0.1	0.4	2.5	0.0	1.2	0.3	0.2	0.1
Flesh foods and other miscellaneous small animal protein	3.0	17.8	0.0	12.9	5.8	7.7	15.0	7.5	4.9	88.6	0.3	2.7	26.8	6.3	9.4
Vitamin A-rich dark green leafy vegetables	1.2	4.8	1.0	1.7	12.5	19.6	8.0	9.8	23.4	0.0	27.4	39.1	26.7	19.9	4.1
Other vitamin A-rich vegetables and fruits [b]	0.6	0.7	0.6	3.6	2.7	4.0	2.7	3.5	5.5	0.0	13.2	40.4	2.6	2.6	1.0
Other fruits and vegetables	2.3	2.3	2.4	4.7	7.4	7.0	4.8	8.5	11.3	0.0	33.2	10.4	8.4	5.4	4.4

[a] Percents may not sum to 100 due to nutrient contributions from foods not included in any of the groups comprising the diversity indicators (e.g., fats, sweets, alcohol).
[b] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.

Table L9c. Percent Contribution of Food Groups (FGI-13) to Intake of Energy, Protein and Nutrients, Lactating Women, R1 [a]

Food groups (%)	Energy	Protein	CHO	Total fat	Thiamin	Riboflavin	Niacin	Vitamin B6	Folate	Vitamin B12	Vitamin C	Vitamin A	Calcium	Iron	Zinc
All starchy staples	87.0	69.2	92.9	27.7	63.5	53.3	65.3	62.6	35.6	0.0	18.3	1.0	22.3	43.4	74.7
All legumes and nuts	1.7	3.3	1.5	2.4	5.6	3.2	2.3	3.5	14.0	0.0	4.2	0.6	2.6	6.4	3.4
All dairy	0.4	0.9	0.2	3.8	0.9	3.1	0.1	0.6	0.7	8.9	0.5	3.4	4.7	0.2	0.7
Organ meat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eggs	0.1	0.2	0.0	0.5	0.2	0.5	0.0	0.1	0.4	2.5	0.0	1.2	0.3	0.2	0.1
Small fish eaten whole w/bones	0.9	5.4	0.0	3.8	1.1	2.5	4.3	1.7	1.6	33.7	0.0	0.0	13.9	1.9	3.4
All other flesh foods misc. small animal protein	2.1	12.4	0.0	9.1	4.7	5.2	10.7	5.8	3.3	54.9	0.3	2.7	12.9	4.4	6.0
Vitamin A-rich dark green leafy vegetables [b]	1.2	4.8	1.0	1.7	12.5	19.6	8.0	9.8	23.4	0.0	27.4	39.1	26.7	19.9	4.1
Vitamin A-rich deep yellow/orange/red vegetables [b]	0.4	0.6	0.4	3.5	2.3	3.6	2.5	3.4	3.7	0.0	8.8	37.9	1.8	2.5	0.9
Vitamin C-rich vegetables [c]	0.3	0.5	0.3	0.3	1.8	1.4	1.3	3.0	1.4	0.0	19.3	3.1	2.2	1.3	1.0
Vitamin A-rich fruits [b]	0.1	0.1	0.1	0.1	0.4	0.3	0.2	0.1	1.8	0.0	4.4	2.5	0.8	0.1	0.1
Vitamin C-rich fruits [c]	0.2	0.1	0.3	0.3	0.7	0.6	0.5	1.0	0.5	0.0	3.0	0.6	0.3	0.3	0.2
All other fruits and vegetables	1.8	1.7	1.9	4.1	4.9	5.0	3.0	4.4	9.4	0.0	10.9	6.7	5.9	3.8	3.2

[a] Percents may not sum to 100 due to nutrient contributions from foods not included in any of the groups comprising the diversity indicators (e.g., fats, sweets, alcohol).
[b] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.
[c] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g.

Table L9d. Percent Contribution of Food Groups (FGI-21) to Intake of Energy, Protein and Nutrients, Lactating Women, R1 [a]

Food groups (%)	Energy	Protein	CHO	Total fat	Thiamin	Riboflavin	Niacin	Vitamin B6	Folate	Vitamin B12	Vitamin C	Vitamin A	Calcium	Iron	Zinc
Grains and grain products	84.8	67.3	90.3	27.1	55.7	49.9	61.1	53.1	28.4	0.0	0.0	0.0	20.3	39.2	72.1
All other starchy staples	2.2	1.9	2.5	0.6	7.8	3.4	4.2	9.5	7.2	0.0	18.3	1.0	2.0	4.2	2.6
Cooked dry beans and peas	0.9	2.7	0.8	0.8	4.0	1.9	1.8	1.8	11.6	0.0	1.0	0.2	1.9	5.2	2.4
Soybeans and soy products	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nuts and seeds	0.8	0.7	0.7	1.7	1.7	1.3	0.6	1.7	2.4	0.0	3.2	0.4	0.7	1.2	0.9
Milk/yogurt	0.4	0.9	0.2	3.8	0.9	3.1	0.1	0.6	0.7	8.9	0.5	3.4	4.7	0.2	0.7
Cheese	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Beef, pork, veal, lamb, goat, game meat	0.3	1.6	0.0	1.4	0.5	0.9	1.1	0.9	0.3	9.1	0.0	0.0	0.1	0.6	1.5
Organ meat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Chicken, duck, turkey, pigeon, guinea hen, game birds	0.2	1.0	0.0	1.0	0.2	0.6	1.0	0.6	0.2	3.2	0.0	0.0	0.3	0.4	0.7
Large whole fish/dried fish/shellfish, other seafood	1.6	9.8	0.0	6.7	4.0	3.7	8.7	4.2	2.8	42.6	0.3	2.7	12.4	3.3	3.7
Small fish eaten whole w/bones	0.9	5.4	0.0	3.8	1.1	2.5	4.3	1.7	1.6	33.7	0.0	0.0	13.9	1.9	3.4
Insects, grubs, snakes, rodents and other small animal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eggs	0.1	0.2	0.0	0.5	0.2	0.5	0.0	0.1	0.4	2.5	0.0	1.2	0.3	0.2	0.1
Vitamin A-rich dark green leafy vegetables [b]	1.2	4.8	1.0	1.7	12.5	19.6	8.0	9.8	23.4	0.0	27.4	39.1	26.7	19.9	4.1
Vitamin A-rich deep yellow/orange/red vegetables [b]	0.4	0.6	0.4	3.5	2.3	3.6	2.5	3.4	3.7	0.0	8.8	37.9	1.8	2.5	0.9
Vitamin C-rich vegetables [c]	0.3	0.5	0.3	0.3	1.8	1.4	1.3	3.0	1.4	0.0	19.3	3.1	2.2	1.3	1.0
All other vegetables	0.6	0.9	0.7	1.0	3.6	2.4	2.0	2.9	7.1	0.0	7.6	4.3	4.0	2.0	2.0
Vitamin A-rich fruits [b]	0.1	0.1	0.1	0.1	0.4	0.3	0.2	0.1	1.8	0.0	4.4	2.5	0.8	0.1	0.1
Vitamin C-rich fruits [c]	0.2	0.1	0.3	0.3	0.7	0.6	0.5	1.0	0.5	0.0	3.0	0.6	0.3	0.3	0.2
All other fruits	1.2	0.8	1.2	3.1	1.2	2.6	1.0	1.5	2.3	0.0	3.3	2.4	2.0	1.7	1.2

[a] Percents may not sum to 100 due to nutrient contributions from foods not included in any of the groups comprising the diversity indicators (e.g., fats, sweets, alcohol).
[b] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.
[c] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g.

Table L10. Correlations between Food Group Diversity Scores and Estimated Usual Intakes of Individual Nutrients, Lactating Women [a, b]

Nutrients	FGI-6 Not controlling for energy	FGI-6 Controlling for energy	FGI-6R Not controlling for energy	FGI-6R Controlling for energy	FGI-9 Not controlling for energy	FGI-9 Controlling for energy	FGI-9R Not controlling for energy	FGI-9R Controlling for energy	FGI-13 Not controlling for energy	FGI-13 Controlling for energy	FGI-13R Not controlling for energy	FGI-13R Controlling for energy	FGI-21 Not controlling for energy	FGI-21 Controlling for energy	FGI-21R Not controlling for energy	FGI-21R Controlling for energy
Total energy	0.325***		0.193*		0.275**		0.217*		0.269**		0.253**		0.326***		0.313***	
Thiamin	0.330***	0.172	0.351***	0.300**	0.314***	0.190*	0.369***	0.306**	0.321***	0.202*	0.360***	0.268**	0.350***	0.198*	0.406***	0.284**
Riboflavin	0.341***	0.238*	0.445***	0.409***	0.391***	0.316***	0.473***	0.431***	0.406***	0.336***	0.432***	0.371***	0.330***	0.224*	0.387***	0.296**
Niacin	0.279**	0.056	0.293**	0.230*	0.289**	0.131	0.322***	0.247**	0.303**	0.159	0.330***	0.220*	0.298**	0.086	0.341***	0.168
Vitamin B6	0.336***	0.165	0.335***	0.284**	0.351***	0.232*	0.341***	0.270**	0.390***	0.293**	0.374***	0.284**	0.452***	0.333***	0.481***	0.385***
Folate	0.397***	0.316***	0.462***	0.428***	0.439***	0.379***	0.467***	0.426***	0.440***	0.381***	0.424***	0.369***	0.402***	0.322***	0.416***	0.341***
Vitamin B12	0.489***	0.419***	0.346***	0.301**	0.430***	0.367***	0.350***	0.297**	0.423***	0.361***	0.369***	0.307**	0.371***	0.285**	0.354***	0.270**
Vitamin C	0.052	0.020	0.246**	0.231*	0.172	0.151	0.263**	0.248**	0.283**	0.267**	0.244**	0.226*	0.188*	0.164	0.234*	0.214*
Vitamin A	0.200*	0.216*	0.334***	0.343***	0.328***	0.345***	0.361***	0.373***	0.338***	0.355***	0.300**	0.314***	0.123	0.135	0.133	0.145
Calcium	0.360***	0.310***	0.414***	0.388***	0.397***	0.357***	0.425***	0.395***	0.400***	0.361***	0.434***	0.400***	0.255**	0.196*	0.354***	0.305**
Iron	0.335***	0.228*	0.408***	0.367***	0.378***	0.299**	0.426***	0.377***	0.378***	0.301**	0.411***	0.346***	0.388***	0.289**	0.420***	0.331***
Zinc	0.424***	0.312***	0.310***	0.306**	0.350***	0.238*	0.321***	0.283**	0.358***	0.267**	0.381***	0.351***	0.399***	0.251**	0.417***	0.317***

[a] Usual intake of energy and individual nutrients are estimated by the BLUP following the method described in Arimond et al. 2008. Diversity scores are from R1 data; BLUP calculation incorporates information from both rounds.
[b] A "*" indicates a coefficient that is statistically significant at $p < 0.05$; ** indicates $p < 0.01$, and *** indicates $p < 0.001$.

Table L11a. Correlation between Energy from 6 Major Food Groups and MPA, With and Without Controlling For Total Energy Intake, Lactating Women [a, b]

Major food groups	Correlation between MPA and energy from each food group:	Partial correlation coefficients for energy from each food group (controlling for total energy)
All starchy staples	0.364***	-0.344***
All legumes and nuts	0.137	0.049
All dairy	0.002	-0.011
Other animal source foods	0.396***	0.258**
Vitamin A-rich fruits and vegetables [c]	0.423***	0.497***
Other fruits and vegetables	0.086	0.078

[a] Numbers in bold indicate coefficients that changed direction when total energy was controlled for, with both coefficients being significant. A "*" indicates a coefficient that is statistically significant at $p < 0.05$; ** indicates $p < 0.01$, and *** indicates $p < 0.001$.
[b] Energy from food groups is from R1; MPA is based on estimated usual intake, calculated using repeat observations for a subset of the sample. MPA was transformed to approximate normality, and the transformed variable was used in the correlations.
[c] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.

Table L11b. Correlation between Energy from 9 Sub-Food Groups and MPA, With and Without Controlling for Total Energy Intake, Lactating Women [a, b]

Major food groups	Correlation between MPA and energy from each food group:	Partial correlation coefficients for energy from each food group (controlling for total energy)
All starchy staples	0.364 ***	-0.344 ***
All legumes and nuts	0.137	0.049
All dairy	0.002	-0.011
Organ meat	–	–
Eggs	0.082	0.036
Flesh foods and other miscellaneous small animal protein	0.396 ***	0.259 **
Vitamin A-rich dark green leafy vegetables [c]	0.431 ***	0.550 ***
Other vitamin A-rich vegetables and fruits [c]	0.096	0.035
Other fruits and vegetables	0.086	0.078

[a] Numbers in bold indicate coefficients that changed direction when total energy was controlled for, with both coefficients being significant. A "*" indicates a coefficient that is statistically significant at $p < 0.05$; ** indicates $p < 0.01$, and *** indicates $p < 0.001$. A "-" indicates the food group was not consumed.
[b] Energy from food groups is from first observation day; MPA is based on estimated usual intake, calculated using repeat observations for a subset of the sample. MPA was transformed to approximate normality, and the transformed variable was used in the correlations.
[c] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.

Table L11c. Correlation between Energy from 13 Sub-Food Groups and MPA, With and Without Controlling for Total Energy Intake, Lactating Women [a, b]

Major food groups	Correlation between MPA and energy from each food group:	Partial correlation coefficients for energy from each food group (controlling for total energy)
All starchy staples	0.364 ***	-0.344 ***
All legumes and nuts	0.137	0.049
All dairy	0.002	-0.011
Organ meat	–	–
Eggs	0.082	0.036
Small fish eaten whole with bones	0.366 ***	0.306 **
All other flesh foods and miscellaneous small animal protein	0.216 *	0.070
Vitamin A-rich dark green leafy vegetables	0.431 ***	0.550 ***
Vitamin A-rich deep yellow/orange/red vegetables [c]	0.092	0.029
Vitamin C-rich vegetables [d]	0.143	0.138
Vitamin A-rich fruits [c]	0.042	0.021
Vitamin C-rich fruits [d]	0.044	0.091
All other fruits and vegetables	0.065	0.046

[a] Numbers in bold indicate coefficients that changed direction when total energy was controlled for, with both coefficients being significant. A "*" indicates a coefficient that is statistically significant at $p < 0.05$; ** indicates $p < 0.01$, and *** indicates $p < 0.001$. A "-" indicates the food group was not consumed.
[b] Energy from food groups is from R1; MPA is based on estimated usual intake, calculated using repeat observations for a subset of the sample. MPA was transformed to approximate normality, and the transformed variable was used in the correlations.
[c] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.
[d] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g.

Table L11d. Correlation between Energy from 21 Sub-Food Groups and MPA, With and Without Controlling for Total Energy Intake, Lactating Women [a, b]

Major food groups	Correlation between MPA and energy from each food group:	Partial correlation coefficients for energy from each food group (controlling for total energy)
Grains and grain products	0.383***	-0.270**
All other starchy staples	0.000	-0.161
Cooked dry beans and peas	0.083	-0.051
Soybeans and soy products	–	–
Nuts and seeds	0.112	0.146
Milk/yogurt	0.002	-0.011
Cheese	–	–
Beef, pork, veal, lamb, goat, game meat	0.038	-0.036
Organ meat	–	–
Chicken, duck, turkey, pigeon, guinea hen, game birds	-0.211*	-0.158
Large whole fish/dried fish/shellfish and other seafood	0.270**	0.135
Small fish eaten whole with bones	0.366***	0.306**
Insects, grubs, snakes, rodents and other small animal	–	–
Eggs	0.082	0.036
Vitamin A-rich dark green leafy vegetables [c]	0.431***	0.550***
Vitamin A-rich deep yellow/orange/red vegetables [c]	0.092	0.029
Vitamin C-rich vegetables [d]	0.143	0.138
All other vegetables	0.153	0.088
Vitamin A-rich fruits [c]	0.042	0.021
Vitamin C-rich fruits [d]	0.044	0.091
All other fruits	0.037	0.031

[a] Numbers in bold indicate coefficients that changed direction when total energy was controlled for, with both coefficients being significant. A "*" indicates a coefficient that is statistically significant at $p < 0.05$; ** indicates $p < 0.01$, and *** indicates $p < 0.001$. A "-" indicates the food group was not consumed.
[b] Energy from food groups is from R1; MPA is based on estimated usual intake, calculated using repeat observations for a subset of the sample. MPA was transformed to approximate normality, and the transformed variable was used in the correlations.
[c] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.
[d] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g.

Table L12. Total Energy Intake (kcal) by Food Group Diversity Scores, Lactating Women, R1 [a]

Number of food groups eaten	Diversity indicators: Median total energy intake (range)															
	FGI-6		FGI-6R		FGI-9		FGI-9R		FGI-13		FGI-13R		FGI-21		FGI-21R	
1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2	–	–	2130	(1170-3122)	–	–	2130	(1170-3122)	–	–	1871	(1170-3122)	–	–	1698	(1365-2290)
3	1909	(1170-3122)	2184	(1298-3442)	2074	(1170-3122)	2184	(1298-3442)	–	–	2160	(1298-3442)	–	–	2219	(1170-3122)
4	2360	(1451-3442)	2604	(1400-3599)	2219	(1365-3442)	2553	(1400-3599)	2018	(1170-3442)	2621	(1400-3304)	2074	(1298-3122)	2465	(1400-3442)
5	2586	(1400-3599)	2526	(1410-3341)	2571	(1400-3599)	2568	(1410-3204)	2205	(1365-2989)	2535	(1679-3599)	1819	(1170-3442)	2577	(1649-3304)
6	2446	(1909-2999)	–	–	2568	(1410-3204)	–	–	2536	(1400-3599)	–	–	2420	(1400-3007)	2766	(1679-3207)
7					–	–	–	–	2492	(1737-3304)	–	–	2492	(1737-3140)	2288	(1410-3599)
8					–	–	–	–	2637	(1410-3204)	–	–	2788	(1679-3599)	–	–
9					–	–	–	–	–	–	–	–	2542	(1961-3236)	–	–
10									–	–	–	–	–	–	–	–
11									–	–	–	–	–	–	–	–
12									–	–	–	–	–	–	–	–
13									–	–	–	–	–	–	–	–
14													–	–	–	–
15													–	–	–	–
16													–	–	–	–
17													–	–	–	–
18													–	–	–	–
19													–	–	–	–
20													–	–	–	–
21													–	–	–	–

[a] Light shading indicates impossible values (beyond range of possible scores). A "–" indicates that a cell has fewer than 5 observations. Cells with fewer than 10 observations have dark shading.

Table L13. Relationship between Food Group Diversity Scores and Total Energy Intake, Lactating Women [a]

	Food group diversity score (mean)	Food group diversity score (median)	Total energy intake (mean)	Total energy intake (median)	Correlation Coefficient [b] (median)
FGI-6	4.2	4.0	2,340	2,360	0.325***
FGI-6R [c]	3.5	3.0	2,340	2,360	0.193*
FGI-9	4.5	4.0	2,340	2,360	0.275**
FGI-9R [c]	3.5	3.0	2,340	2,360	0.217*
FGI-13	5.7	6.0	2,340	2,360	0.269**
FGI-13R [c]	3.6	4.0	2,340	2,360	0.253**
FGI-21	6.5	6.0	2,340	2,360	0.326***
FGI-21R [c]	4.3	4.0	2,340	2,360	0.313***

[a] Food group diversity scores and mean and median energy intakes are from first observation day; BLUP for energy intake (calculated using repeat observations for a subset of the sample) is used for correlation analysis.
[b] A "*" indicates a coefficient that is statistically significant at $p < 0.05$; ** indicates $p < 0.01$, and *** indicates $p < 0.001$.
[c] Refers to minimum intake of 15 g for each of the food groups/sub-food groups.

Table L14. MPA by Food Group Diversity Scores, Lactating Women [a, b]

Number of food groups eaten	Diversity indicators															
	FGI-6		FGI-6R		FGI-9		FGI-9R		FGI-13		FGI-13R		FGI-21		FGI-21R	
	Median MPA (range)															
1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2	–	–	0.13	(0.01-0.28)	–	–	0.13	(0.01-0.28)	–	–	0.13	(0.01-0.28)	–	–	0.12	(0.08-0.25)
3	0.14	(0.01-0.42)	0.24	(0.08-0.50)	0.13	(0.01-0.29)	0.24	(0.08-0.50)	–	–	0.25	(0.08-0.54)	–	–	0.15	(0.01-0.54)
4	0.25	(0.08-0.55)	0.24	(0.09-0.55)	0.25	(0.08-0.50)	0.23	(0.09-0.55)	0.13	(0.01-0.30)	0.24	(0.09-0.55)	0.17	(0.09-0.28)	0.29	(0.09-0.55)
5	0.28	(0.09-0.66)	0.30	(0.15-0.66)	0.23	(0.08-0.55)	0.36	(0.15-0.66)	0.27	(0.08-0.50)	0.34	(0.12-0.66)	0.15	(0.01-0.42)	0.25	(0.09-0.44)
6	0.19	(0.12-0.33)	–	–	0.27	(0.12-0.66)	–	–	0.23	(0.08-0.55)	–	–	0.22	(0.09-0.55)	0.19	(0.12-0.66)
7					–	–	–	–	0.27	(0.12-0.54)	–	–	0.29	(0.08-0.54)	0.23	(0.17-0.39)
8					–	–	–	–	0.36	(0.17-0.66)	–	–	0.27	(0.12-0.44)	–	–
9					–	–	–	–	–	–	–	–	0.19	(0.12-0.66)	–	–
10									–	–	–	–	–	–	–	–
11									–	–	–	–	–	–	–	–
12									–	–	–	–	–	–	–	–
13									–	–	–	–	–	–	–	–
14													–	–	–	–
15													–	–	–	–
16													–	–	–	–
17													–	–	–	–
18													–	–	–	–
19													–	–	–	–
20													–	–	–	–
21													–	–	–	–

[a] Food group diversity scores are from first observation day; MPA is based on estimated usual intake, calculated using repeat observations for a subset of the sample.

[b] Light shading indicates impossible values (beyond range of possible scores). A "–" indicates that a cell has fewer than 5 observations. Cells with fewer than 10 observations have dark shading.

Table L15. Relationship between MPA and Food Group Diversity Scores, Lactating Women [a]

	Food group diversity score		MPA		Correlation Coefficient [b]	Partial correlation controlling for total energy intake [b]
	(mean)	(median)	(mean)	(median)	(median)	
FGI-6	4.2	4.0	0.25	0.23	0.280 **	0.148
FGI-6R [c]	3.5	3.0	0.25	0.23	0.375 ***	0.328 ***
FGI-9	4.5	4.0	0.25	0.23	0.348 ***	0.255 **
FGI-9R [c]	3.5	3.0	0.25	0.23	0.405 ***	0.352 ***
FGI-13	5.7	6.0	0.25	0.23	0.387 ***	0.304 **
FGI-13R [c]	3.6	4.0	0.25	0.23	0.412 ***	0.342 ***
FGI-21	6.5	6.0	0.25	0.23	0.289 **	0.158
FGI-21R [c]	4.3	4.0	0.25	0.23	0.374 ***	0.268 **

[a] Food group diversity scores are from first observation day. MPA is based on the 1st observation day and repeat observations for a subset of the sample. MPA was transformed to approximate normality, and transformed MPA and BLUP for total energy intake were used for correlation analysis.
[b] A "*" indicates a coefficient that is statistically significant at $p < 0.05$; ** indicates $p < 0.01$, and *** indicates $p < 0.001$.
[c] Refers to minimum intake of 15 g for each of the food groups/sub-food groups.

Table L17. Percent of Observation Days above Selected Cutoff(s) for MPA, Lactating Women [a]

	Percent (number)	
Women with MPA >50%	5	(5)
Women with MPA >60%	1	(1)
Women with MPA >70%	0	(0)
Women with MPA >80%	0	(0)
Women with MPA >90%	0	(0)

[a] MPA is calculated based on both observation days.

FIGURES

Figure L1. Distribution of Thiamin Intakes, Lactating Women

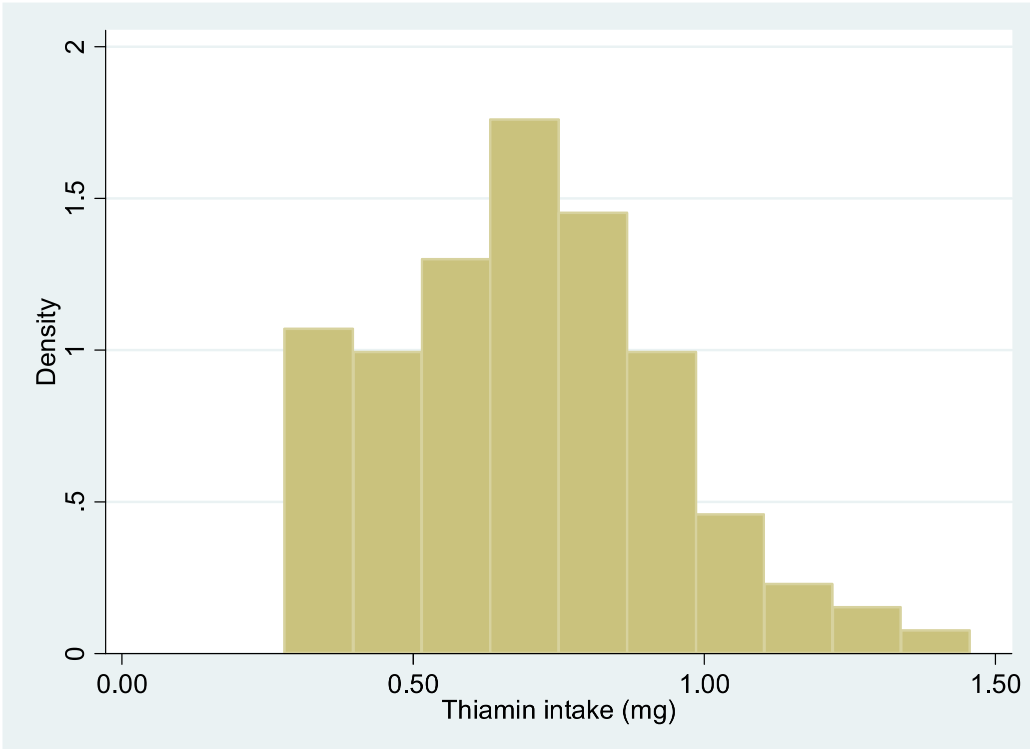


Figure L2. Distribution of Riboflavin Intakes, Lactating Women

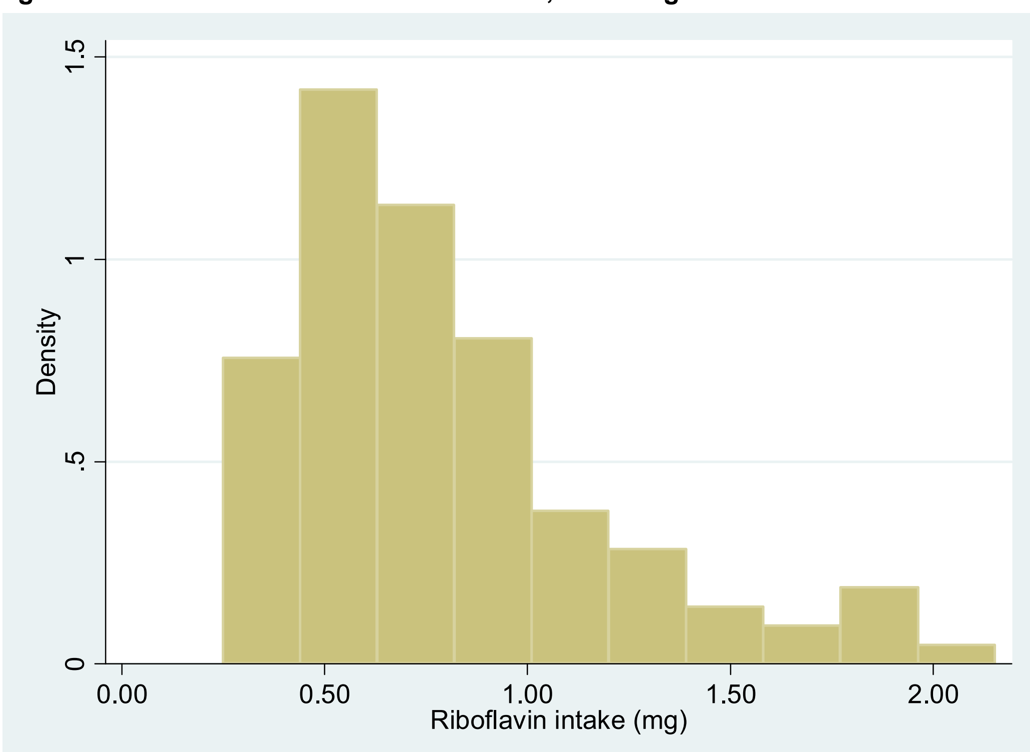


Figure L3. Distribution of Niacin Intakes, Lactating Women

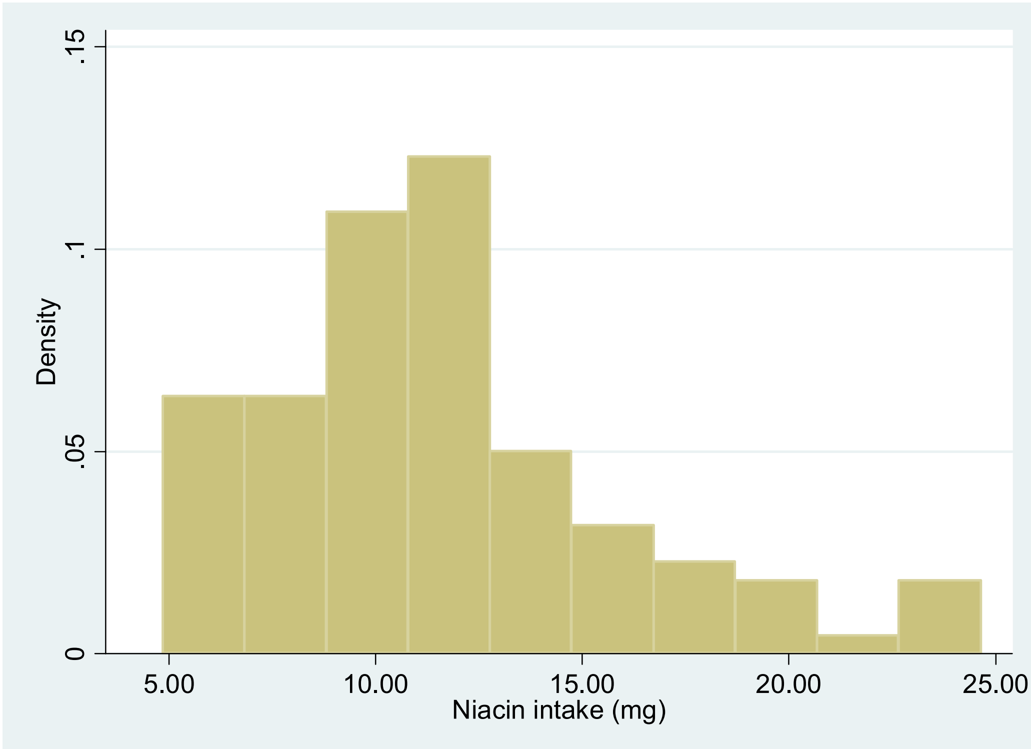


Figure L4. Distribution of Vitamin B6 Intakes, Lactating Women

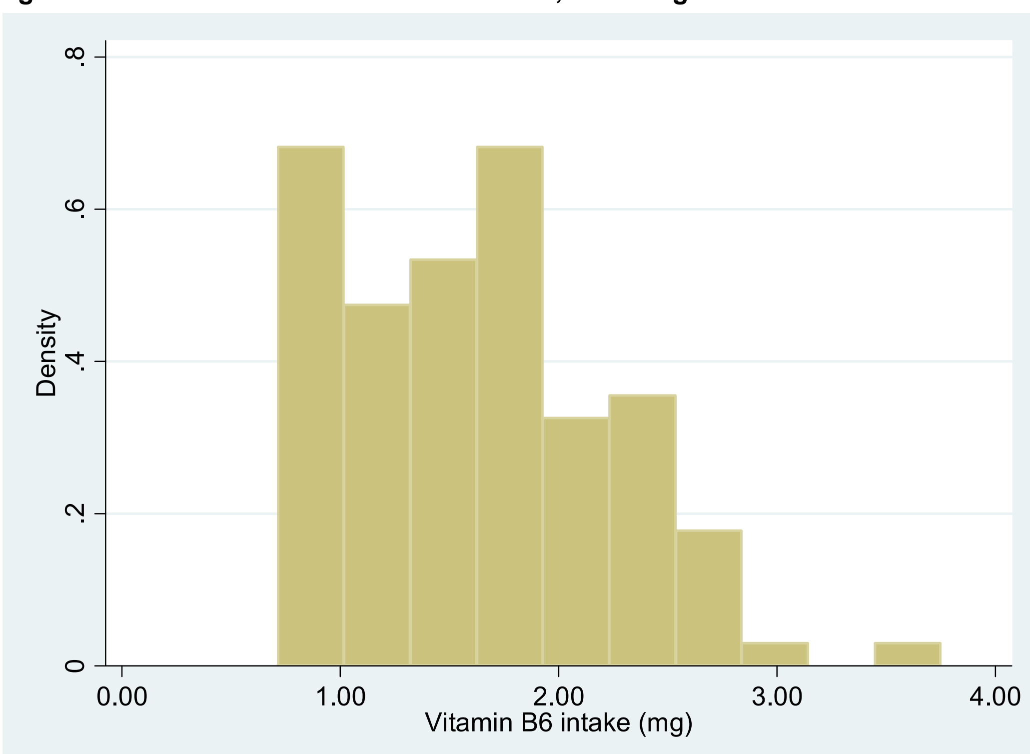


Figure L5. Distribution of Folate Intakes, Lactating Women

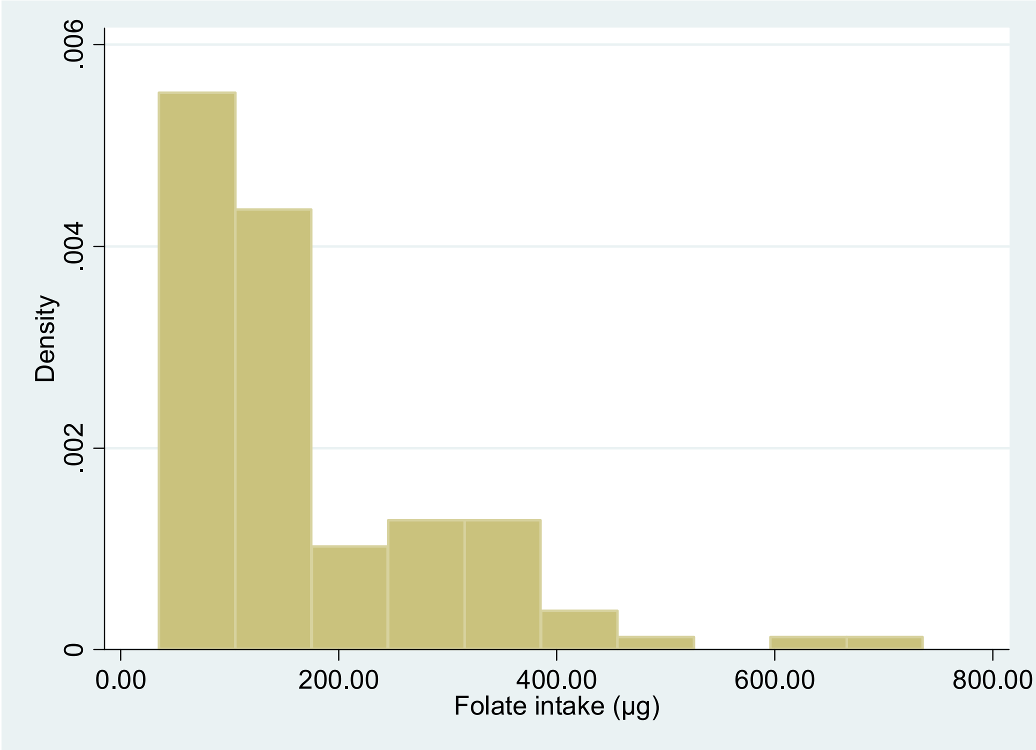


Figure L6. Distribution of Vitamin B12 Intakes, Lactating Women

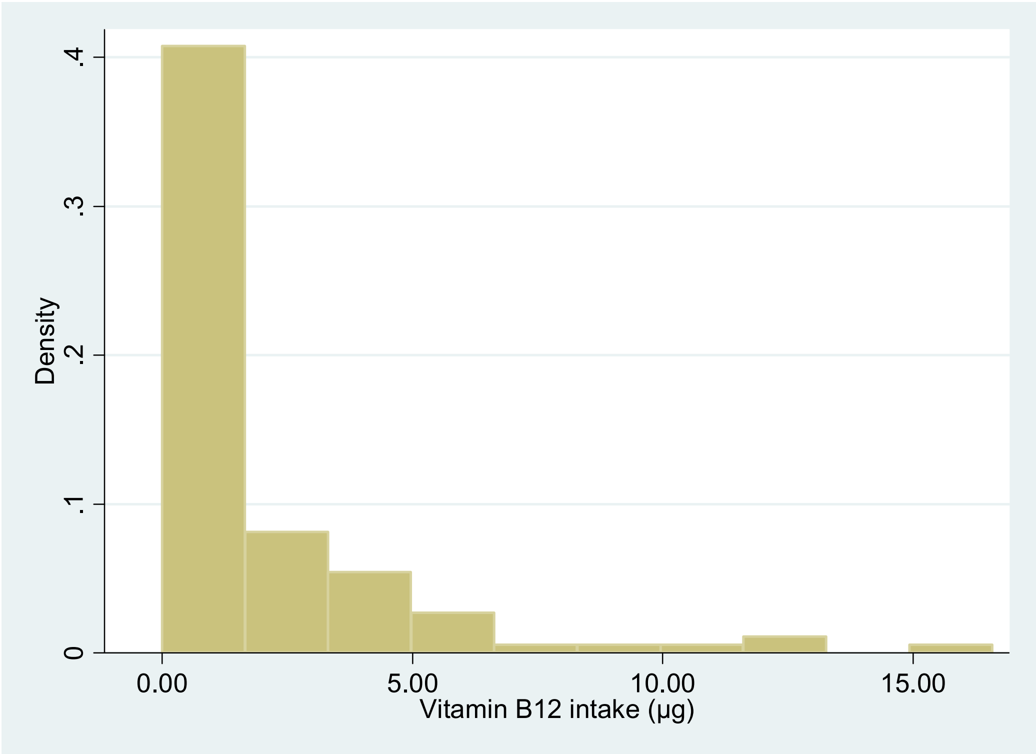


Figure L7. Distribution of Vitamin C Intakes, Lactating Women

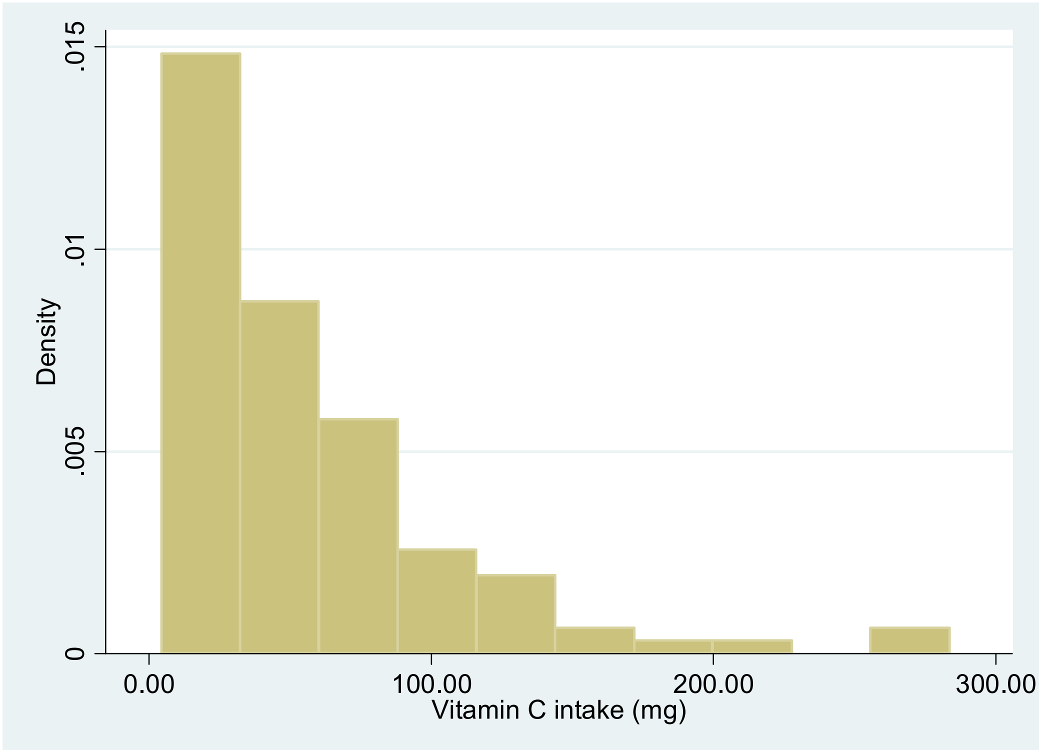


Figure L8. Distribution of Vitamin A Intakes, Lactating Women

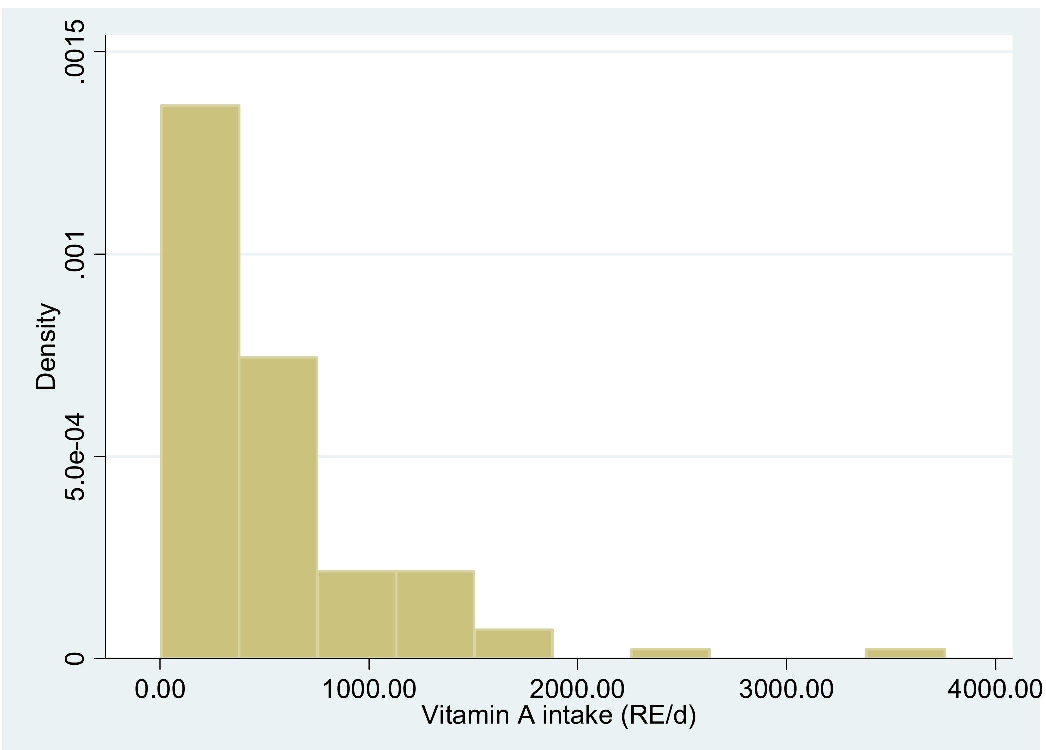


Figure L9. Distribution of Calcium Intakes, Lactating Women

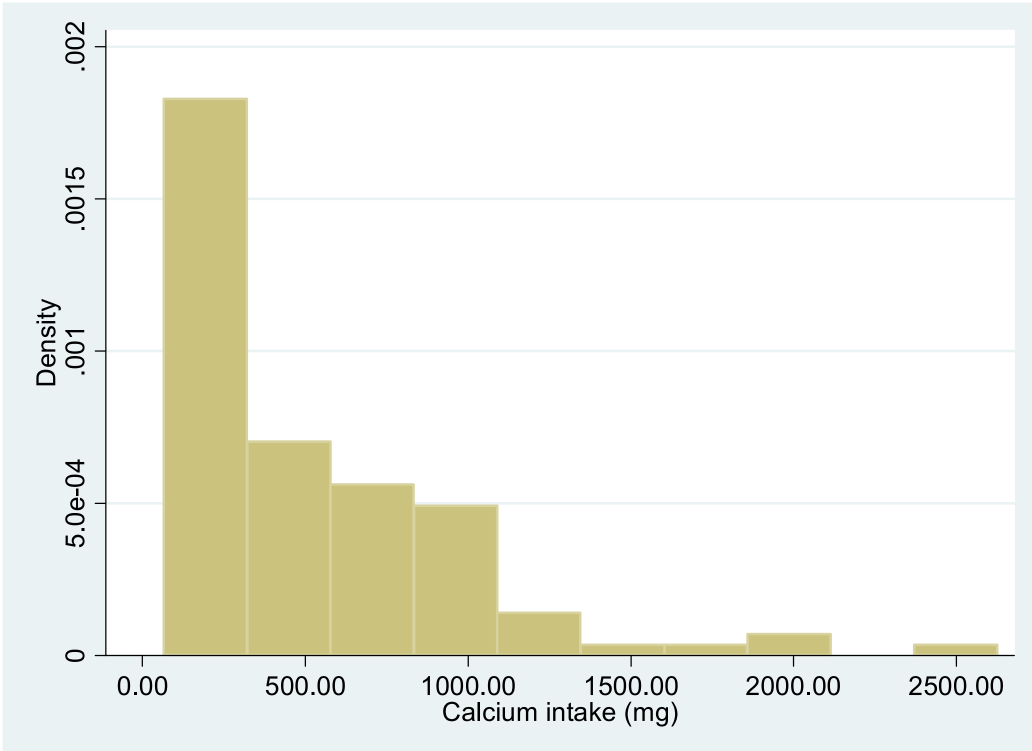


Figure L10. Distribution of Iron Intakes, Lactating Women

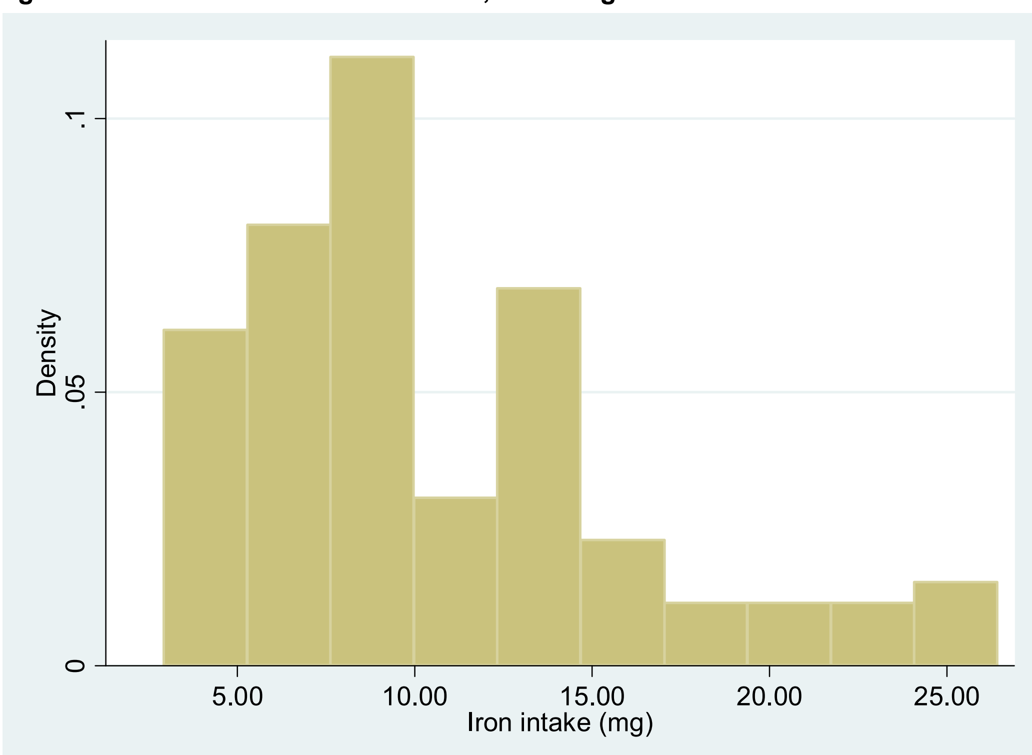


Figure L11. Distribution of Zinc Intakes, Lactating Women

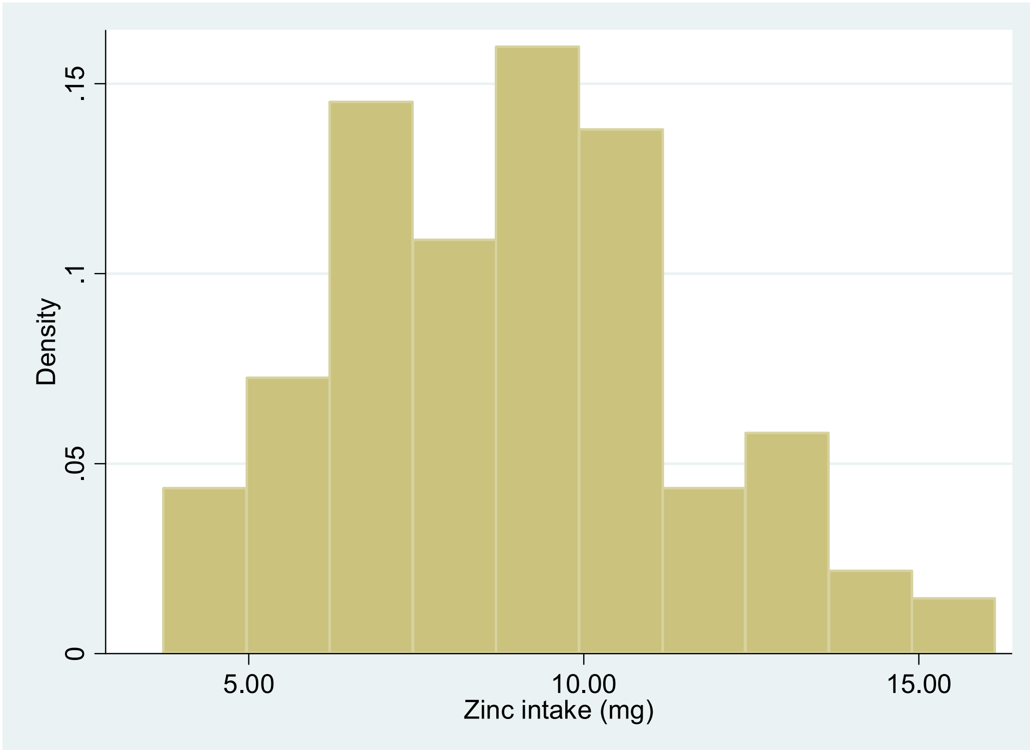


Figure L12. Intra-Individual SD of Thiamin Intakes, Lactating Women

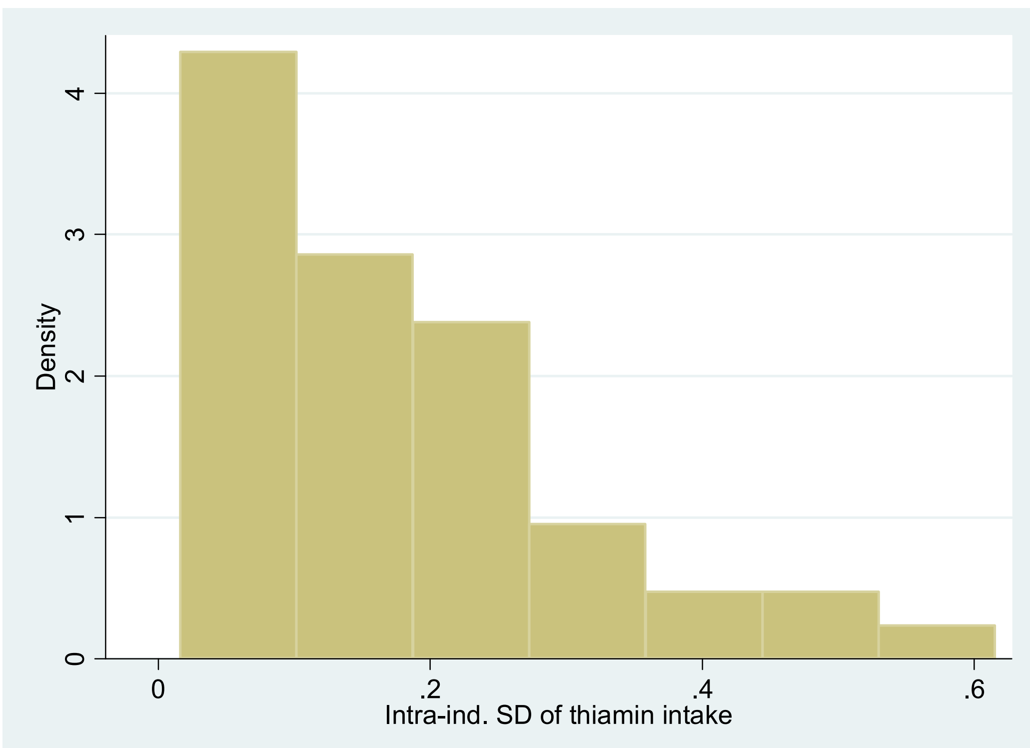


Figure L13. Intra-Individual SD of Riboflavin Intakes, Lactating Women

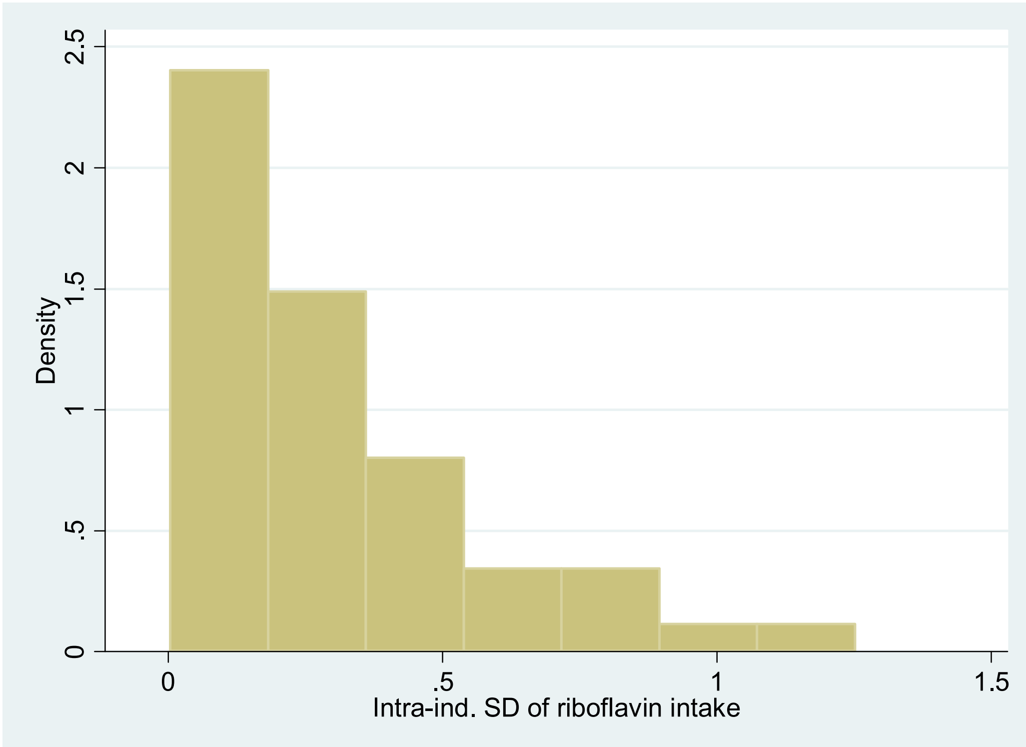


Figure L14. Intra-Individual SD of Niacin Intakes, Lactating Women

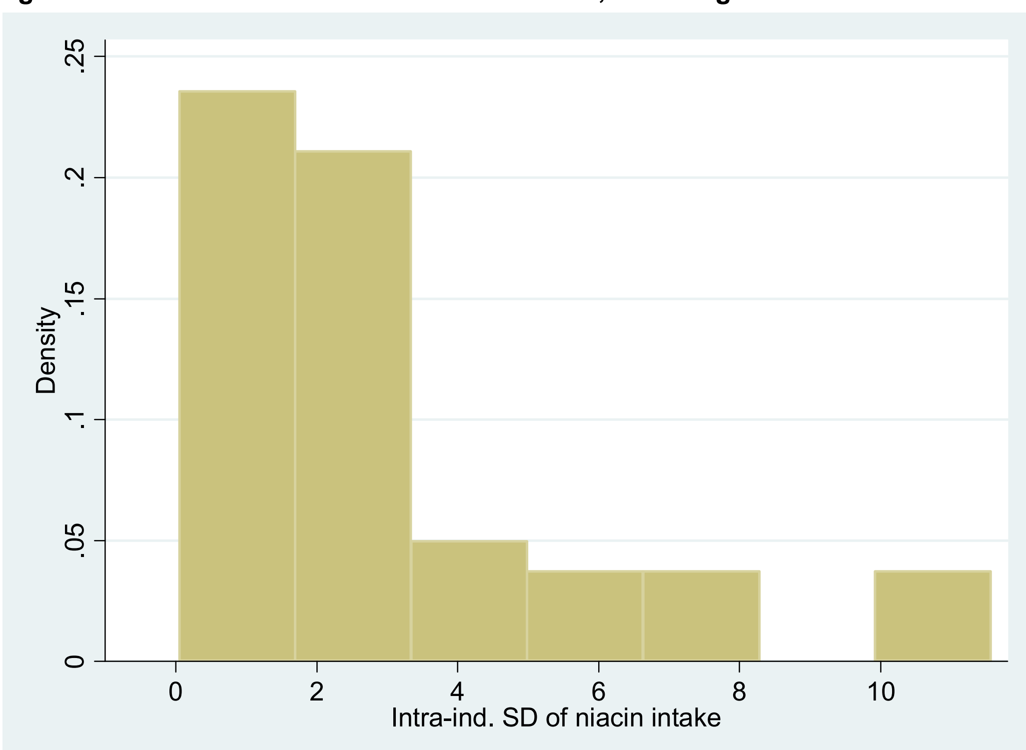


Figure L15. Intra-Individual SD of Vitamin B6 Intakes, Lactating Women

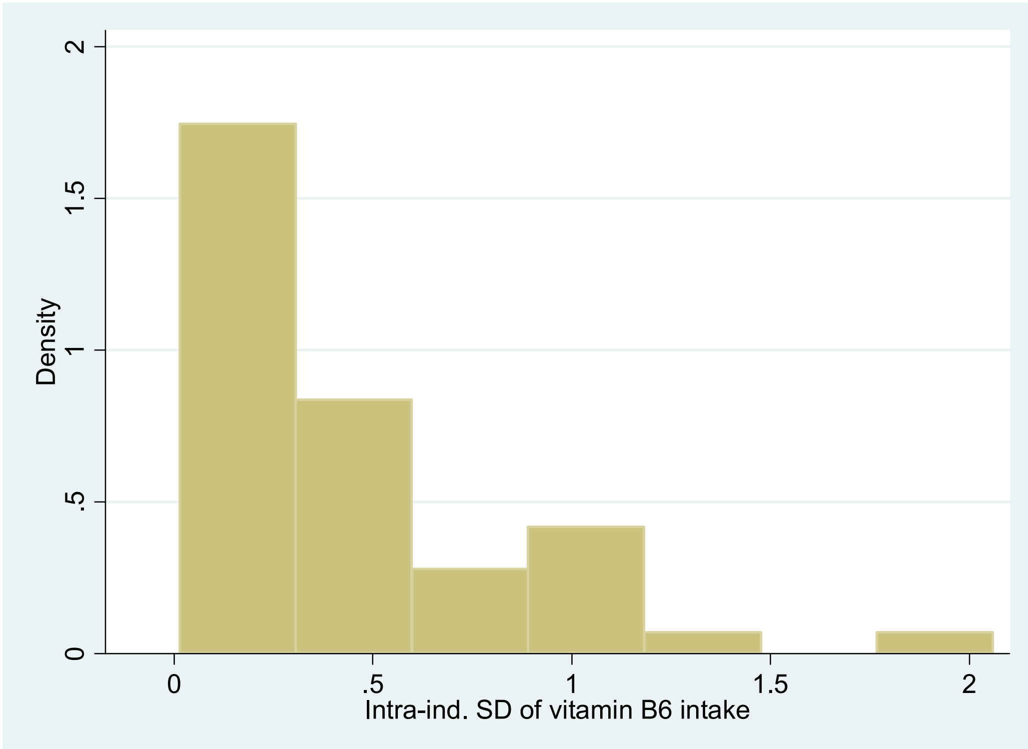


Figure L16. Intra-Individual SD of Folate Intakes, Lactating Women

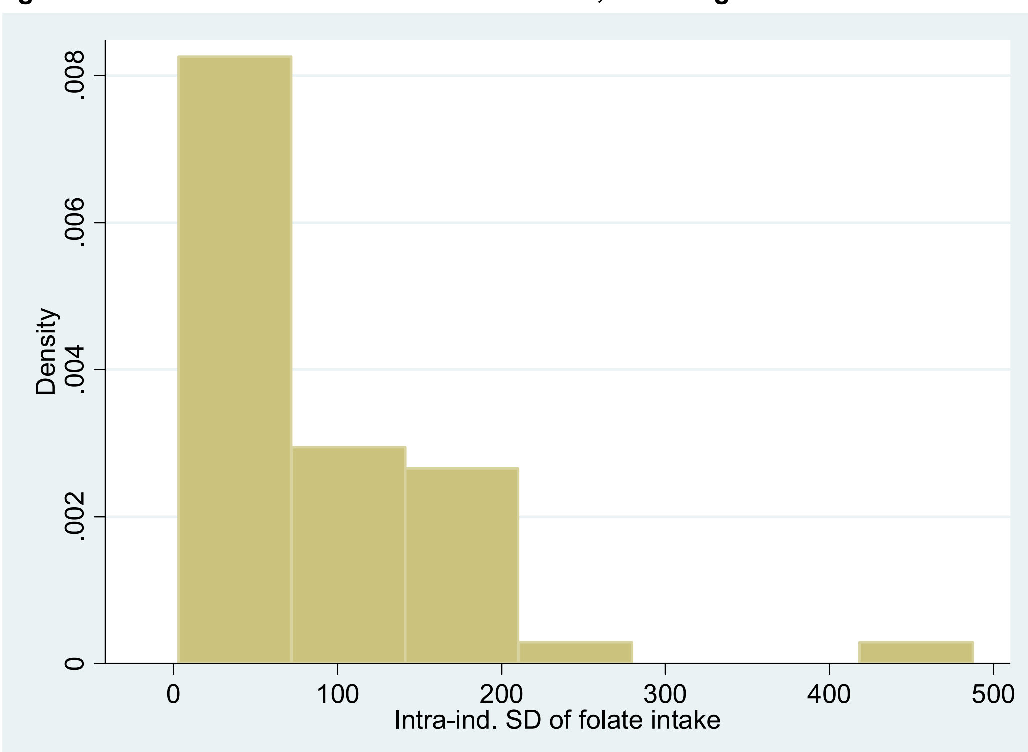


Figure L17. Intra-Individual SD of Vitamin B12 Intakes, Lactating Women

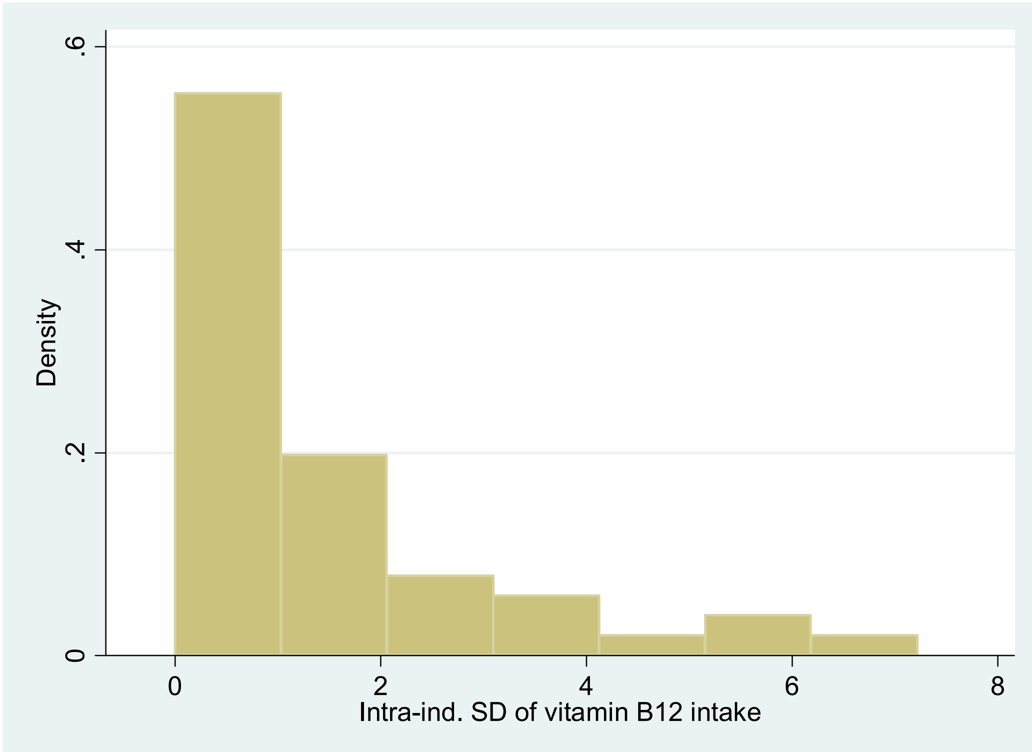


Figure L18. Intra-Individual SD of Vitamin C Intakes, Lactating Women

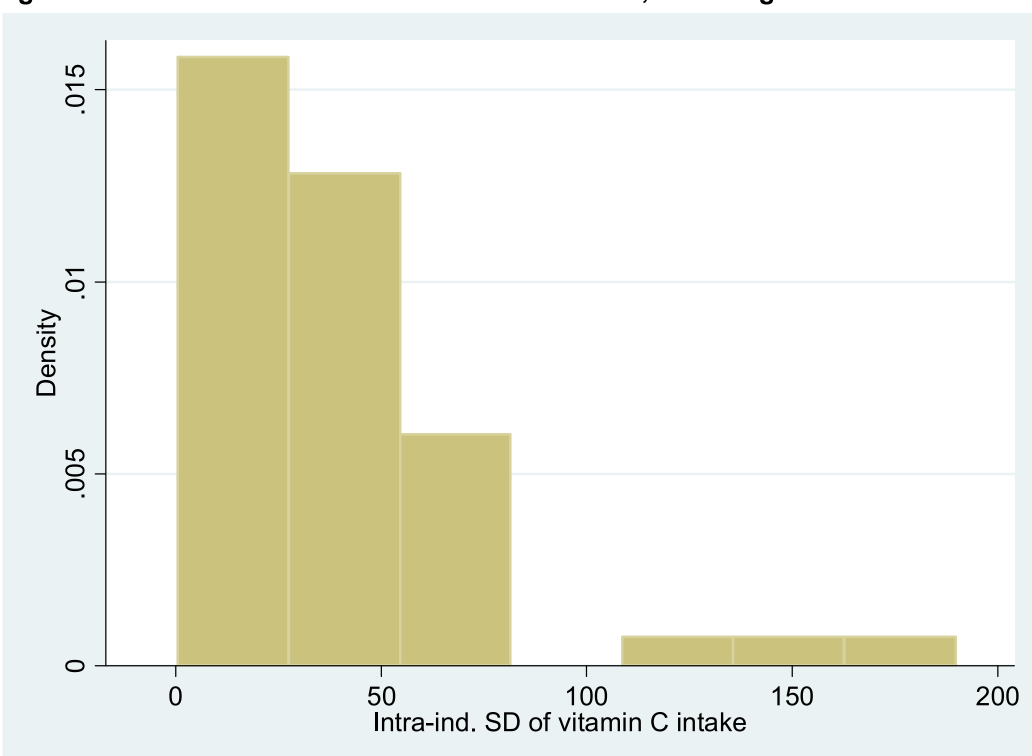


Figure L19. Intra-Individual SD of Vitamin A Intakes, Lactating Women

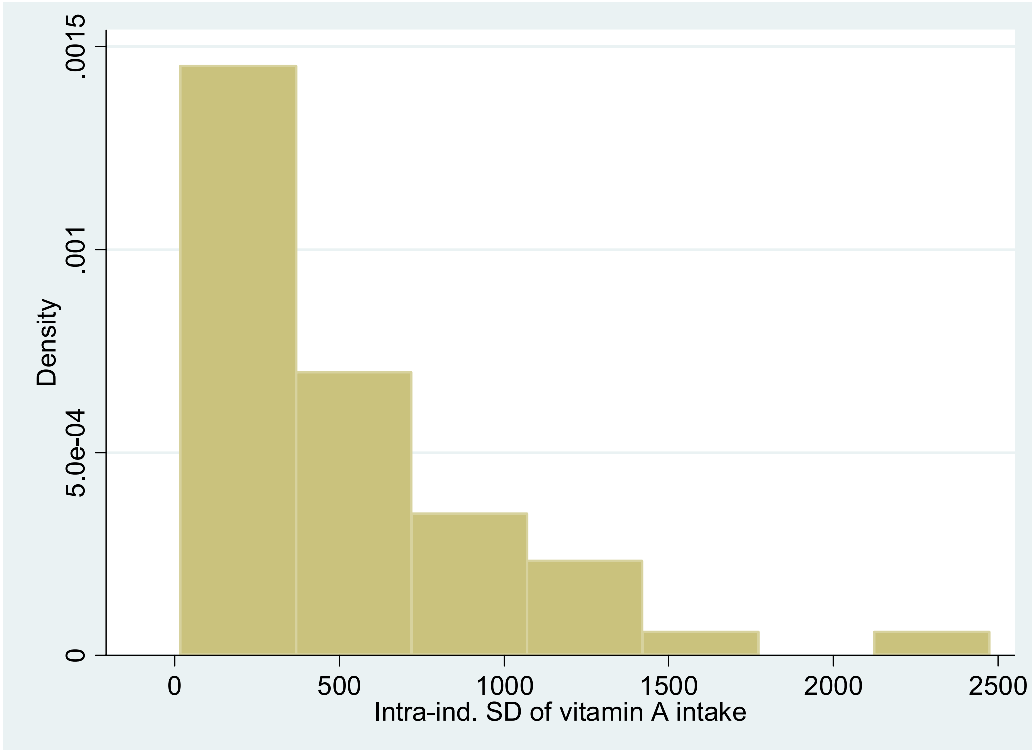


Figure L20. Intra-Individual SD of Calcium Intakes, Lactating Women

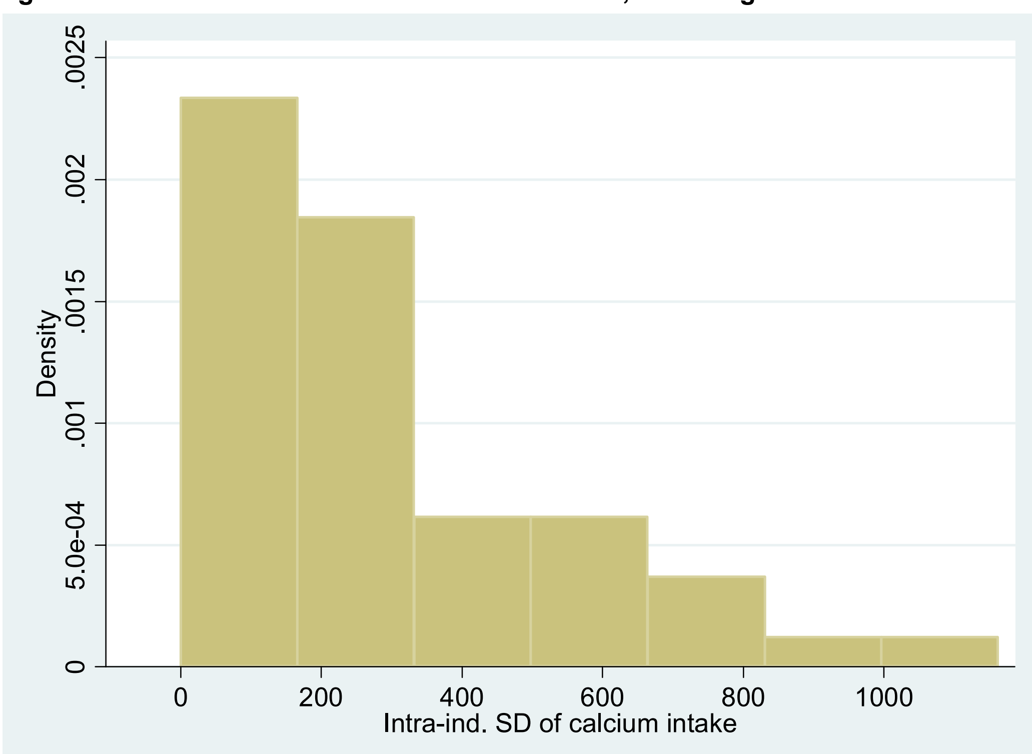


Figure L21. Intra-Individual SD of Iron Intakes, Lactating Women

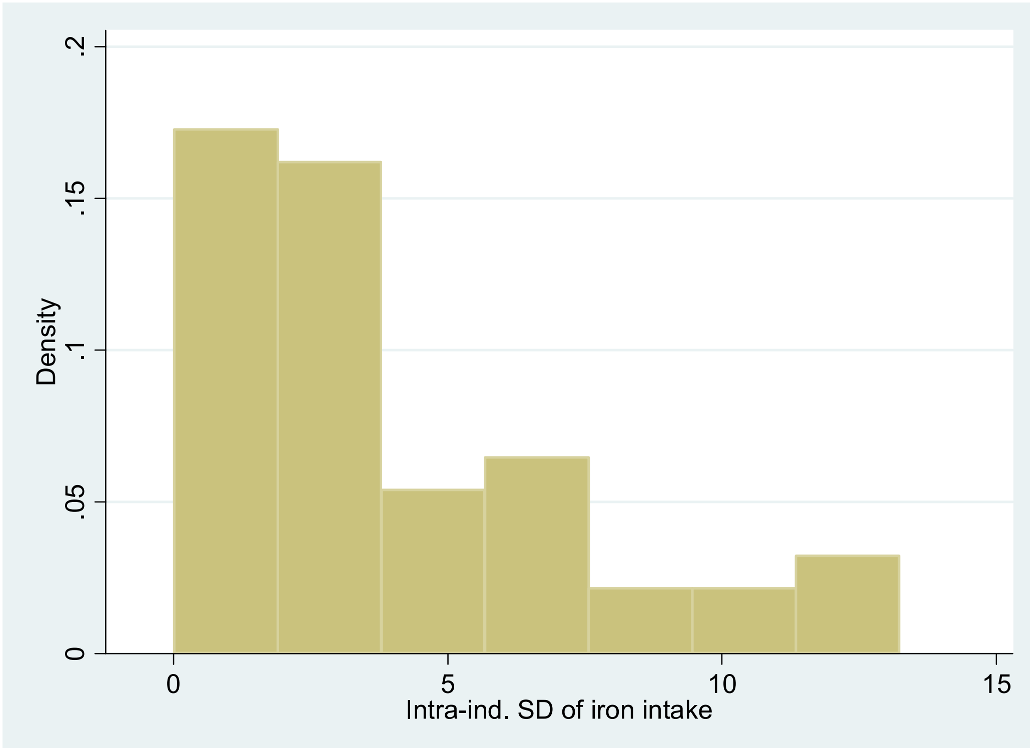


Figure L22. Intra-Individual SD of Zinc Intakes, Lactating Women

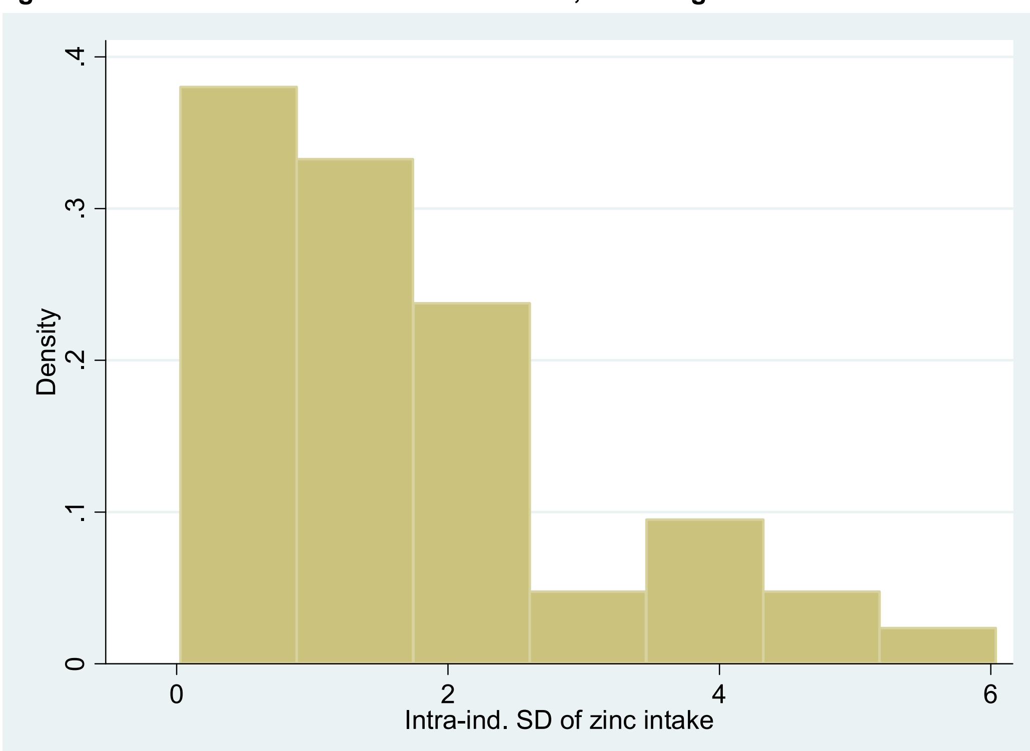


Figure L23. Distribution of Scores for FGI-6, Lactating Women

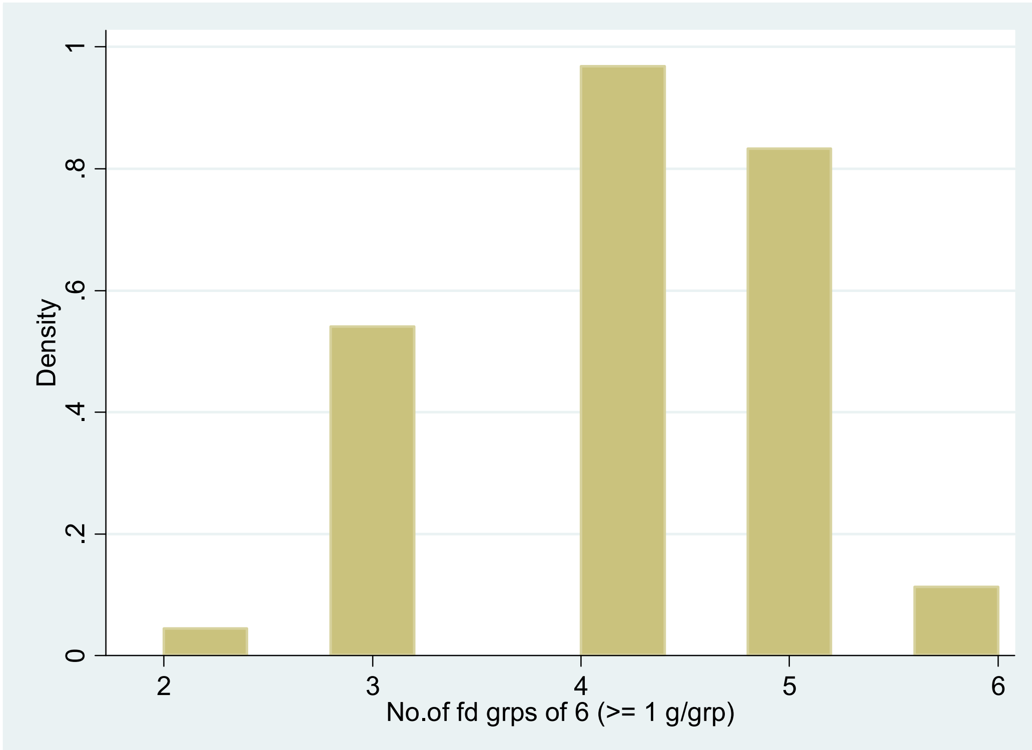


Figure L24. Distribution of Scores for FGI-6R, Lactating Women

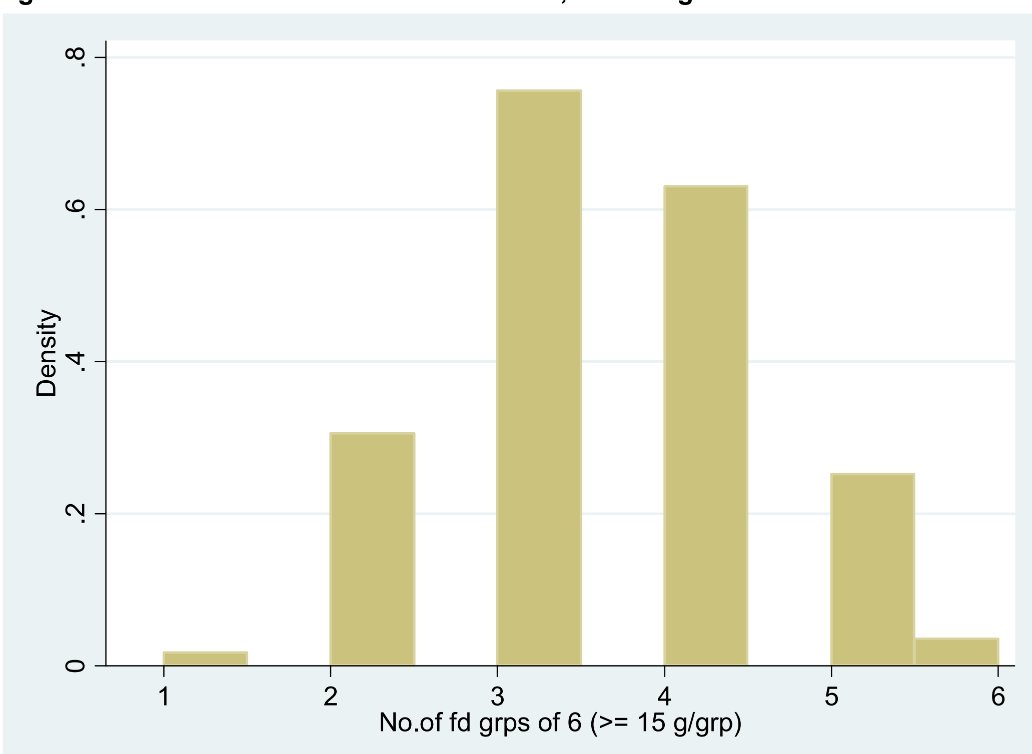


Figure L25. Distribution of Scores for FGI-9, Lactating Women

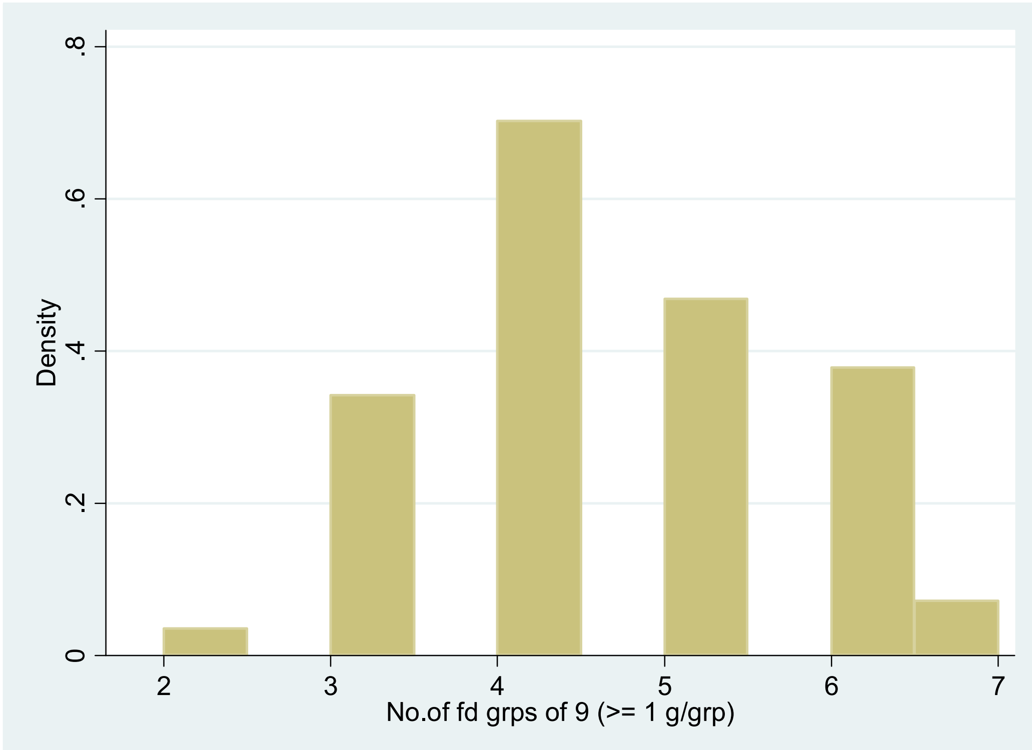


Figure L26. Distribution of Scores for FGI-9R, Lactating Women

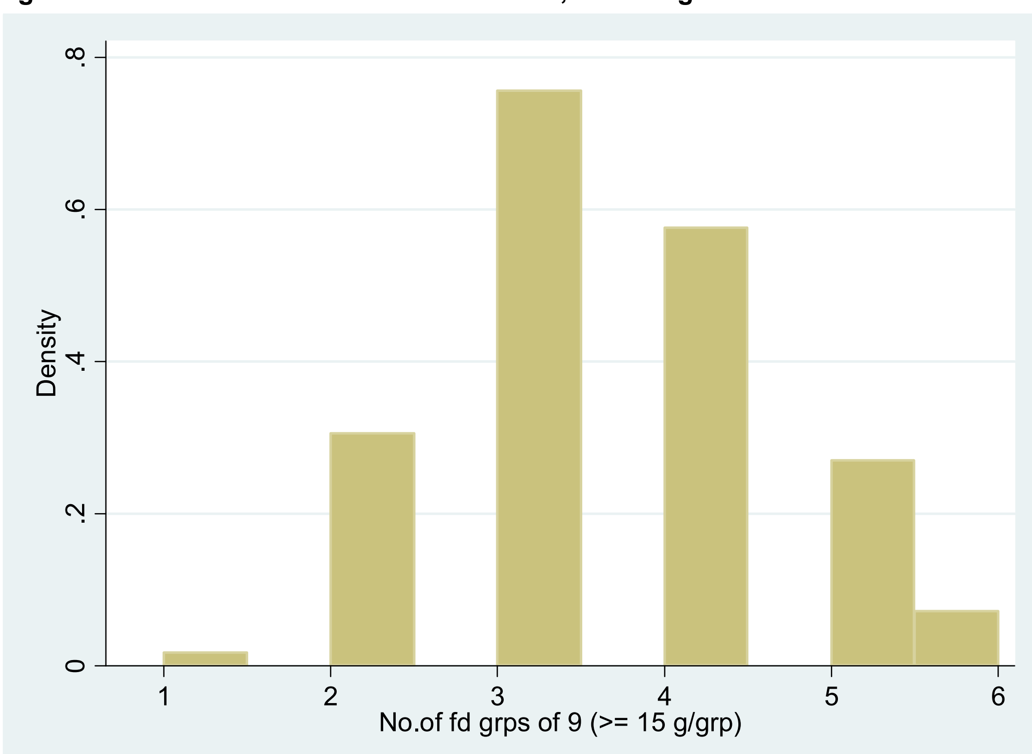


Figure L27. Distribution of Scores for FGI-13, Lactating Women

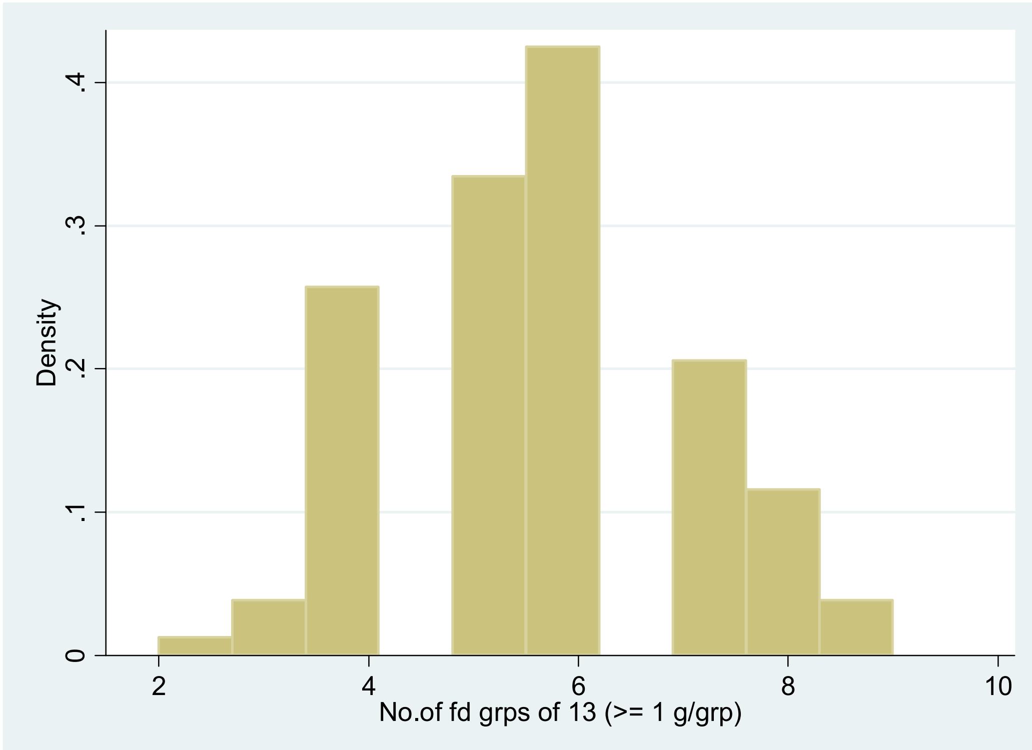


Figure L28. Distribution of Scores for FGI-13R, Lactating Women

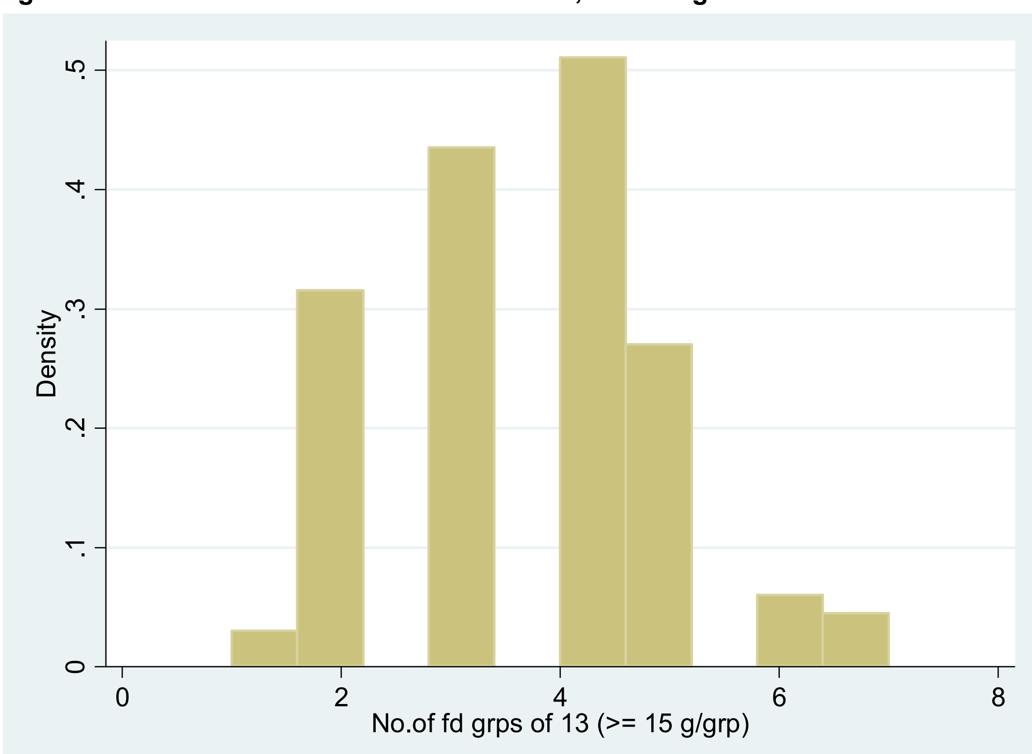


Figure L29. Distribution of Scores for FGI-21, Lactating Women

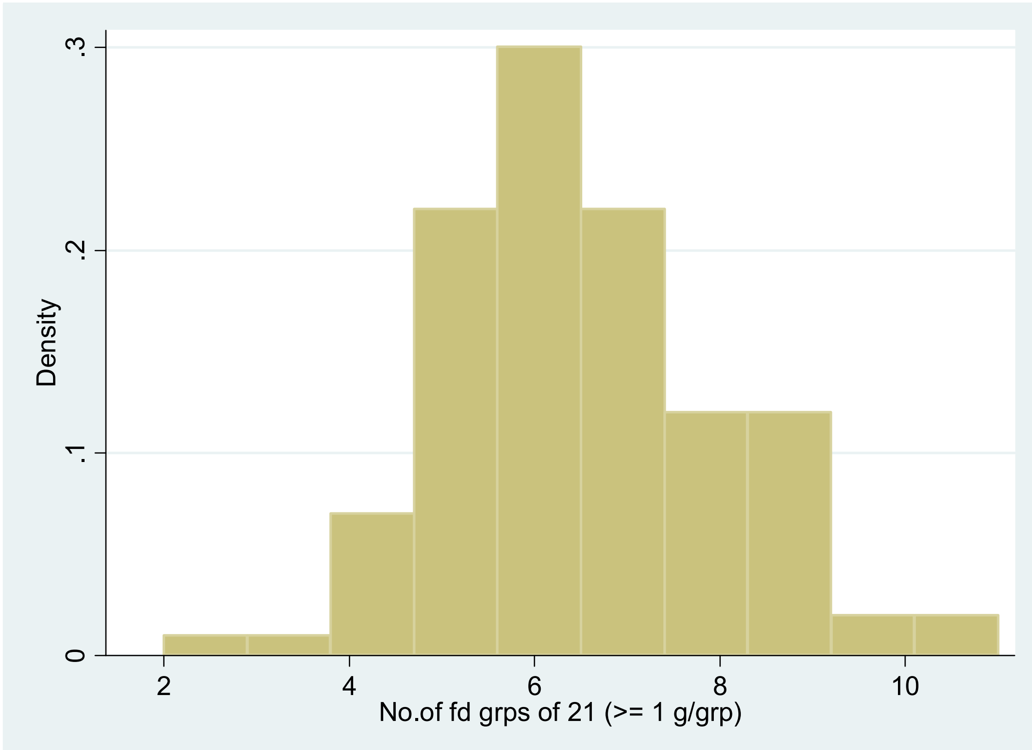


Figure L30. Distribution of Scores for FGI-21R, Lactating Women

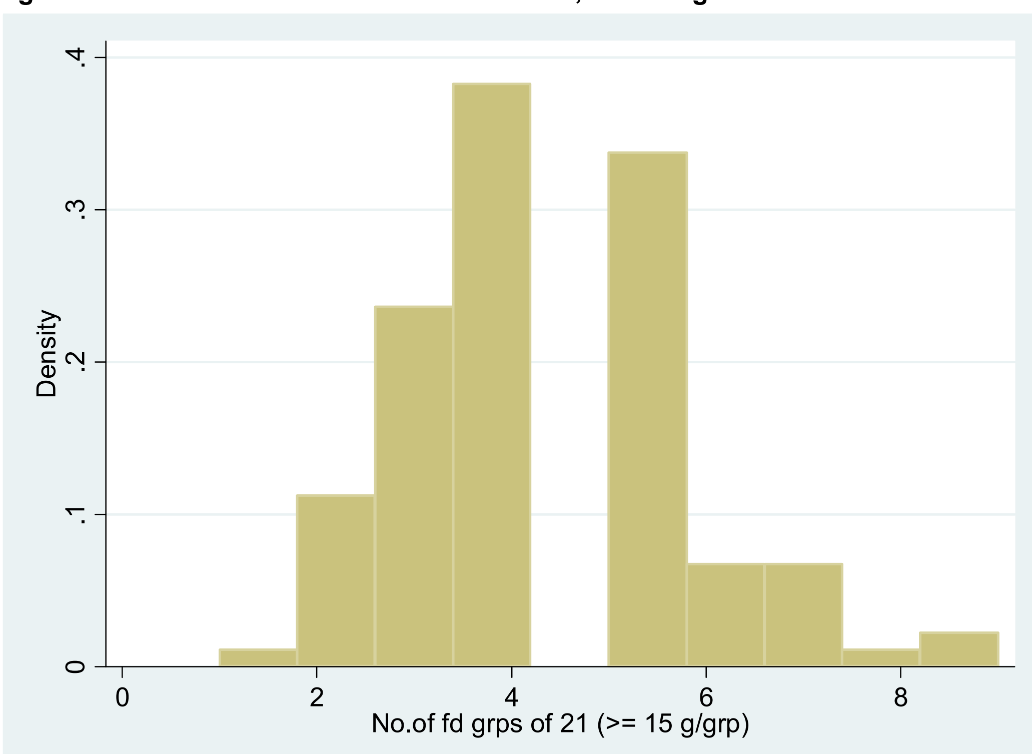


Table L6. Percent of Observation Days at Each Food Group Diversity Score, Lactating Women, R1

Number of food groups eaten	Diversity indicators							
	FGI-6	FGI-6R	FGI-9	FGI-9R	FGI-13	FGI-13R	FGI-21	FGI-21R
1	0	1	0	1	0	2	0	1
2	2	15	2	15	1	19	1	9
3	22	38	17	38	3	26	1	19
4	39	32	35	29	18	31	6	31
5	33	13	23	14	23	16	20	27
6	5	2	19	4	30	4	27	5
7			4	0	14	3	20	5
8			0	0	8	0	11	1
9			0	0	3	0	11	2
10					0	0	2	0
11					0	0	2	0
12					0	0	0	0
13					0	0	0	0
14							0	0
15							0	0
16							0	0
17							0	0
18							0	0
19							0	0
20							0	0
21							0	0

Figure L31. Distribution of PA for Thiamin, Lactating Women

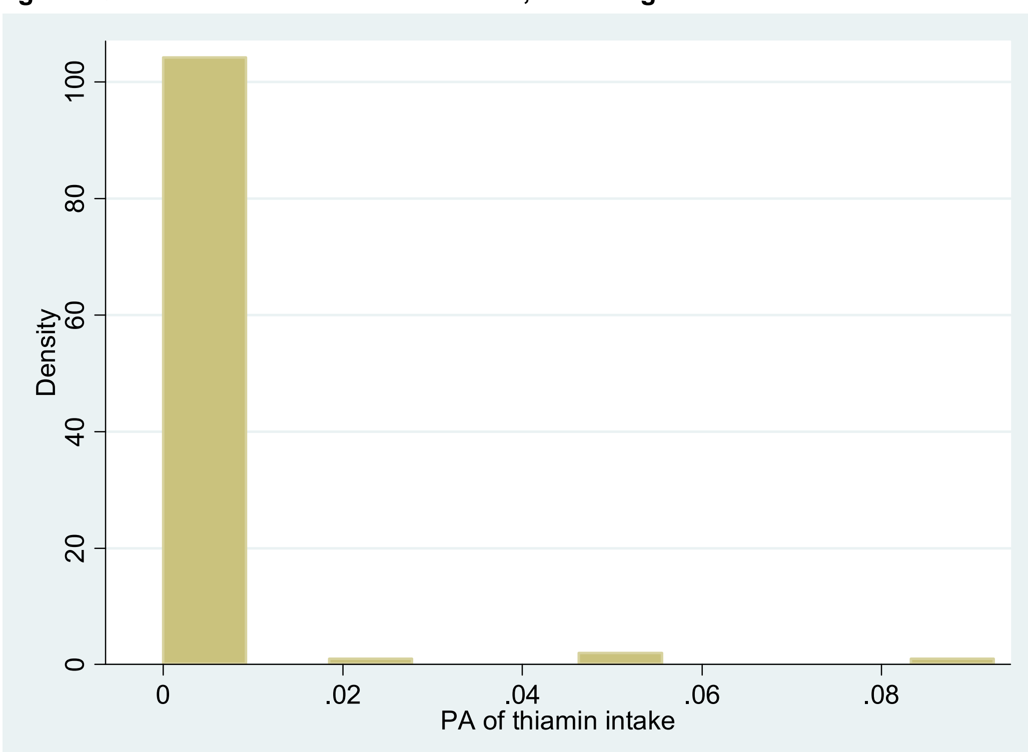


Figure L32. Distribution of PA for Riboflavin, Lactating Women

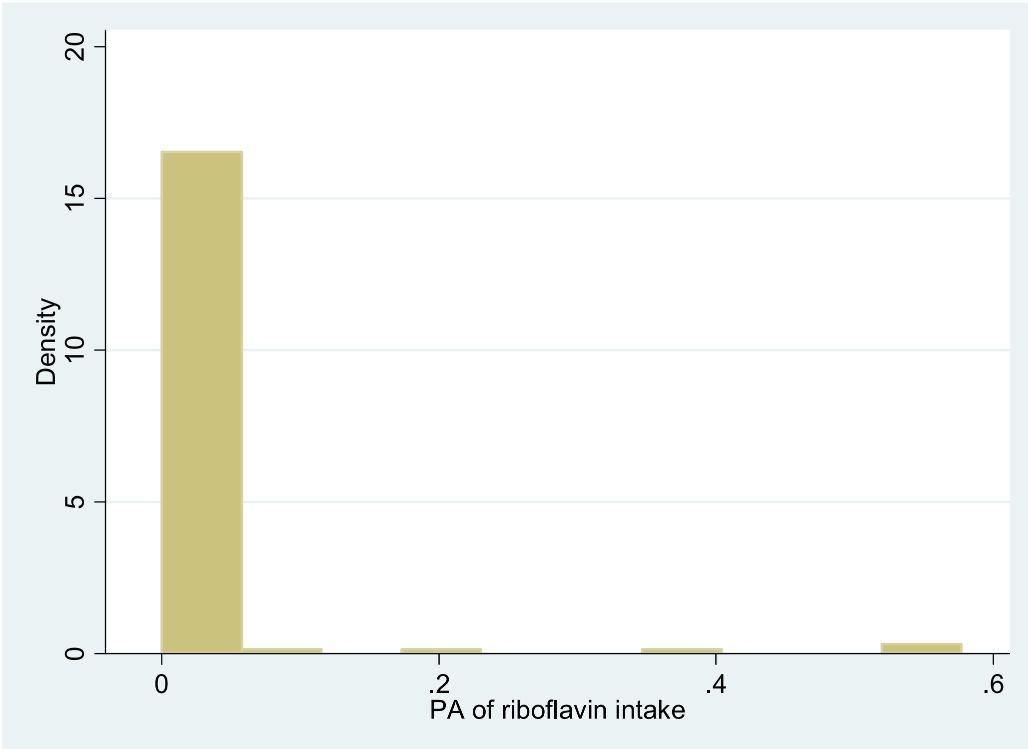


Figure L33. Distribution of PA for Niacin, Lactating Women

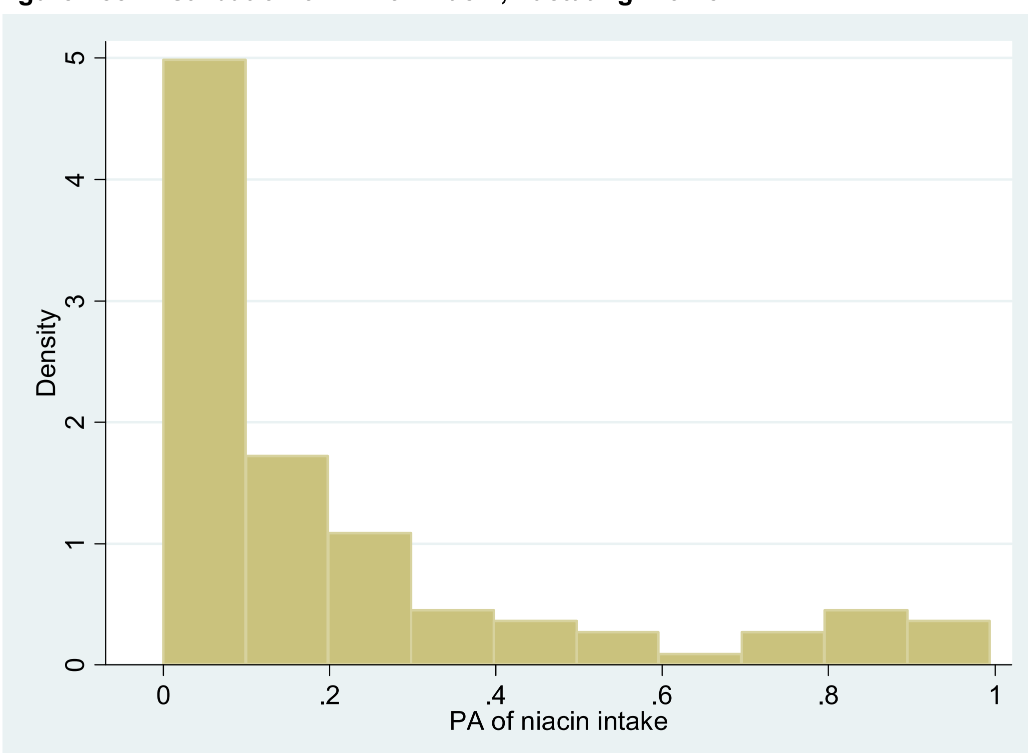


Figure L34. Distribution of PA for Vitamin B6, Lactating Women

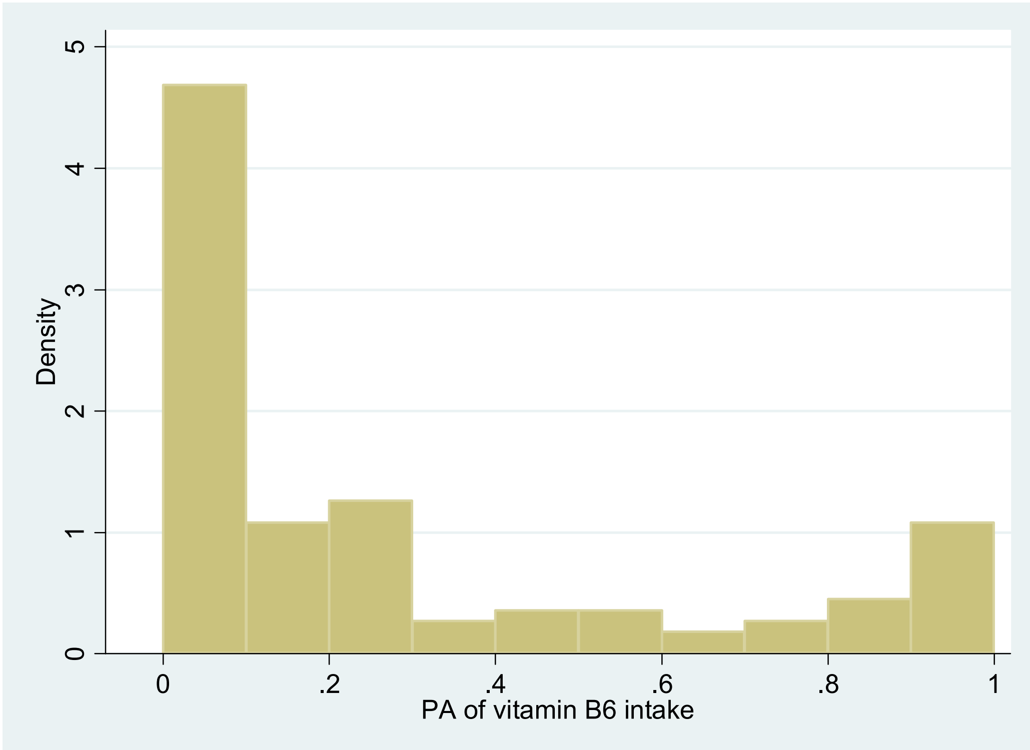


Figure L35. Distribution of PA for Folate, Lactating Women

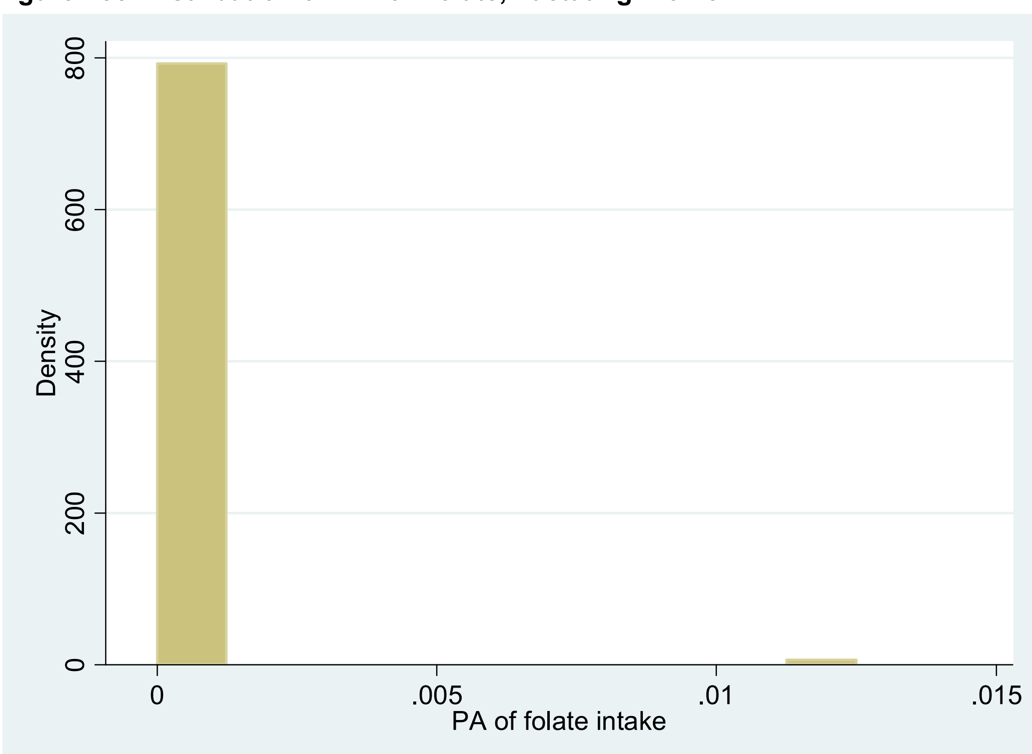


Figure L36. Distribution of PA for Vitamin B12, Lactating Women

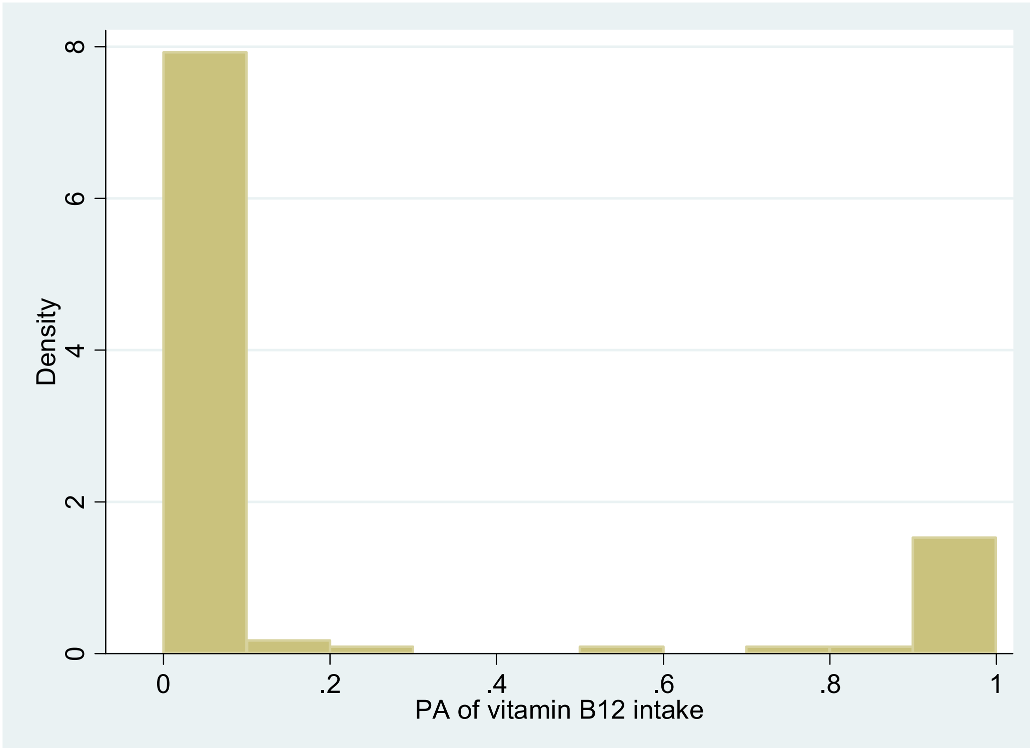


Figure L37. Distribution of PA for Vitamin C, Lactating Women

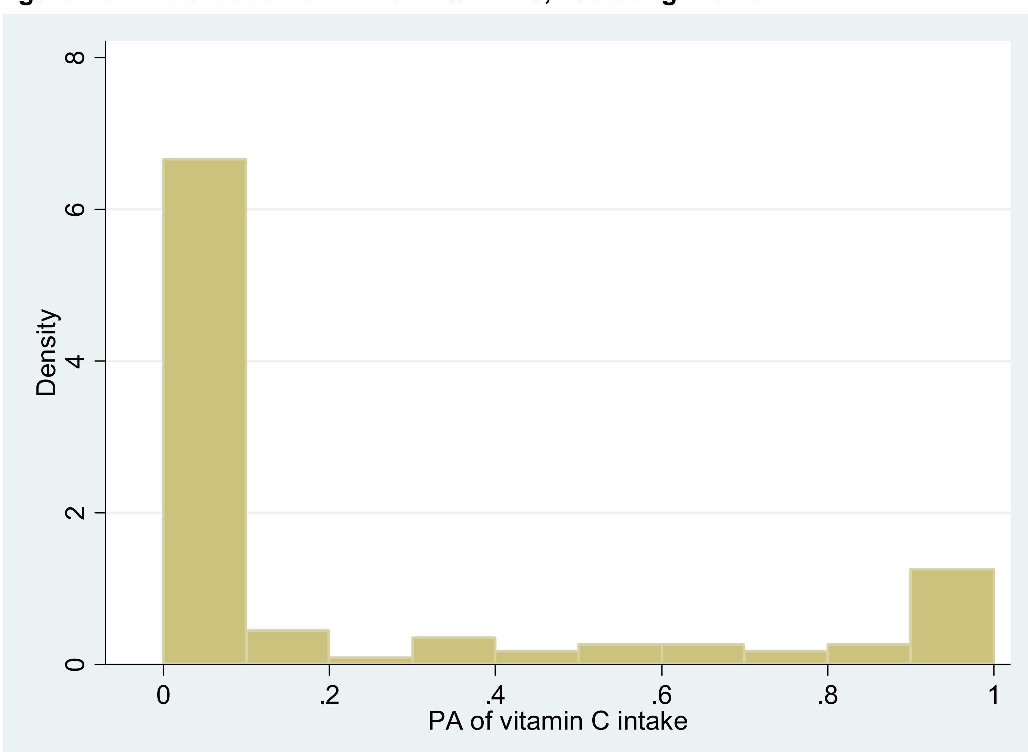


Figure L38. Distribution of PA for Vitamin A, Lactating Women

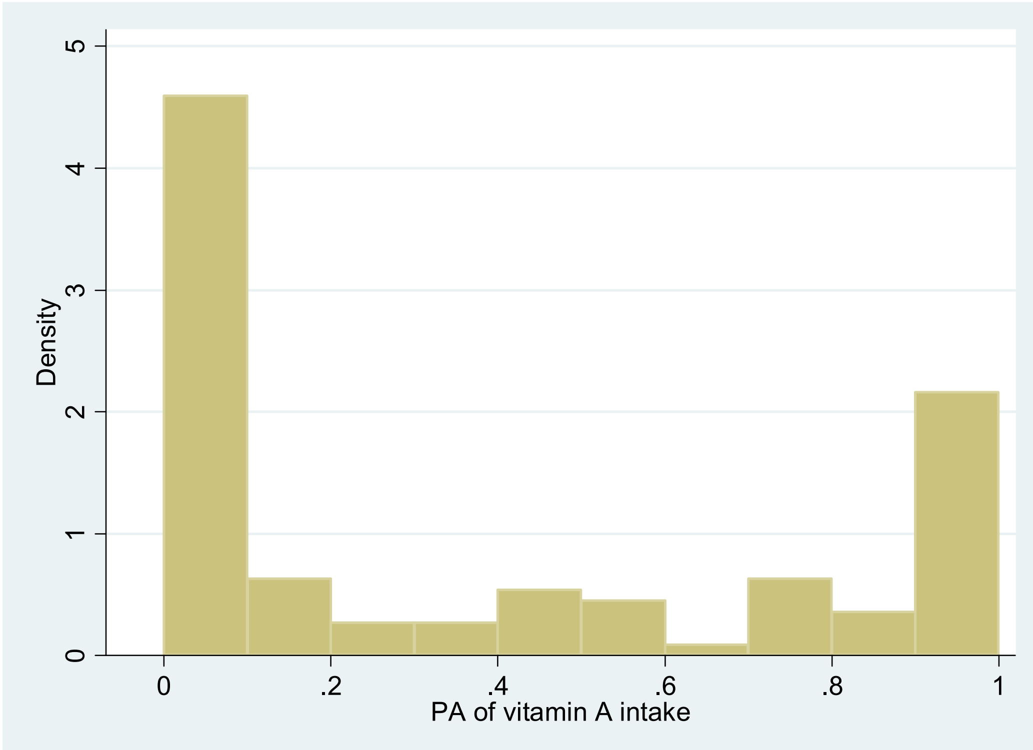


Figure L39. Distribution of PA for Calcium, Lactating Women

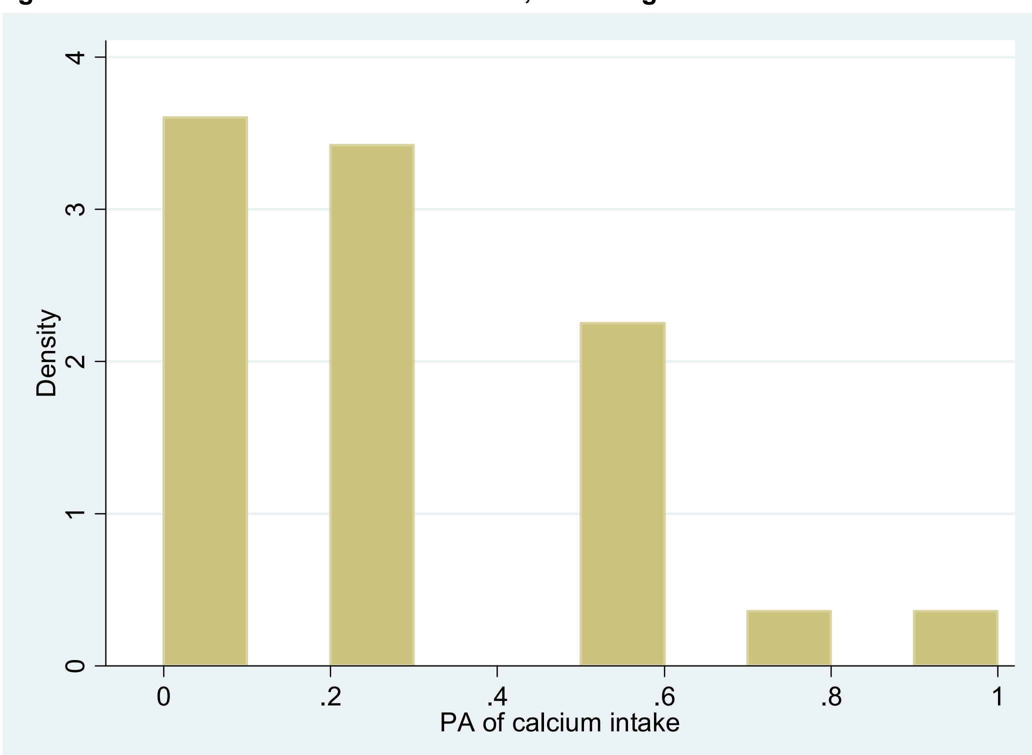


Figure L40. Distribution of PA for Iron, Lactating Women

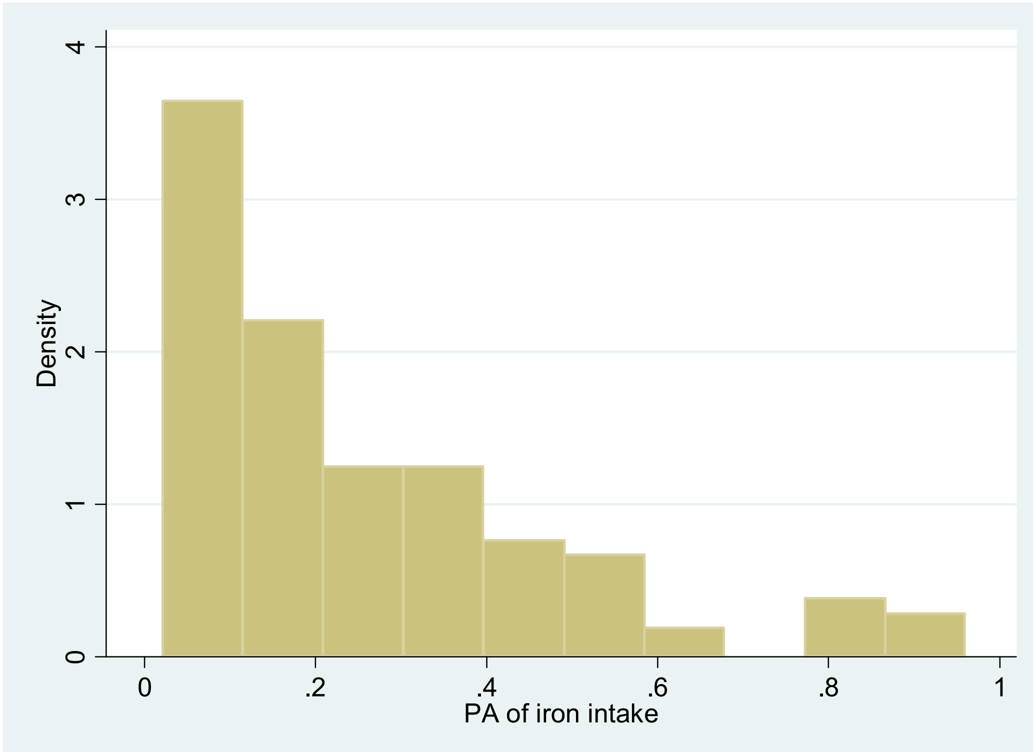


Figure L41. Distribution of PA for Zinc, Lactating Women

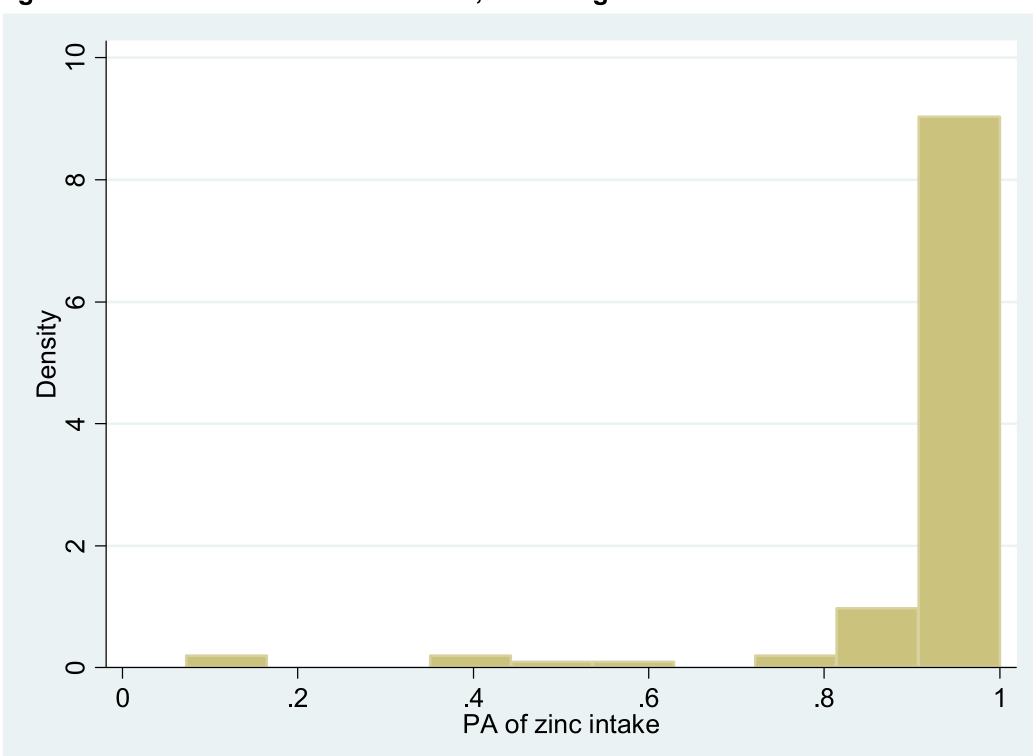
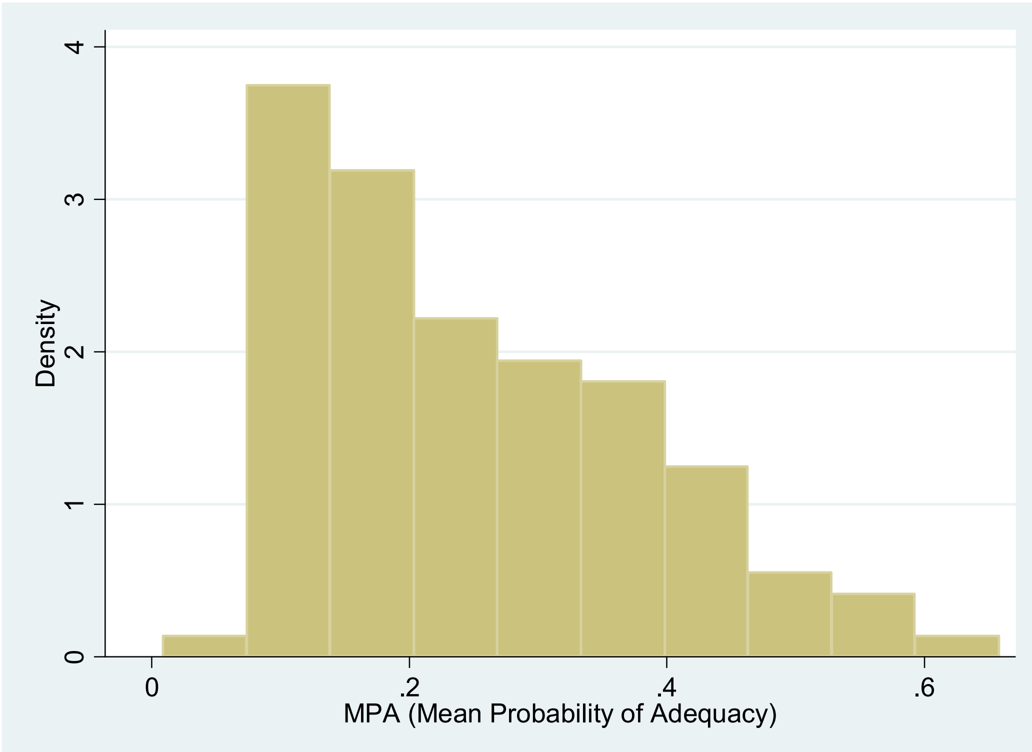


Figure L42. Distribution of MPA across 11 Micronutrients, Lactating Women



Appendix 3. Tables and Figures, Non-Pregnant Non-Lactating Women

Table N1. Description of Sample, NPNL Women, R1

	n	Mean	SD	Median	Range
Age (year)	299	32.7	9.9	35.0	15.0-49.0
Height (cm)	299	150.3	5.1	150.0	138.2-166.0
Weight (kg)	299	42.7	6.2	42.0	30.0-74.0
BMI	299	18.9	2.4	18.7	13.6-28.8
% Illiterate	299	69.2			
% Lactating	299	0.0			
% Pregnant	299	0.0			
	n	Percent			
BMI <16	24	8.0			
BMI 16-16.9	40	13.4			
BMI 17-18.49	77	25.8			
BMI 18.5-24.9	152	50.8			
BMI 25-29.9	6	2.0			
BMI ≥ 30	0	0.0			

Table N2. Energy and Macronutrient Intakes, NPNL Women, R1

	Mean	SD	Median	Range	Percent of kcal
Energy (kcal)	2,130.4	514.5	2,082.6	1,011.0-3,560.8	
Protein (g)	52.8	18.0	49.0	19.6-152.1	10
Animal source (g)	10.8	13.5	6.3	0.0-121.0	2
Plant source (g)	42.0	12.3	40.8	18.0-92.8	8
Total carbohydrate (g)	437.2	108.7	435.3	179.1-742.2	82
Sugars (g)	8.2	13.0	3.1	0.8-102.1	2
Total fat (g)	15.0	8.9	12.5	2.3-54.1	6
Saturated fat (g)	3.7	2.5	3.1	0.8-18.8	2

Table N3a. Percent of Women Who Consumed 6 Major Food Groups, NPNL Women, R1

	≥ 1 g	≥ 15 g
All starchy staples	100	100
All legumes and nuts	35	32
All dairy	21	19
Other animal source foods	74	57
Vitamin A-rich fruits and vegetables [a]	83	60
Other fruits and vegetables	100	84

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.

Table N3b. Percent of Women Who Consumed 9 Sub-Food Groups, NPNL Women, R1

	≥ 1 g	≥ 15 g
All starchy staples	100	100
All legumes and nuts	35	32
All dairy	21	19
Organ meat	0	0
Eggs	8	4
Flesh foods and other miscellaneous small animal protein	72	55
Vitamin A-rich dark green leafy vegetables [a]	51	50
Other vitamin A-rich vegetables and fruits [a]	60	17
Other fruits and vegetables	100	84

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.

Table N3c. Percent of Women Who Consumed 13 Sub-Food Groups, NPNL Women, R1

	≥ 1 g	≥ 15 g
All starchy staples	100	100
All legumes and nuts	35	32
All dairy	21	19
Organ meat	0	0
Eggs	8	4
Small fish eaten whole with bones	24	13
All other flesh foods and miscellaneous small animal protein	61	45
Vitamin A-rich dark green leafy vegetables [a]	51	50
Vitamin A-rich deep yellow/orange/red vegetables [a]	53	7
Vitamin C-rich vegetables [b]	93	16
Vitamin A-rich fruits [a]	11	11
Vitamin C-rich fruits [b]	15	13
All other fruits and vegetables	98	67

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g.

Table N3d. Percent of Women Who Consumed 21 Sub-Food Groups, NPNL Women, R1

	≥ 1 g	≥ 15 g
Grains and grain products	100	100
All other starchy staples	48	45
Cooked dry beans and peas	22	20
Soybeans and soy products	0	0
Nuts and seeds	18	17
Milk/yogurt	21	19
Cheese	0	0
Beef, pork, veal, lamb, goat, game meat	6	6
Organ meat	0	0
Chicken, duck, turkey, pigeon, guinea hen, game birds	6	5
Large whole fish/dried fish/shellfish and other seafood	53	36
Small fish eaten whole with bones	24	13
Insects, grubs, snakes, rodents and other small animal	0	0
Eggs	8	4
Vitamin A-rich dark green leafy vegetables [a]	51	50
Vitamin A-rich deep yellow/orange/red vegetables [a]	53	7
Vitamin C-rich vegetables [b]	93	16
All other vegetables	97	60
Vitamin A-rich fruits [a]	11	11
Vitamin C-rich fruits [b]	15	13
All other fruits	22	16

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g.

Table N4a. Summary of Food Group Intake (FGI-6) for NPNL Women, for All R1 Observation Days and for Days When the Food Was Consumed

	All (n = 299)					Among those who consume			
Food group	Mean amount (g)	Mean energy (kcal)	Median amount (g)	Median energy (kcal)	Percent consuming	Mean amount (g)	Mean energy (kcal)	Median amount (g)	Median energy (kcal)
All starchy staples	1,630.3	1,833.2	1,602.5	1,793.3	100	1,630.3	1,833.2	1,602.5	1,793.3
All legumes and nuts	27.1	45.0	0.0	0.0	35	77.2	128.1	55.5	108.6
All dairy	22.1	14.8	0.0	0.0	21	106.6	71.5	100.0	67.0
Other animal source foods	29.1	63.2	19.7	34.4	74	39.3	85.5	29.8	52.8
Vitamin A-rich fruits and vegetables [a]	72.6	35.1	45.5	25.2	83	87.8	42.4	73.2	31.5
Other fruits and vegetables	109.8	54.4	73.1	23.2	100	109.8	54.4	73.1	23.2

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.

Table N4b. Summary of Food Group Intake (FGI-9) for NPNL Women, for All R1 Observation Days and for Days When the Food Was Consumed

	All (n = 299)					Among those who consume			
Food group	Mean amount (g)	Mean energy (kcal)	Median amount (g)	Median energy (kcal)	Percent consuming	Mean amount (g)	Mean energy (kcal)	Median amount (g)	Median energy (kcal)
All starchy staples	1,630.3	1,833.2	1,602.5	1,793.3	100	1,630.3	1,833.2	1,602.5	1,793.3
All legumes and nuts	27.1	45.0	0.0	0.0	35	77.2	128.1	55.5	108.6
All dairy	22.1	14.8	0.0	0.0	21	106.6	71.5	100.0	67.0
Organ meat	0.0	0.0	0.0	0.0	0				
Eggs	1.6	2.8	0.0	0.0	8	19.2	33.9	14.2	25.8
Flesh foods and other miscellaneous small animal protein	27.5	60.4	19.1	31.7	72	38.4	84.3	28.9	53.7
Vitamin A-rich dark green leafy vegetables [a]	47.8	22.6	12.8	3.2	51	93.4	44.2	79.6	33.8
Other vitamin A-rich vegetables and fruits [a]	24.8	12.4	1.9	4.7	60	41.3	20.5	4.1	9.8
Other fruits and vegetables	109.8	54.4	73.1	23.2	100	109.8	54.4	73.1	23.2

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.

Table N4c. Summary of Food Group Intake (FGI-13) for NPNL Women, for All R1 Observation Days and for Days When the Food Was Consumed

	All (n = 299)					Among those who consume			
Food group	Mean amount (g)	Mean energy (kcal)	Median amount (g)	Median energy (kcal)	Percent consuming	Mean amount (g)	Mean energy (kcal)	Median amount (g)	Median energy (kcal)
All starchy staples	1,630.3	1,833.2	1,602.5	1,793.3	100	1,630.3	1,833.2	1,602.5	1,793.3
All legumes and nuts	27.1	45.0	0.0	0.0	35	77.2	128.1	55.5	108.6
All dairy	22.1	14.8	0.0	0.0	21	106.6	71.5	100.0	67.0
Organ meat	0.0	0.0	0.0	0.0	0				
Eggs	1.6	2.8	0.0	0.0	8	19.2	33.9	14.2	25.8
Small fish eaten whole with bones	4.6	12.8	0.0	0.0	24	19.5	53.8	16.3	20.5
All other flesh foods and miscellaneous small animal protein	22.8	47.6	10.9	20.5	61	37.3	77.8	24.1	47.3
Vitamin A-rich dark green leafy vegetables [a]	47.8	22.6	12.8	3.2	51	93.4	44.2	79.6	33.8
Vitamin A-rich deep yellow/orange/red vegetables [a]	9.8	6.9	1.3	3.2	53	18.3	12.6	3.4	8.2
Vitamin C-rich vegetables [b]	16.0	6.3	5.1	3.5	93	17.3	6.8	5.5	3.9
Vitamin A-rich fruits [a]	15.0	5.5	0.0	0.0	11	135.5	50.0	99.5	35.8
Vitamin C-rich fruits [b]	13.5	10.6	0.0	0.0	15	89.7	70.5	71.0	61.9
All other fruits and vegetables	80.3	37.5	39.6	14.3	98	82.2	38.4	47.5	14.9

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g.

Table N4d. Summary of Food Group Intake (FGI-21) for NPNL Women, for All R1 Observation Days and for Days When the Food Was Consumed

Food group	All (n = 299)					Among those who consume			
	Mean amount (g)	Mean energy (kcal)	Median amount (g)	Median energy (kcal)	Percent consuming	Mean amount (g)	Mean energy (kcal)	Median amount (g)	Median energy (kcal)
Grains and grain products	1,595.7	1,790.6	1,577.5	1,751.1	100	1,595.7	1,790.6	1,577.5	1,751.1
All other starchy staples	34.6	42.6	0.0	0.0	48	72.9	89.6	60.9	66.1
Cooked dry beans and peas	15.5	28.4	0.0	0.0	22	69.3	127.0	38.6	103.2
Soybeans and soy products	0.0	0.0	0.0	0.0	0				
Nuts and seeds	11.6	16.5	0.0	0.0	18	65.2	93.3	54.4	75.2
Milk/yogurt	22.1	14.8	0.0	0.0	21	106.6	71.5	100.0	67.0
Cheese	0.0	0.0	0.0	0.0	0				
Beef, pork, veal, lamb, goat, game meat	5.8	7.9	0.0	0.0	6	91.3	124.4	60.2	91.6
Organ meat	0.0	0.0	0.0	0.0	0				
Chicken, duck, turkey, pigeon, guinea hen, game birds	2.3	3.3	0.0	0.0	6	36.8	51.8	28.0	40.2
Large whole fish/dried fish/shellfish and other seafood	14.7	36.4	4.6	10.7	53	27.8	68.9	21.6	44.4
Small fish eaten whole with bones	4.6	12.8	0.0	0.0	24	19.5	53.8	16.3	20.5
Insects, grubs, snakes, rodents and other small animal	0.0	0.0	0.0	0.0	0				
Eggs	1.6	2.8	0.0	0.0	8	19.2	33.9	14.2	25.8
Vitamin A-rich dark green leafy vegetables [a]	47.8	22.6	12.8	3.2	51	93.4	44.2	79.6	33.8
Vitamin A-rich deep yellow/orange/red vegetables [a]	9.8	6.9	1.3	3.2	53	18.3	12.6	3.4	8.2
Vitamin C-rich vegetables [b]	16.0	6.3	5.1	3.5	93	17.3	6.8	5.5	3.9
All other vegetables	62.7	16.6	22.8	9.3	97	64.7	17.1	26.5	9.6
Vitamin A-rich fruits [a]	15.0	5.5	0.0	0.0	11	135.5	50.0	99.5	35.8
Vitamin C-rich fruits [b]	13.5	10.6	0.0	0.0	15	89.7	70.5	71.0	61.9
All other fruits	17.5	20.9	0.0	0.0	22	80.6	96.0	42.4	63.0

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g.

Table N5. Diversity Scores for Various Diversity Indicators, NPNL Women, R1

Indicator	Number of food groups and level	Mean	SD	Median	Range
FGI-6	6 major food groups	4.1	0.9	4.0	2-6
FGI-6R [a]	6 major food groups	3.5	1.0	4.0	1-6
FGI-9	9 food subgroups	4.5	1.1	4.0	2-7
FGI-9R [a]	9 food subgroups	3.6	1.1	4.0	1-7
FGI-13	13 food subgroups	5.7	1.3	6.0	2-10
FGI-13R [a]	13 food subgroups	3.8	1.3	4.0	1-8
FGI-21	21 food subgroups	6.5	1.6	6.0	2-11
FGI-21R [a]	21 food subgroups	4.4	1.5	4.0	1-9

[a] "R" indicates that at least 15 g must be consumed in order for the food group/subgroup to "count" in the score.

Table N6. Percent of Observation Days at Each Food Group Diversity Score, NPNL Women, R1

Number of food groups eaten	Diversity indicators							
	FGI-6	FGI-6R	FGI-9	FGI-9R	FGI-13	FGI-13R	FGI-21	FGI-21R
1	0	1	0	1	0	1	0	1
2	4	16	4	15	0	15	0	9
3	16	32	13	30	4	28	3	20
4	49	36	35	32	12	27	6	26
5	26	13	32	17	28	20	15	22
6	5	3	14	3	31	5	29	14
7			3	0	16	3	21	6
8			0	0	7	0	16	2
9			0	0	1	0	8	1
10					0	0	2	0
11					0	0	0	0
12					0	0	0	0
13					0	0	0	0
14							0	0
15							0	0
16							0	0
17							0	0
18							0	0
19							0	0
20							0	0
21							0	0

Table N7a. Percent of Observation Days on Which Different Food Groups Were Consumed, by Food Group Diversity Score, NPNL Women, R1 (FGI-6 - 1 g Minimum)

	Number of food groups eaten					
	1	2	3	4	5	6
Percent (number) of observation days at each diversity score	0 (0)	4 (12)	16 (48)	49 (145)	26 (79)	5 (15)
Food groups	**Percent of observation days on which each food group was consumed**					
All starchy staples	–	100	100	100	100	100
All legumes and nuts	–	0	4	25	66	100
All dairy	–	0	0	7	47	100
Other animal source foods	–	0	46	79	89	100
Vitamin A-rich fruits and vegetables [a]	–	0	50	90	99	100
Other fruits and vegetables	–	100	100	100	100	100

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.

Table N7b. Percent of Observation Days on Which Different Food Groups Were Consumed, by Food Group Diversity Score, NPNL Women, R1 (FGI-6R - 15 g Minimum)

	Number of food groups eaten					
	1	2	3	4	5	6
Percent (number) of observation days at each diversity score	1 (2)	16 (47)	32 (97)	36 (107)	13 (38)	3 (8)
Food groups	**Percent of observation days on which each food group was consumed**					
All starchy staples	100	100	100	100	100	100
All legumes and nuts	0	6	11	44	74	100
All dairy	0	0	6	21	58	100
Other animal source foods	0	13	51	69	84	100
Vitamin A-rich fruits and vegetables [a]	0	23	55	68	87	100
Other fruits and vegetables	0	57	77	98	97	100

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.

Table N7c. Percent of Observation Days on Which Different Food Groups Were Consumed, by Food Group Diversity Score, NPNL Women, R1 (FGI-9 - 1 g Minimum)

	Number of food groups eaten								
	1	2	3	4	5	6	7	8	9
Percent (number) of observation days at each diversity score	0 (0)	4 (12)	13 (38)	35 (104)	32 (96)	14 (41)	3 (8)	0 (0)	0 (0)
Food groups	**Percent of observation days on which each food group was consumed**								
All starchy staples	–	100	100	100	100	100	100	–	–
All legumes and nuts	–	0	5	25	45	63	100	–	–
All dairy	–	0	0	8	30	44	88	–	–
Organ meat	–	0	0	0	0	0	0	–	–
Eggs	–	0	3	5	7	24	25	–	–
Flesh foods and other miscellaneous small animal protein	–	0	50	70	77	98	100	–	–
Vitamin A-rich dark green leafy vegetables [a]	–	0	34	38	65	78	88	–	–
Other vitamin A-rich vegetables and fruits [a]	–	0	8	55	76	93	100	–	–
Other fruits and vegetables	–	100	100	100	100	100	100	–	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.

Table N7d. Percent of Observation Days on Which Different Food Groups Were Consumed, by Food Group Diversity Score, NPNL Women, R1 (FGI-9R - 15 g Minimum)

	Number of food groups eaten								
	1	2	3	4	5	6	7	8	9
Percent (number) of observation days at each diversity score	1 (2)	15 (46)	30 (91)	32 (97)	17 (52)	3 (10)	0 (1)	0 (0)	0 (0)
Food groups	**Percent of observation days on which each food group was consumed**								
All starchy staples	100	100	100	100	100	100	100	–	–
All legumes and nuts	0	7	12	39	69	80	100	–	–
All dairy	0	0	3	25	40	90	100	–	–
Organ meat	0	0	0	0	0	0	0	–	–
Eggs	0	0	1	4	12	0	0	–	–
Flesh foods and other miscellaneous small animal protein	0	13	52	64	73	100	100	–	–
Vitamin A-rich dark green leafy vegetables [a]	0	17	43	54	77	90	100	–	–
Other vitamin A-rich vegetables and fruits [a]	0	4	11	20	31	40	100	–	–
Other fruits and vegetables	0	59	78	95	98	100	100	–	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.

Table N7e. Percent of Observation Days on Which Different Food Groups Were Consumed, by Food Group Diversity Score, NPNL Women, R1 (FGI-13 - 1 g Minimum)

	Number of food groups eaten												
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
Percent (number) of observation days at each diversity score	0 (0)	0 (1)	4 (13)	12 (35)	28 (83)	31 (93)	16 (48)	7 (21)	1 (4)	0 (1)	0 (0)	0 (0)	0 (0)
Food groups	**Percent of observation days on which each food group was consumed**												
All starchy staples	–	100	100	100	100	100	100	100	100	100	–	–	–
All legumes and nuts	–	0	8	3	29	40	50	62	100	100	–	–	–
All dairy	–	0	0	0	11	22	42	38	100	100	–	–	–
Organ meat	–	0	0	0	0	0	0	0	0	0	–	–	–
Eggs	–	0	0	3	6	8	15	24	0	0	–	–	–
Small fish eaten whole with bones	–	0	0	6	16	18	40	81	50	100	–	–	–
All other flesh foods and miscellaneous small animal protein	–	0	8	46	51	68	83	76	100	100	–	–	–
Vitamin A-rich dark green leafy vegetables [a]	–	0	0	37	45	55	65	76	100	100	–	–	–
Vitamin A-rich deep yellow/orange/red vegetables [a]	–	0	0	17	37	62	83	91	100	100	–	–	–
Vitamin C-rich vegetables [b]	–	0	92	89	90	97	92	95	100	100	–	–	–
Vitamin A-rich fruits [a]	–	0	0	0	11	14	15	14	25	0	–	–	–
Vitamin C-rich fruits [b]	–	0	0	0	11	17	19	43	25	100	–	–	–
All other fruits and vegetables	–	100	92	100	94	100	98	100	100	100	–	–	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g.

Table N7f. Percent of Observation Days on Which Different Food Groups Were Consumed, by Food Group Diversity Score, NPNL Women, R1 (FGI-13R - 15 g Minimum)

	Number of food groups eaten												
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
Percent (number) of observation days at each diversity score	1 (4)	15 (45)	28 (85)	27 (82)	20 (60)	5 (14)	3 (8)	0 (1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Food groups	**Percent of observation days on which each food group was consumed**												
All starchy staples	100	100	100	100	100	100	100	100	–	–	–	–	–
All legumes and nuts	0	9	15	27	68	86	50	100	–	–	–	–	–
All dairy	0	0	7	24	27	64	75	100	–	–	–	–	–
Organ meat	0	0	0	0	0	0	0	0	–	–	–	–	–
Eggs	0	0	2	2	8	7	13	0	–	–	–	–	–
Small fish eaten whole with bones	0	2	6	15	22	29	38	0	–	–	–	–	–
All other flesh foods and miscellaneous small animal protein	0	11	45	56	50	50	88	100	–	–	–	–	–
Vitamin A-rich dark green leafy vegetables [a]	0	27	45	50	67	64	100	100	–	–	–	–	–
Vitamin A-rich deep yellow/orange/red vegetables [a]	0	2	2	9	15	14	0	0	–	–	–	–	–
Vitamin C-rich vegetables [b]	0	0	8	20	23	29	63	100	–	–	–	–	–
Vitamin A-rich fruits [a]	0	4	9	11	13	21	25	0	–	–	–	–	–
Vitamin C-rich fruits [b]	0	2	7	17	15	36	50	100	–	–	–	–	–
All other fruits and vegetables	0	42	53	70	92	100	100	100	–	–	–	–	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g.

Table N7g. Percent of Observation Days on Which Different Food Groups Were Consumed, by Food Group Diversity Score, NPNL Women, R1 (FGI-21 - 1 g Minimum)

	Number of food groups eaten																				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**
Percent (number) of observation days at each diversity score	0 (0)	0 (1)	3 (10)	6 (17)	15 (45)	29 (86)	21 (62)	16 (48)	8 (23)	2 (6)	0 (1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Food groups	**Percent of observation days on which each food group was consumed**																				
Grains and grain products	–	100	100	100	100	100	100	100	100	100	100	–	–	–	–	–	–	–	–	–	–
All other starchy staples	–	0	0	6	31	43	58	71	74	50	0	–	–	–	–	–	–	–	–	–	–
Cooked dry beans and peas	–	0	10	0	20	15	24	33	35	83	0	–	–	–	–	–	–	–	–	–	–
Soybeans and soy products	–	0	0	0	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–
Nuts and seeds	–	0	0	0	4	17	18	25	30	83	100	–	–	–	–	–	–	–	–	–	–
Milk/yogurt	–	0	0	0	7	12	19	46	48	50	100	–	–	–	–	–	–	–	–	–	–
Cheese	–	0	0	0	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–
Beef, pork, veal, lamb, goat, game meat	–	0	0	0	7	5	5	2	30	17	0	–	–	–	–	–	–	–	–	–	–
Organ meat	–	0	0	0	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–
Chicken, duck, turkey, pigeon, guinea hen, game birds	–	0	0	0	0	6	10	13	4	17	0	–	–	–	–	–	–	–	–	–	–
Large whole fish/dried fish/shellfish and other seafood	–	0	10	24	31	56	63	67	61	83	100	–	–	–	–	–	–	–	–	–	–
Small fish eaten whole with bones	–	0	0	12	16	11	32	35	48	67	100	–	–	–	–	–	–	–	–	–	–
Insects, grubs, snakes, rodents and other small animal	–	0	0	0	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–
Eggs	–	0	0	0	4	5	15	8	26	0	0	–	–	–	–	–	–	–	–	–	–
Vitamin A-rich dark green leafy vegetables [a]	–	0	0	41	36	55	50	67	65	67	100	–	–	–	–	–	–	–	–	–	–
Vitamin A-rich deep yellow/orange/red vegetables [a]	–	0	0	29	38	45	65	69	78	100	100	–	–	–	–	–	–	–	–	–	–
Vitamin C-rich vegetables [b]	–	0	90	82	91	92	97	96	96	83	100	–	–	–	–	–	–	–	–	–	–
All other vegetables	–	100	90	100	91	98	100	96	100	100	100	–	–	–	–	–	–	–	–	–	–
Vitamin A-rich fruits [a]	–	0	0	0	9	15	7	15	17	17	0	–	–	–	–	–	–	–	–	–	–
Vitamin C-rich fruits [b]	–	0	0	0	11	8	19	21	35	33	100	–	–	–	–	–	–	–	–	–	–
All other fruits	–	0	0	6	4	19	19	38	52	50	100	–	–	–	–	–	–	–	–	–	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g.

Table N7h. Percent of Observation Days on Which Different Food Groups Were Consumed, by Food Group Diversity Score, NPNL Women, R1 (FGI-21R - 15 g Minimum)

	Number of food groups eaten																				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**
Percent (number) of observation days at each diversity score	1 (2)	9 (26)	20 (60)	26 (79)	22 (65)	14 (42)	6 (18)	2 (5)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Food groups	**Percent of observation days on which each food group was consumed**																				
Grains and grain products	100	100	100	100	100	100	100	100	100	–	–	–	–	–	–	–	–	–	–	–	–
All other starchy staples	0	8	30	44	57	67	56	60	100	–	–	–	–	–	–	–	–	–	–	–	–
Cooked dry beans and peas	0	4	12	13	31	26	50	40	0	–	–	–	–	–	–	–	–	–	–	–	–
Soybeans and soy products	0	0	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Nuts and seeds	0	0	5	9	15	36	56	80	50	–	–	–	–	–	–	–	–	–	–	–	–
Milk/yogurt	0	0	3	14	20	48	50	40	50	–	–	–	–	–	–	–	–	–	–	–	–
Cheese	0	0	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Beef, pork, veal, lamb, goat, game meat	0	4	3	4	9	7	17	20	0	–	–	–	–	–	–	–	–	–	–	–	–
Organ meat	0	0	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Chicken, duck, turkey, pigeon, guinea hen, game birds	0	0	3	4	5	14	0	40	0	–	–	–	–	–	–	–	–	–	–	–	–
Large whole fish/dried fish/shellfish and other seafood	0	8	23	41	42	45	56	40	100	–	–	–	–	–	–	–	–	–	–	–	–
Small fish eaten whole with bones	0	0	7	8	20	24	17	40	0	–	–	–	–	–	–	–	–	–	–	–	–
Insects, grubs, snakes, rodents and other small animal	0	0	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Eggs	0	0	0	5	5	2	6	40	0	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin A-rich dark green leafy vegetables [a]	0	31	38	48	55	57	83	60	100	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin A-rich deep yellow/orange/red vegetables [a]	0	4	0	9	8	17	6	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin C-rich vegetables [b]	0	0	8	15	19	17	39	40	100	–	–	–	–	–	–	–	–	–	–	–	–
All other vegetables	0	31	45	53	79	76	72	80	100	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin A-rich fruits [a]	0	8	10	8	12	14	17	20	0	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin C-rich fruits [b]	0	4	8	13	14	12	28	60	100	–	–	–	–	–	–	–	–	–	–	–	–
All other fruits	0	0	3	14	11	38	50	40	100	–	–	–	–	–	–	–	–	–	–	–	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g.

Table N8. Mean and Median Nutrient Intake and PA, NPNL Women [a]

Nutrient	Mean	SD	Median	EAR [b]	SD [b]	PA (Mean)	PA (Median)	Lambda (Box-Cox transformation) [c]
Energy	2,130	514	2,083					
Protein (All Sources) (% of kcal)	10	2	9					
Protein from animal sources (% of kcal)	2	2	1					
Total carbohydrate (% of kcal)	82	5	83					
Sugars (% of kcal)	2	3	1					
Total fat (% of kcal)	6	4	5					
Saturated fat (% of kcal)	2	1	1					
Thiamin (mg/d)	0.68	0.30	0.61	0.9	0.09	0.09	0.00	-0.099
Riboflavin (mg/d)	0.73	0.40	0.63	0.9	0.09	0.15	0.00	-0.179
Niacin (mg/d)	10.38	4.15	9.33	11.0	1.6	0.30	0.16	-0.084
Vitamin B6 (mg/d)	1.50	0.60	1.41	1.1	0.11	0.82	1.00	0.181
Folate (µg/d)	171.70	134.51	132.24	320	32	0.02	0.00	-0.160
Vitamin B12 (µg/d)	1.43	2.03	0.54	2.0	0.2	0.20	0.00	0.318
Vitamin C (mg/d)	59.46	66.29	41.56	38	3.8	0.52	0.50	0.072
Vitamin A (RE/d)	481.36	475.48	315.69	270	54	0.53	0.64	0.250
Calcium (mg/d)	418.06	362.44	283.41	1,000 [d]	[d]	0.21	0.25	0.039
Iron (mg/d)	9.75	5.60	8.22	See Table A6-2		0.10	0.04	-0.157
Zinc (mg/d)	8.25	2.51	7.76	6	0.75	0.92	1.00	0.347
MPA across 11 micronutrients	0.35	0.17	0.35					

[a] Mean and median nutrient intakes are for first observation day; PA are based on estimated usual intake, calculated using repeat observations for a subset of the sample. Thus, PA incorporate information from both rounds of data collection.
[b] See Table A6-1 for sources for each EAR and SD. Requirements for NPNL women are presented here; see Tables A6-1 and L8 for requirements for lactating women. There are no pregnant women in the study sample.
[c] This documents the transformation parameters selected for each nutrient. The power transformations result in approximately normal distributions.
[d] There is no EAR and no SD for calcium; 1,000 mg is the Adequate Intake (AI) for lactating women

Table N9a. Percent Contribution of Food Groups (FGI-6) To Intake of Energy, Protein and Nutrients, NPNL Women, R1[a]

Food groups (%)	Energy	Protein	CHO	Total fat	Thiamin	Riboflavin	Niacin	Vitamin B6	Folate	Vitamin B12	Vitamin C	Vitamin A	Calcium	Iron	Zinc
All starchy staples	86.0	69.9	92.2	27.6	61.4	52.6	67.7	61.5	33.5	0.0	14.3	0.8	23.3	43.0	74.5
All legumes and nuts	2.0	4.2	1.8	2.0	6.4	3.8	2.8	4.1	15.1	0.0	4.4	0.6	3.1	7.0	4.1
All dairy	0.7	1.3	0.2	4.8	1.3	4.3	0.2	0.9	1.0	12.4	0.6	4.6	6.2	0.2	1.0
Other animal source foods	3.0	16.1	0.0	13.2	6.6	7.2	12.2	6.3	4.6	87.6	0.5	3.8	22.5	6.0	8.5
Vitamin A-rich fruits /vegetables [b]	1.7	5.2	1.6	3.8	14.2	22.7	9.6	12.7	28.4	0.0	40.9	73.8	30.1	22.1	4.8
Other fruits and vegetables	2.6	2.6	2.6	6.0	8.8	7.9	5.7	10.8	14.3	0.0	36.9	15.5	10.2	6.6	4.9

[a] Percents may not sum to 100 due to nutrient contributions from foods not included in any of the groups comprising the diversity indicators (e.g., fats, sweets, alcohol).
[b] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.

Table N9b. Percent Contribution of Food Groups (FGI-9) to Intake of Energy, Protein and Nutrients, NPNL Women, R1[a]

Food groups (%)	Energy	Protein	CHO	Total fat	Thiamin	Riboflavin	Niacin	Vitamin B6	Folate	Vitamin B12	Vitamin C	Vitamin A	Calcium	Iron	Zinc
All starchy staples	86.0	69.9	92.2	27.6	61.4	52.6	67.7	61.5	33.5	0.0	14.3	0.8	23.3	43.0	74.5
All legumes and nuts	2.0	4.2	1.8	2.0	6.4	3.8	2.8	4.1	15.1	0.0	4.4	0.6	3.1	7.0	4.1
All dairy	0.7	1.3	0.2	4.8	1.3	4.3	0.2	0.9	1.0	12.4	0.6	4.6	6.2	0.2	1.0
Organ meat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eggs	0.1	0.4	0.0	1.1	0.3	1.1	0.0	0.2	0.7	5.5	0.0	2.1	0.4	0.5	0.3
Flesh foods and other miscellaneous small animal protein	2.8	15.7	0.0	12.1	6.3	6.1	12.1	6.1	3.9	82.1	0.5	1.8	22.1	5.5	8.2
Vitamin A-rich dark green leafy vegetables	1.1	4.6	1.0	1.4	12.0	19.7	7.6	10.3	22.6	0.0	27.9	39.8	27.2	20.3	4.0
Other vitamin A-rich vegetables and fruits [b]	0.6	0.6	0.6	2.4	2.2	3.1	2.0	2.4	5.7	0.0	13.0	33.9	2.9	1.8	0.8
Other fruits and vegetables	2.6	2.6	2.6	6.0	8.8	7.9	5.7	10.8	14.3	0.0	36.9	15.5	10.2	6.6	4.9

[a] Percents may not sum to 100 due to nutrient contributions from foods not included in any of the groups comprising the diversity indicators (e.g., fats, sweets, alcohol).
[b] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.

Table N9c. Percent Contribution of Food Groups (FGI-13) to Intake of Energy, Protein and Nutrients, NPNL Women, R1[a]

Food groups (%)	Energy	Protein	CHO	Total fat	Thiamin	Riboflavin	Niacin	Vitamin B6	Folate	Vitamin B12	Vitamin C	Vitamin A	Calcium	Iron	Zinc
All starchy staples	86.0	69.9	92.2	27.6	61.4	52.6	67.7	61.5	33.5	0.0	14.3	0.8	23.3	43.0	74.5
All legumes and nuts	2.0	4.2	1.8	2.0	6.4	3.8	2.8	4.1	15.1	0.0	4.4	0.6	3.1	7.0	4.1
All dairy	0.7	1.3	0.2	4.8	1.3	4.3	0.2	0.9	1.0	12.4	0.6	4.6	6.2	0.2	1.0
Organ meat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eggs	0.1	0.4	0.0	1.1	0.3	1.1	0.0	0.2	0.7	5.5	0.0	2.1	0.4	0.5	0.3
Small fish eaten whole w/bones	0.6	3.4	0.0	2.7	0.6	1.4	2.6	1.0	0.9	19.6	0.0	0.0	9.5	1.0	2.1
All other flesh foods misc. small animal protein	2.3	12.3	0.0	9.4	5.7	4.7	9.6	5.1	3.0	62.5	0.5	1.8	12.6	4.5	6.1
Vitamin A-rich dark green leafy vegetables [b]	1.1	4.6	1.0	1.4	12.0	19.7	7.6	10.3	22.6	0.0	27.9	39.8	27.2	20.3	4.0
Vitamin A-rich deep yellow/orange/red vegetables [b]	0.3	0.4	0.3	2.3	1.5	2.3	1.6	2.2	2.4	0.0	5.6	28.9	1.2	1.6	0.6
Vitamin C-rich vegetables [c]	0.3	0.6	0.3	0.4	1.9	1.6	1.3	2.9	2.2	0.0	21.1	4.5	2.7	1.7	1.0
Vitamin A-rich fruits [b]	0.3	0.2	0.3	0.1	0.7	0.7	0.4	0.2	3.4	0.0	7.4	5.0	1.7	0.2	0.2
Vitamin C-rich fruits [c]	0.5	0.2	0.6	0.6	1.3	1.5	0.9	2.7	1.6	0.0	5.5	1.5	0.6	0.6	0.3
All other fruits and vegetables	1.8	1.7	1.7	5.0	5.5	4.9	3.5	5.1	10.4	0.0	10.2	9.5	6.9	4.3	3.6

[a] Percents may not sum to 100 due to nutrient contributions from foods not included in any of the groups comprising the diversity indicators (e.g., fats, sweets, alcohol).
[b] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.
[c] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g.

Table N9d. Percent Contribution of Food Groups (FGI-21) to Intake of Energy, Protein and Nutrients, NPNL Women, R1[a]

Food groups (%)	Energy	Protein	CHO	Total fat	Thiamin	Riboflavin	Niacin	Vitamin B6	Folate	Vitamin B12	Vitamin C	Vitamin A	Calcium	Iron	Zinc
Grains and grain products	84.0	68.2	89.9	27.0	54.8	50.0	63.7	53.2	27.9	0.0	0.0	0.0	21.6	39.6	72.3
All other starchy staples	2.0	1.7	2.3	0.5	6.6	2.6	4.0	8.4	5.6	0.0	14.3	0.8	1.7	3.4	2.2
Cooked dry beans and peas	1.3	3.6	1.1	0.9	4.9	2.5	2.3	2.5	12.6	0.0	1.4	0.3	2.3	5.9	3.3
Soybeans and soy products	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nuts and seeds	0.7	0.6	0.7	1.0	1.5	1.3	0.5	1.6	2.5	0.0	3.0	0.4	0.8	1.1	0.8
Milk/yogurt	0.7	1.3	0.2	4.8	1.3	4.3	0.2	0.9	1.0	12.4	0.6	4.6	6.2	0.2	1.0
Cheese	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Beef, pork, veal, lamb, goat, game meat	0.4	1.1	0.0	1.6	0.4	0.6	0.8	0.5	0.2	4.0	0.0	0.0	0.1	0.5	1.0
Organ meat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Chicken, duck, turkey, pigeon, guinea hen, game birds	0.2	0.8	0.0	0.8	0.2	0.4	0.7	0.4	0.1	4.7	0.0	0.0	0.2	0.4	0.5
Large whole fish/dried fish/shellfish, other seafood	1.7	10.4	0.0	6.9	5.2	3.6	8.0	4.1	2.7	53.8	0.5	1.7	12.3	3.6	4.6
Small fish eaten whole w/bones	0.6	3.4	0.0	2.7	0.6	1.4	2.6	1.0	0.9	19.6	0.0	0.0	9.5	1.0	2.1
Insects, grubs, snakes, rodents and other small animal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eggs	0.1	0.4	0.0	1.1	0.3	1.1	0.0	0.2	0.7	5.5	0.0	2.1	0.4	0.5	0.3
Vitamin A-rich dark green leafy vegetables [b]	1.1	4.6	1.0	1.4	12.0	19.7	7.6	10.3	22.6	0.0	27.9	39.8	27.2	20.3	4.0
Vitamin A-rich deep yellow/orange/red vegetables [b]	0.3	0.4	0.3	2.3	1.5	2.3	1.6	2.2	2.4	0.0	5.6	28.9	1.2	1.6	0.6
Vitamin C-rich vegetables [c]	0.3	0.6	0.3	0.4	1.9	1.6	1.3	2.9	2.2	0.0	21.1	4.5	2.7	1.7	1.0
All other vegetables	0.8	1.2	0.9	1.2	4.7	3.3	2.9	4.2	8.9	0.0	8.5	8.6	5.6	2.9	2.6
Vitamin A-rich fruits [b]	0.3	0.2	0.3	0.1	0.7	0.7	0.4	0.2	3.4	0.0	7.4	5.0	1.7	0.2	0.2
Vitamin C-rich fruits [c]	0.5	0.2	0.6	0.6	1.3	1.5	0.9	2.7	1.6	0.0	5.5	1.5	0.6	0.6	0.3
All other fruits	1.0	0.5	0.8	3.8	0.8	1.5	0.6	0.9	1.5	0.0	1.7	0.9	1.3	1.4	0.9

[a] Percents may not sum to 100 due to nutrient contributions from foods not included in any of the groups comprising the diversity indicators (e.g., fats, sweets, alcohol).
[b] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.
[c] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g.

Table N10. Correlations between Food Group Diversity Scores and Estimated Usual Intakes of Individual Nutrients, NPNL Women [a, b]

	FGI-6		FGI-6R		FGI-9		FGI-9R		FGI-13		FGI-13R		FGI-21		FGI-21R	
Nutrients	Not controlling for energy	Controlling for energy	Not controlling for energy	Controlling for energy	Not controlling for energy	Controlling for energy	Not controlling for energy	Controlling for energy	Not controlling for energy	Controlling for energy	Not controlling for energy	Controlling for energy	Not controlling for energy	Controlling for energy	Not controlling for energy	Controlling for energy
Total energy	0.256 ***		0.280 ***		0.248 ***		0.265 ***		0.285 ***		0.291 ***		0.299 ***		0.319 ***	
Thiamin	0.300 ***	0.193 ***	0.419 ***	0.328 ***	0.334 ***	0.242 ***	0.420 ***	0.339 ***	0.328 ***	0.209 ***	0.425 ***	0.329 ***	0.396 ***	0.287 ***	0.475 ***	0.376 ***
Riboflavin	0.404 ***	0.331 ***	0.519 ***	0.456 ***	0.477 ***	0.422 ***	0.514 ***	0.457 ***	0.448 ***	0.369 ***	0.499 ***	0.427 ***	0.448 ***	0.363 ***	0.488 ***	0.402 ***
Niacin	0.259 ***	0.118 *	0.335 ***	0.204 ***	0.307 ***	0.195 ***	0.343 ***	0.229 ***	0.315 ***	0.171 **	0.351 ***	0.217 ***	0.337 ***	0.189 **	0.382 ***	0.237 ***
Vitamin B6	0.299 ***	0.176 **	0.364 ***	0.246 ***	0.321 ***	0.215 ***	0.380 ***	0.283 ***	0.341 ***	0.208 ***	0.394 ***	0.280 ***	0.418 ***	0.307 ***	0.474 ***	0.370 ***
Folate	0.398 ***	0.341 ***	0.466 ***	0.409 ***	0.430 ***	0.378 ***	0.482 ***	0.430 ***	0.380 ***	0.311 ***	0.454 ***	0.392 ***	0.388 ***	0.316 ***	0.437 ***	0.366 ***
Vitamin B12	0.476 ***	0.447 ***	0.340 ***	0.300 ***	0.465 ***	0.436 ***	0.305 ***	0.265 ***	0.469 ***	0.437 ***	0.331 ***	0.290 ***	0.437 ***	0.402 ***	0.331 ***	0.286 ***
Vitamin C	0.203 ***	0.158 **	0.343 ***	0.303 ***	0.261 ***	0.221 ***	0.374 ***	0.338 ***	0.294 ***	0.250 ***	0.387 ***	0.349 ***	0.340 ***	0.297 ***	0.399 ***	0.358 ***
Vitamin A	0.315 ***	0.267 ***	0.421 ***	0.375 ***	0.443 ***	0.405 ***	0.462 ***	0.422 ***	0.389 ***	0.340 ***	0.398 ***	0.349 ***	0.333 ***	0.277 ***	0.340 ***	0.281 ***
Calcium	0.429 ***	0.384 ***	0.469 ***	0.424 ***	0.503 ***	0.466 ***	0.455 ***	0.411 ***	0.475 ***	0.430 ***	0.446 ***	0.397 ***	0.428 ***	0.375 ***	0.415 ***	0.357 ***
Iron	0.371 ***	0.299 ***	0.456 ***	0.387 ***	0.427 ***	0.367 ***	0.445 ***	0.380 ***	0.387 ***	0.306 ***	0.427 ***	0.350 ***	0.409 ***	0.326 ***	0.429 ***	0.341 ***
Zinc	0.336 ***	0.232 ***	0.371 ***	0.263 ***	0.339 ***	0.251 ***	0.355 ***	0.255 ***	0.341 ***	0.196 ***	0.375 ***	0.253 ***	0.362 ***	0.216 ***	0.396 ***	0.250 ***

[a] Usual intake of energy and individual nutrients are estimated by the BLUP following the method described in Arimond et al. 2008. Diversity scores are from R1 data; BLUP calculation incorporates information from both rounds.
[b] A "*" indicates a coefficient that is statistically significant at $p < 0.05$; ** indicates $p < 0.01$, and *** indicates $p < 0.001$.

Table N11a. Correlation between Energy from 6 Major Food Groups and MPA, With and Without Controlling for Total Energy Intake, NPNL Women [a, b]

Major food groups	Correlation between MPA and energy from each food group:	Partial correlation coefficients for energy from each food group (controlling for total energy)
All starchy staples	0.324 ***	-0.394 ***
All legumes and nuts	0.161 **	0.063
All dairy	0.200 ***	0.149 **
Other animal source foods	0.271 ***	0.218 ***
Vitamin A-rich fruits and vegetables [c]	0.562 ***	0.562 ***
Other fruits and vegetables	0.249 ***	0.208 ***

[a] Numbers in bold indicate coefficients that changed direction when total energy was controlled for, with both coefficients being significant. A "*" indicates a coefficient that is statistically significant at $p < 0.05$; ** indicates $p < 0.01$, and *** indicates $p < 0.001$.
[b] Energy from food groups is from R1; MPA is based on estimated usual intake, calculated using repeat observations for a subset of the sample. MPA was transformed to approximate normality, and the transformed variable was used in the correlations.
[c] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.

Table N11b. Correlation between Energy from 9 Sub-Food Groups and MPA, With and Without Controlling for Total Energy Intake, NPNL Women [a, b]

Major food groups	Correlation between MPA and energy from each food group:	Partial correlation coefficients for energy from each food group (controlling for total energy)
All starchy staples	0.324 ***	-0.394 ***
All legumes and nuts	0.161 **	0.063
All dairy	0.200 ***	0.149 **
Organ meat	–	–
Eggs	0.086	0.086
Flesh foods and other miscellaneous small animal protein	0.264 ***	0.209 ***
Vitamin A-rich dark green leafy vegetables [c]	0.514 ***	0.556 ***
Other vitamin A-rich vegetables and fruits [c]	0.184 **	0.117 *
Other fruits and vegetables	0.249 ***	0.208 ***

[a] Numbers in bold indicate coefficients that changed direction when total energy was controlled for, with both coefficients being significant. A "*" indicates a coefficient that is statistically significant at $p < 0.05$; ** indicates $p < 0.01$, and *** indicates $p < 0.001$. A "-" indicates the food group was not consumed.
[b] Energy from food groups is from R1; MPA is based on estimated usual intake, calculated using repeat observations for a subset of the sample. MPA was transformed to approximate normality, and the transformed variable was used in the correlations.
[c] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.

Table N11c. Correlation between Energy from 13 Sub-Food Groups and MPA, With and Without Controlling for Total Energy Intake, NPNL Women [a, b]

Major food groups	Correlation between MPA and energy from each food group:	Partial correlation coefficients for energy from each food group (controlling for total energy)
All starchy staples	0.324 ***	-0.394 ***
All legumes and nuts	0.161 **	0.063
All dairy	0.200 ***	0.149 **
Organ meat	–	–
Eggs	0.086	0.086
Small fish eaten whole with bones	0.242 ***	0.198 ***
All other flesh foods and miscellaneous small animal protein	0.153 **	0.116 *
Vitamin A-rich dark green leafy vegetables [c]	0.514 ***	0.556 ***
Vitamin A-rich deep yellow/orange/red vegetables [c]	0.223 ***	0.166 **
Vitamin C-rich vegetables [d]	0.148 *	0.101
Vitamin A-rich fruits [c]	0.080	0.037
Vitamin C-rich fruits [d]	0.136 *	0.130 *
All other fruits and vegetables	0.197 ***	0.159 **

[a] Numbers in bold indicate coefficients that changed direction when total energy was controlled for, with both coefficients being significant. A "*" indicates a coefficient that is statistically significant at $p < 0.05$; ** indicates $p < 0.01$, and *** indicates $p < 0.001$. A "-" indicates the food group was not consumed.
[b] Energy from food groups is from R1; MPA is based on estimated usual intake, calculated using repeat observations for a subset of the sample. MPA was transformed to approximate normality, and the transformed variable was used in the correlations.
[c] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.
[d] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g.

Table N11d. Correlation between Energy from 21 Sub-Food Groups and MPA, With and Without Controlling for Total Energy Intake, NPNL Women [a, b]

Major food groups	Correlation between MPA and energy from each food group:	Partial correlation coefficients for energy from each food group (controlling for total energy)
Grains and grain products	0.320 ***	-0.360 ***
All other starchy staples	0.062	-0.032
Cooked dry beans and peas	-0.005	-0.071
Soybeans and soy products	–	–
Nuts and seeds	0.278 ***	0.206 ***
Milk/yogurt	0.200 ***	0.149 **
Cheese	–	–
Beef, pork, veal, lamb, goat, game meat	0.004	0.003
Organ meat	–	–
Chicken, duck, turkey, pigeon, guinea hen, game birds	0.020	-0.003
Large whole fish/dried fish/shellfish and other seafood	0.167 **	0.131 *
Small fish eaten whole with bones	0.242 ***	0.198 ***
Insects, grubs, snakes, rodents and other small animal	–	–
Eggs	0.086	0.086
Vitamin A-rich dark green leafy vegetables [c]	0.514 ***	0.556 ***
Vitamin A-rich deep yellow/orange/red vegetables [c]	0.223 ***	0.166 **
Vitamin C-rich vegetables [d]	0.148 *	0.101
All other vegetables	0.063	-0.056
Vitamin A-rich fruits [c]	0.080	0.037
Vitamin C-rich fruits [d]	0.136 *	0.130 *
All other fruits	0.188 **	0.188 **

[a] Numbers in bold indicate coefficients that changed direction when total energy was controlled for, with both coefficients being significant. A "*" indicates a coefficient that is statistically significant at p < 0.05; ** indicates p < 0.01, and *** indicates p < 0.001. A "-" indicates the food group was not consumed.
[b] Energy from food groups is from R1; MPA is based on estimated usual intake, calculated using repeat observations for a subset of the sample. MPA was transformed to approximate normality, and the transformed variable was used in the correlations.
[c] Vitamin A-rich fruits and vegetables are defined as those with > 60 RAE/100 g.
[d] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g.

Table N12. Total Energy Intake (kcal) by Food Group Diversity Scores, NPNL Women, R1 [a]

Number of food groups eaten	Diversity indicators: Median total energy intake (range)															
	FGI-6		FGI-6R		FGI-9		FGI-9R		FGI-13		FGI-13R		FGI-21		FGI-21R	
1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2	1647	(1011-2383)	1761	(1011-2855)	1647	(1011-2383)	1737	(1011-2855)	–	–	1838	(1011-3561)	–	–	1861	(1011-3161)
3	1982	(1084-3161)	2075	(1122-3561)	1982	(1084-2956)	2075	(1122-3561)	1601	(1011-2383)	2025	(1122-3175)	1478	(1011-2278)	1933	(1084-3561)
4	2053	(1103-3561)	2193	(1103-3459)	2057	(1122-3561)	2163	(1126-3459)	1817	(1084-2956)	2181	(1126-3445)	1884	(1182-2956)	2041	(1122-3303)
5	2304	(1266-3532)	2387	(1335-3532)	2136	(1103-3445)	2387	(1103-3532)	2046	(1122-3561)	2324	(1103-3459)	1945	(1200-3161)	2319	(1103-3372)
6	2288	(1683-3003)	1996	(1683-2747)	2396	(1266-3532)	1991	(1683-2553)	2149	(1126-3232)	2199	(1708-3532)	2097	(1084-3561)	2110	(1460-3459)
7					1914	(1683-2747)	–	–	2334	(1103-3445)	2215	(1611-3265)	2017	(1103-3303)	2610	(1714-3114)
8					–	–	–	–	2276	(1266-3532)	–	–	2315	(1266-3346)	2483	(1683-3532)
9					–	–	–	–	–	–	–	–	2445	(1611-3459)	–	–
10									–	–	–	–	2621	(1925-3532)	–	–
11									–	–	–	–	–	–	–	–
12									–	–	–	–	–	–	–	–
13									–	–	–	–	–	–	–	–
14													–	–	–	–
15													–	–	–	–
16													–	–	–	–
17													–	–	–	–
18													–	–	–	–
19													–	–	–	–
20													–	–	–	–
21													–	–	–	–

[a] Light shading indicates impossible values (beyond range of possible scores). A "--" indicates that a cell has fewer than five observations. Cells with fewer than ten observations have dark shading.

Table N13. Relationship between Food Group Diversity Scores and Total Energy Intake, NPNL Women [a]

	Food group diversity score		Total energy intake		Correlation Coefficient [b]
	(mean)	(median)	(mean)	(median)	(median)
FGI-6	4.1	4.0	2,130	2,083	0.256 ***
FGI-6R [c]	3.5	4.0	2,130	2,083	0.280 ***
FGI-9	4.5	4.0	2,130	2,083	0.248 ***
FGI-9R [c]	3.6	4.0	2,130	2,083	0.265 ***
FGI-13	5.7	6.0	2,130	2,083	0.285 ***
FGI-13R [c]	3.8	4.0	2,130	2,083	0.291 ***
FGI-21	6.5	6.0	2,130	2,083	0.299 ***
FGI-21R [c]	4.4	4.0	2,130	2,083	0.319 ***

[a] Food group diversity scores and mean and median energy intakes are from first observation day; BLUP for energy intake, calculated using repeat observations for a subset of the sample is used for correlation analysis.
[b] A "*" indicates a coefficient that is statistically significant at $p < 0.05$; ** indicates $p < 0.01$, and *** indicates $p < 0.001$.
[c] Refers to minimum intake of 15 g for each of the food groups/sub-food groups.

Table N14. MPA by Food Group Diversity Scores, NPNL Women [a, b]

Number of food groups eaten	Diversity indicators															
	FGI-6		FGI-6R		FGI-9		FGI-9R		FGI-13		FGI-13R		FGI-21		FGI-21R	
	Median MPA (range)															
1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2	0.10	(0.00-0.33)	0.19	(0.00-0.42)	0.10	(0.00-0.33)	0.19	(0.00-0.42)	–	–	0.20	(0.00-0.59)	–	–	0.20	(0.00-0.59)
3	0.25	(0.02-0.59)	0.32	(0.02-0.70)	0.24	(0.02-0.50)	0.32	(0.02-0.70)	0.09	(0.00-0.33)	0.30	(0.02-0.70)	0.08	(0.00-0.33)	0.23	(0.02-0.70)
4	0.33	(0.02-0.76)	0.39	(0.11-0.81)	0.28	(0.02-0.62)	0.36	(0.11-0.81)	0.25	(0.02-0.50)	0.33	(0.11-0.62)	0.23	(0.02-0.50)	0.32	(0.08-0.56)
5	0.40	(0.11-0.87)	0.43	(0.11-0.87)	0.40	(0.05-0.76)	0.47	(0.11-0.87)	0.27	(0.02-0.59)	0.48	(0.11-0.87)	0.23	(0.02-0.59)	0.36	(0.12-0.87)
6	0.39	(0.21-0.77)	0.45	(0.24-0.77)	0.39	(0.11-0.81)	0.45	(0.24-0.77)	0.38	(0.05-0.76)	0.45	(0.36-0.77)	0.36	(0.05-0.70)	0.43	(0.11-0.76)
7					0.45	(0.24-0.87)	–	–	0.40	(0.11-0.81)	0.43	(0.28-0.77)	0.38	(0.08-0.76)	0.46	(0.28-0.81)
8					–	–	–	–	0.43	(0.14-0.87)	–	–	0.37	(0.11-0.87)	0.55	(0.24-0.58)
9					–	–	–	–	–	–	–	–	0.46	(0.24-0.81)	–	–
10									–	–	–	–	0.42	(0.35-0.75)	–	–
11									–	–	–	–	–	–	–	–
12									–	–	–	–	–	–	–	–
13									–	–	–	–	–	–	–	–
14													–	–	–	–
15													–	–	–	–
16													–	–	–	–
17													–	–	–	–
18													–	–	–	–
19													–	–	–	–
20													–	–	–	–
21													–	–	–	–

[a] Food group diversity scores are from first observation day; MPA is based on estimated usual intake, calculated using repeat observations for a subset of the sample.

[b] Light shading indicates impossible values (beyond range of possible scores). A "--" indicates that a cell has fewer than 5 observations. Cells with fewer than 10 observations have dark shading.

Table N15. Relationship between MPA and Food Group Diversity Scores, NPNL Women [a]

	Food group diversity score		MPA		Correlation Coefficient [b]	Partial correlation controlling for total energy intake [b]
	(mean)	(median)	(mean)	(median)	(median)	
FGI-6	4.1	4.0	0.35	0.35	0.394 ***	0.315 ***
FGI-6R [c]	3.5	4.0	0.35	0.35	0.503 ***	0.436 ***
FGI-9	4.5	4.0	0.35	0.35	0.476 ***	0.419 ***
FGI-9R [c]	3.6	4.0	0.35	0.35	0.520 ***	0.464 ***
FGI-13	5.7	6.0	0.35	0.35	0.463 ***	0.385 ***
FGI-13R [c]	3.8	4.0	0.35	0.35	0.508 ***	0.437 ***
FGI-21	6.5	6.0	0.35	0.35	0.465 ***	0.379 ***
FGI-21R [c]	4.4	4.0	0.35	0.35	0.503 ***	0.417 ***

[a] Food group diversity scores are from first observation day, MPA is based on the first observation day and repeat observations for a subset of the sample. MPA was transformed to approximate normality, and transformed MPA and BLUP for total energy intake were used for correlation analysis.
[b] A "*" indicates a coefficient that is statistically significant at $p < 0.05$; ** indicates $p < 0.01$, and *** indicates $p < 0.001$.
[c] Refers to minimum intake of 15 g for each of the food groups/sub-food groups.

Table N16. Results of Ordinary Least Squares Regression Analysis of the Determinants of MPA, NPNL Women [a, b]

	FGI-6		FGI-6R		FGI-9		FGI-9R		FGI-13		FGI-13R		FGI-21		FGI-21R	
	Not controlling for energy															
	B	**Standard error**	**B**	**Standard error**	**B**	**Standard error**	**B**	**Standard error**	**B**	**Standard error**	**B**	**Standard error**	**B**	**Standard error**	**B**	**Standard error**
Constant	-1.840***	0.429	-1.825***	0.403	-1.982***	0.410	-1.729***	0.400	-2.018***	0.414	-1.843***	0.402	-1.932***	0.414	-1.744***	0.404
Woman's height	0.004	0.003	0.004	0.003	0.005	0.003	0.003	0.003	0.005	0.003	0.004	0.003	0.004	0.003	0.004	0.003
Age	-0.002	0.001	-0.001	0.001	-0.002	0.001	-0.001	0.001	-0.001	0.001	-0.001	0.001	-0.001	0.001	-0.001	0.001
Dietary diversity score	0.121***	0.017	0.133***	0.013	0.118***	0.013	0.128***	0.012	0.095***	0.011	0.106***	0.011	0.079***	0.009	0.090***	0.009
Adjusted R^2	0.157***		0.255***		0.231***		0.269***		0.218***		0.259***		0.216***		0.252***	
	Controlling for energy															
	B	**Standard error**	**B**	**Standard error**	**B**	**Standard error**	**B**	**Standard error**	**B**	**Standard error**	**B**	**Standard error**	**B**	**Standard error**	**B**	**Standard error**
Constant	-2.028***	0.386	-1.994***	0.370	-2.132***	0.370	-1.917***	0.366	-2.149***	0.377	-2.008***	0.368	-2.077***	0.380	-1.928***	0.374
Woman's height	0.003	0.003	0.003	0.002	0.004	0.002	0.003	0.002	0.004	0.002	0.004	0.002	0.003	0.002	0.003	0.002
Age	-0.002	0.001	-0.002	0.001	-0.002	0.001	-0.002	0.001	-0.002	0.001	-0.002	0.001	-0.002	0.001	-0.002	0.001
Dietary diversity score	0.091***	0.015	0.104***	0.013	0.095***	0.012	0.102***	0.012	0.072***	0.010	0.083***	0.010	0.058***	0.009	0.068***	0.009
Total energy intake [c]	0.219***	0.026	0.192***	0.025	0.206***	0.025	0.192***	0.025	0.201***	0.026	0.192***	0.025	0.197***	0.026	0.187***	0.026
Adjusted R^2	0.320***		0.375***		0.375***		0.390***		0.351***		0.380***		0.340***		0.362***	

[a] A "*" indicates a coefficient that is statistically significant at $p < 0.05$; ** indicates $p < 0.01$, and *** indicates $p < 0.001$. For the adjusted R^2, the stars indicate the significance level of the F statistic of the regression.
[b] MPA was transformed to approximate a normal distribution and the transformed variable was used in the regressions.
[c] Energy was divided by 1,000 before running the regressions. Otherwise, while being highly significant, all coefficients showed as 0.000 due to the large scale of the energy variable (range 1,011-3,561 kcal) and the small scale of MPA (range 0.00-0.87).

Table N17. Percent of Observation Days above Selected Cutoff(s) for MPA, NPNL Women [a]

	Percent (number)	
Women with MPA > 50%	20	(59)
Women with MPA > 60%	7	(21)
Women with MPA > 70%	4	(12)
Women with MPA > 80%	1	(2)
Women with MPA > 90%	0	(0)

[a] MPA is calculated based on both observation days.

Table N18. MPA: Performance of Diversity Scores, NPNL Women [a]

	Range	AUC	p-value [b]	SEM [c]	95% CI [d]
			MPA >50% (1st cutoff)		
FGI-6	2.0-6.0	0.588	0.036	0.034	0.522-0.655
FGI-6R [e]	1.0-6.0	0.716	0.000	0.030	0.658-0.775
FGI-9	2.0-7.0	0.674	0.000	0.034	0.607-0.741
FGI-9R [e]	1.0-7.0	0.735	0.000	0.031	0.674-0.796
FGI-13	2.0-10.0	0.678	0.000	0.034	0.612-0.744
FGI-13R [e]	1.0-8.0	0.752	0.000	0.032	0.689-0.814
FGI-21	2.0-11.0	0.672	0.000	0.037	0.599-0.744
FGI-21R [e]	1.0-9.0	0.722	0.000	0.036	0.652-0.793
			MPA > 60% (2nd cutoff)		
FGI-6	2.0-6.0	0.666	0.011	0.048	0.571-0.760
FGI-6R [e]	1.0-6.0	0.782	0.000	0.038	0.708-0.856
FGI-9	2.0-7.0	0.766	0.000	0.037	0.694-0.839
FGI-9R [e]	1.0-7.0	0.815	0.000	0.038	0.740-0.890
FGI-13	2.0-10.0	0.760	0.000	0.035	0.690-0.829
FGI-13R [e]	1.0-8.0	0.836	0.000	0.033	0.770-0.901
FGI-21	2.0-11.0	0.735	0.000	0.046	0.644-0.826
FGI-21R [e]	1.0-9.0	0.800	0.000	0.040	0.722-0.879
			MPA > 70% (3rd cutoff)		
FGI-6	2.0-6.0	0.696	0.022	0.066	0.567-0.824
FGI-6R [e]	1.0-6.0	0.784	0.001	0.057	0.672-0.897
FGI-9	2.0-7.0	0.824	0.000	0.042	0.741-0.907
FGI-9R [e]	1.0-7.0	0.805	0.000	0.059	0.689-0.921
FGI-13	2.0-10.0	0.803	0.000	0.046	0.713-0.893
FGI-13R [e]	1.0-8.0	0.827	0.000	0.051	0.727-0.927
FGI-21	2.0-11.0	0.808	0.000	0.055	0.702-0.915
FGI-21R [e]	1.0-9.0	0.808	0.000	0.063	0.685-0.931

[a] Diversity scores are from a single (R1) observation day. MPA is calculated based on both observation days.
[b] P-value for test of null hypothesis that area = 0.5 ("neutral" diagonal line on ROC graph).
[c] Standard error of the mean.
[d] Confidence interval.
[e] Refer to minimum intake of 15 g for each food groups/sub-food groups.

Table N19. MPA: Tests Comparing AUC for Various Diversity Scores, NPNL Women [a, b]

		FGI-6	FGI-6R	FGI-9	FGI-9R	FGI-13	FGI-13R	FGI-21	FGI-21R
MPA > 50% (1st cutoff)									
	AUC [c]	0.588	0.716	0.674	0.735	0.678	0.752	0.672	0.722
		P-values							
FGI-6	0.588								
FGI-6R [d]	0.716	**0.000**							
FGI-9	0.674	**0.000**	0.149						
FGI-9R [d]	0.735	**0.000**	0.117	**0.024**					
FGI-13	0.678	**0.001**	0.216	0.831	0.059				
FGI-13R [d]	0.752	**0.000**	0.054	**0.014**	0.298	**0.018**			
FGI-21	0.672	**0.006**	0.181	0.941	0.053	0.775	**0.012**		
FGI-21R [d]	0.722	**0.000**	0.791	0.169	0.529	0.204	0.063	0.075	
MPA > 60% (2nd cutoff)									
		FGI-6	**FGI-6R**	**FGI-9**	**FGI-9R**	**FGI-13**	**FGI-13R**	**FGI-21**	**FGI-21R**
	AUC [c]	0.666	0.782	0.766	0.815	0.760	0.836	0.735	0.800
		P-values							
FGI-6	0.666								
FGI-6R [d]	0.782	**0.000**							
FGI-9	0.766	**0.003**	0.652						
FGI-9R [d]	0.815	**0.001**	0.141	0.207					
FGI-13	0.760	**0.019**	0.510	0.783	0.200				
FGI-13R [d]	0.836	**0.000**	**0.034**	0.089	0.402	0.053			
FGI-21	0.735	0.114	0.190	0.392	0.071	0.451	**0.020**		
FGI-21R [d]	0.800	**0.005**	0.555	0.457	0.611	0.373	0.095	0.066	
MPA > 70% (3rd cutoff)									
		FGI-6	**FGI-6R**	**FGI-9**	**FGI-9R**	**FGI-13**	**FGI-13R**	**FGI-21**	**FGI-21R**
	AUC [c]	0.696	0.784	0.824	0.805	0.803	0.827	0.808	0.808
		P-values							
FGI-6	0.696								
FGI-6R [d]	0.784	**0.023**							
FGI-9	0.824	**0.000**	0.352						
FGI-9R [d]	0.805	0.051	0.438	0.722					
FGI-13	0.803	**0.032**	0.691	0.428	0.969				
FGI-13R [d]	0.827	**0.025**	0.185	0.947	0.526	0.605			
FGI-21	0.808	**0.012**	0.518	0.735	0.951	0.897	0.617		
FGI-21R [d]	0.808	0.090	0.605	0.803	0.952	0.940	0.486	0.988	

[a] Diversity scores are from a single (R1) observation day. MPA is calculated based on both observation days.
[b] P-value for test of null hypothesis that area under the curve is equal for the 2 indicators. P-values <0.05 are in bold type.
[c] Area under the curve.
[d] Refer to minimum intake of 15 g for each food groups/sub-food groups.

Table N20a. Sensitivity/Specificity Analysis of the Relationship between Food Group Diversity (FGI-6) and MPA, by Diversity Cutoffs, NPNL Women [a]

N	Cutoff	Sensitivity	Specificity	Proportion of false positives	Proportion of false negatives	Total proportion misclassified
			MPA > 50%			
299	≥ 1	100.0	0.0	80.3	0.0	80.3
299	≥ 2	100.0	0.0	80.3	0.0	80.3
287	≥ 3	100.0	5.0	76.3	0.0	76.3
239	≥ 4	94.9	23.8	61.2	1.0	62.2
94	≥ 5	35.6	69.6	24.4	12.7	37.1
15	6	6.8	95.4	3.7	18.4	22.1
			MPA > 60%			
299	≥ 1	100.0	0.0	93.0	0.0	93.0
299	≥ 2	100.0	0.0	93.0	0.0	93.0
287	≥ 3	100.0	4.3	89.0	0.0	89.0
239	≥ 4	100.0	21.6	72.9	0.0	72.9
94	≥ 5	52.4	70.1	27.8	3.3	31.1
15	6	9.5	95.3	4.3	6.4	10.7
			MPA > 70%			
299	≥ 1	100.0	0.0	96.0	0.0	96.0
299	≥ 2	100.0	0.0	96.0	0.0	96.0
287	≥ 3	100.0	4.2	92.0	0.0	92.0
239	≥ 4	100.0	20.9	75.9	0.0	75.9
94	≥ 5	58.3	69.7	29.1	1.7	30.8
15	6	16.7	95.5	4.3	3.3	7.7

[a] Diversity scores are from a single (R1) observation day. MPA is calculated based on both observation days.

Table N20b. Sensitivity/Specificity Analysis of the Relationship between Food Group Diversity (FGI-6R) and MPA, by Diversity Cutoffs, NPNL Women [a]

n	Cutoff	Sensitivity	Specificity	Proportion of false positives	Proportion of false negatives	Total proportion misclassified
			MPA > 50%			
299	≥ 1	100.0	0.0	80.3	0.0	80.3
297	≥ 2	100.0	0.8	79.6	0.0	79.6
250	≥ 3	100.0	20.4	63.9	0.0	63.9
153	≥ 4	83.1	56.7	34.8	3.3	38.1
46	≥ 5	25.4	87.1	10.4	14.7	25.1
8	6	3.4	97.5	2.0	19.1	21.1
			MPA > 60%			
299	≥ 1	100.0	0.0	93.0	0.0	93.0
297	≥ 2	100.0	0.7	92.3	0.0	92.3
250	≥ 3	100.0	17.6	76.6	0.0	76.6
153	≥ 4	95.2	52.2	44.5	0.3	44.8
46	≥ 5	42.9	86.7	12.4	4.0	16.4
8	6	9.5	97.8	2.0	6.4	8.4
			MPA > 70%			
299	≥ 1	100.0	0.0	96.0	0.0	96.0
297	≥ 2	100.0	0.7	95.3	0.0	95.3
250	≥ 3	100.0	17.1	79.6	0.0	79.6
153	≥ 4	91.7	50.5	47.5	0.3	47.8
46	≥ 5	50.0	86.1	13.4	2.0	15.4
8	6	16.7	97.9	2.0	3.3	5.4

[a] Diversity scores are from a single (R1) observation day. MPA is calculated based on both observation days.

Table N20c. Sensitivity/Specificity Analysis of the Relationship between Food Group Diversity (FGI-9) and MPA, by Diversity Cutoffs, NPNL Women [a]

n	Cutoff	Sensitivity	Specificity	Proportion of false positives	Proportion of false negatives	Total proportion misclassified
			MPA > 50%			
299	≥ 1	100.0	0.0	80.3	0.0	80.3
299	≥ 2	100.0	0.0	80.3	0.0	80.3
287	≥ 3	100.0	5.0	76.3	0.0	76.3
249	≥ 4	98.3	20.4	63.9	0.3	64.2
145	≥ 5	69.5	56.7	34.8	6.0	40.8
49	≥ 6	28.8	86.7	10.7	14.0	24.7
8	≥ 7	5.1	97.9	1.7	18.7	20.4
0	≥ 8	–	–	–	–	–
0	9	–	–	–	–	–
			MPA > 60%			
299	≥ 1	100.0	0.0	93.0	0.0	93.0
299	≥ 2	100.0	0.0	93.0	0.0	93.0
287	≥ 3	100.0	4.3	89.0	0.0	89.0
249	≥ 4	100.0	18.0	76.3	0.0	76.3
145	≥ 5	95.2	55.0	41.8	0.3	42.1
49	≥ 6	33.3	84.9	14.0	4.7	18.7
8	≥ 7	14.3	98.2	1.7	6.0	7.7
0	≥ 8	–	–	–	–	–
0	9	–	–	–	–	–
			MPA > 70%			
299	≥ 1	100.0	0.0	96.0	0.0	96.0
299	≥ 2	100.0	0.0	96.0	0.0	96.0
287	≥ 3	100.0	4.2	92.0	0.0	92.0
249	≥ 4	100.0	17.4	79.3	0.0	79.3
145	≥ 5	100.0	53.7	44.5	0.0	44.5
49	≥ 6	50.0	85.0	14.4	2.0	16.4
8	≥ 7	25.0	98.3	1.7	3.0	4.7
0	≥ 8	–	–	–	–	–
0	9	–	–	–	–	–

[a] Diversity scores are from a single (R1) observation day. MPA is calculated based on both observation days.

Table N20d. Sensitivity/Specificity Analysis of the Relationship between Food Group Diversity (FGI-9R) and MPA, by Diversity Cutoffs, NPNL Women [a]

n	Cutoff	Sensitivity	Specificity	Proportion of false positives	Proportion of false negatives	Total proportion misclassified
				MPA > 50%		
299	≥ 1	100.0	0.0	80.3	0.0	80.3
297	≥ 2	100.0	0.8	79.6	0.0	79.6
251	≥ 3	100.0	20.0	64.2	0.0	64.2
160	≥ 4	83.1	53.8	37.1	3.3	40.5
63	≥ 5	44.1	84.6	12.4	11.0	23.4
11	≥ 6	5.1	96.7	2.7	18.7	21.4
1	≥ 7	0.0	99.6	0.3	19.7	20.1
0	≥ 8	–	–	–	–	–
0	9	–	–	–	–	–
				MPA > 60%		
299	≥ 1	100.0	0.0	93.0	0.0	93.0
297	≥ 2	100.0	0.7	92.3	0.0	92.3
251	≥ 3	100.0	17.3	76.9	0.0	76.9
160	≥ 4	95.2	49.6	46.8	0.3	47.2
63	≥ 5	66.7	82.4	16.4	2.3	18.7
11	≥ 6	14.3	97.1	2.7	6.0	8.7
1	≥ 7	0.0	99.6	0.3	7.0	7.4
0	≥ 8	–	–	–	–	–
0	9	–	–	–	–	–
				MPA > 70%		
299	≥ 1	100.0	0.0	96.0	0.0	96.0
297	≥ 2	100.0	0.7	95.3	0.0	95.3
251	≥ 3	100.0	16.7	79.9	0.0	79.9
160	≥ 4	91.7	48.1	49.8	0.3	50.2
63	≥ 5	66.7	80.8	18.4	1.3	19.7
11	≥ 6	25.0	97.2	2.7	3.0	5.7
1	≥ 7	0.0	99.7	0.3	4.0	4.3
0	≥ 8	–	–	–	–	–
0	9	–	–	–	–	–

[a] Diversity scores are from a single (R1) observation day. MPA is calculated based on both observation days.

Table N20e. Sensitivity/Specificity Analysis of the Relationship between Food Group Diversity (FGI-13) and MPA, by Diversity Cutoffs, NPNL Women [a]

n	Cutoff	Sensitivity	Specificity	Proportion of false positives	Proportion of false negatives	Total proportion misclassified
				MPA > 50%		
299	≥ 1	100.0	0.0	80.3	0.0	80.3
299	≥ 2	100.0	0.0	80.3	0.0	80.3
298	≥ 3	100.0	0.4	79.9	0.0	79.9
285	≥ 4	100.0	5.8	75.6	0.0	75.6
250	≥ 5	98.3	20.0	64.2	0.3	64.5
167	≥ 6	79.7	50.0	40.1	4.0	44.1
74	≥ 7	39.0	78.8	17.1	12.0	29.1
26	≥ 8	13.6	92.5	6.0	17.1	23.1
5	≥ 9	3.4	98.8	1.0	19.1	20.1
1	≥10	1.7	100.0	0.0	19.4	19.4
0	≥ 11	–	–	–	–	–
0	≥ 12	–	–	–	–	–
0	13	–	–	–	–	–
				MPA > 60%		
299	≥ 1	100.0	0.0	93.0	0.0	93.0
299	≥ 2	100.0	0.0	93.0	0.0	93.0
298	≥ 3	100.0	0.4	92.6	0.0	92.6
285	≥ 4	100.0	5.0	88.3	0.0	88.3
250	≥ 5	100.0	17.6	76.6	0.0	76.6
167	≥ 6	100.0	47.5	48.8	0.0	48.8
74	≥ 7	52.4	77.3	21.1	3.3	24.4
26	≥ 8	14.3	91.7	7.7	6.0	13.7
5	≥ 9	9.5	98.9	1.0	6.4	7.4
1	≥10	4.8	100.0	0.0	6.7	6.7
0	≥ 11	–	–	–	–	–
0	≥ 12	–	–	–	–	–
0	13	–	–	–	–	–
				MPA > 70%		
299	≥ 1	100.0	0.0	96.0	0.0	96.0
299	≥ 2	100.0	0.0	96.0	0.0	96.0
298	≥ 3	100.0	0.3	95.7	0.0	95.7
285	≥ 4	100.0	4.9	91.3	0.0	91.3
250	≥ 5	100.0	17.1	79.6	0.0	79.6
167	≥ 6	100.0	46.0	51.8	0.0	51.8
74	≥ 7	66.7	77.0	22.1	1.3	23.4
26	≥ 8	25.0	92.0	7.7	3.0	10.7
5	≥ 9	16.7	99.0	1.0	3.3	4.3
1	≥10	8.3	100.0	0.0	3.7	3.7
0	≥ 11	–	–	–	–	–
0	≥ 12	–	–	–	–	–
0	13	–	–	–	–	–

[a] Diversity scores are from a single (R1) observation day. MPA is calculated based on both observation days.

Table N20f. Sensitivity/Specificity Analysis of the Relationship between Food Group Diversity (FGI-13R) and MPA, by Diversity Cutoffs, NPNL Women [a]

n	Cutoff	Sensitivity	Specificity	Proportion of false positives	Proportion of false negatives	Total proportion misclassified
				MPA > 50%		
299	≥ 1	100.0	0.0	80.3	0.0	80.3
295	≥ 2	100.0	1.7	78.9	0.0	78.9
250	≥ 3	98.3	20.0	64.2	0.3	64.5
165	≥ 4	84.7	52.1	38.5	3.0	41.5
83	≥ 5	61.0	80.4	15.7	7.7	23.4
23	≥ 6	13.6	93.8	5.0	17.1	22.1
9	≥ 7	3.4	97.1	2.3	19.1	21.4
1	≥ 8	0.0	99.6	0.3	19.7	20.1
0	≥ 9	–	–	–	–	–
0	≥10	–	–	–	–	–
0	≥ 11	–	–	–	–	–
0	≥ 12	–	–	–	–	–
0	13	–	–	–	–	–
				MPA > 60%		
299	≥ 1	100.0	0.0	93.0	0.0	93.0
295	≥ 2	100.0	1.4	91.6	0.0	91.6
250	≥ 3	100.0	17.6	76.6	0.0	76.6
165	≥ 4	95.2	47.8	48.5	0.3	48.8
83	≥ 5	90.5	77.0	21.4	0.7	22.1
23	≥ 6	19.0	93.2	6.4	5.7	12.0
9	≥ 7	4.8	97.1	2.7	6.7	9.4
1	≥ 8	0.0	99.6	0.3	7.0	7.4
0	≥ 9	–	–	–	–	–
0	≥10	–	–	–	–	–
0	≥ 11	–	–	–	–	–
0	≥ 12	–	–	–	–	–
0	13	–	–	–	–	–
				MPA > 70%		
299	≥ 1	100.0	0.0	96.0	0.0	96.0
295	≥ 2	100.0	1.4	94.6	0.0	94.6
250	≥ 3	100.0	17.1	79.6	0.0	79.6
165	≥ 4	91.7	46.3	51.5	0.3	51.8
83	≥ 5	91.7	74.9	24.1	0.3	24.4
23	≥ 6	25.0	93.0	6.7	3.0	9.7
9	≥ 7	8.3	97.2	2.7	3.7	6.4
1	≥ 8	0.0	99.7	0.3	4.0	4.3
0	≥ 9	–	–	–	–	–
0	≥10	–	–	–	–	–
0	≥ 11	–	–	–	–	–
0	≥ 12	–	–	–	–	–
0	13	–	–	–	–	–

[a] Diversity scores are from a single (R1) observation day. MPA is calculated based on both observation days.

Table N20g. Sensitivity/Specificity Analysis of the Relationship between Food Group Diversity (FGI-21) and MPA, by Diversity Cutoffs, NPNL Women [a]

n	Cutoff	Sensitivity	Specificity	Proportion of false positives	Proportion of false negatives	Total proportion misclassified
			MPA > 50%			
299	≥ 1	100.0	0.0	80.3	0.0	80.3
299	≥ 2	100.0	0.0	80.3	0.0	80.3
298	≥ 3	100.0	0.4	79.9	0.0	79.9
288	≥ 4	100.0	4.6	76.6	0.0	76.6
271	≥ 5	98.3	11.3	71.2	0.3	71.6
226	≥ 6	91.5	28.3	57.5	1.7	59.2
140	≥ 7	66.1	57.9	33.8	6.7	40.5
78	≥ 8	42.4	77.9	17.7	11.4	29.1
30	≥ 9	22.0	92.9	5.7	15.4	21.1
7	≥ 10	5.1	98.3	1.3	18.7	20.1
1	≥ 11	1.7	100.0	0.0	19.4	19.4
0	≥ 12	–	–	–	–	–
0	≥ 13	–	–	–	–	–
0	≥ 14	–	–	–	–	–
0	≥ 15	–	–	–	–	–
0	≥ 16	–	–	–	–	–
0	≥ 17	–	–	–	–	–
0	≥ 18	–	–	–	–	–
0	≥ 19	–	–	–	–	–
0	≥ 20	–	–	–	–	–
0	21	–	–	–	–	–
			MPA > 60%			
299	≥ 1	100.0	0.0	93.0	0.0	93.0
299	≥ 2	100.0	0.0	93.0	0.0	93.0
298	≥ 3	100.0	0.4	92.6	0.0	92.6
288	≥ 4	100.0	4.0	89.3	0.0	89.3
271	≥ 5	100.0	10.1	83.6	0.0	83.6
226	≥ 6	100.0	26.3	68.6	0.0	68.6
140	≥ 7	81.0	55.8	41.1	1.3	42.5
78	≥ 8	52.4	75.9	22.4	3.3	25.8
30	≥ 9	23.8	91.0	8.4	5.4	13.7
7	≥ 10	9.5	98.2	1.7	6.4	8.0
1	≥ 11	4.8	100.0	0.0	6.7	6.7
0	≥ 12	–	–	–	–	–
0	≥ 13	–	–	–	–	–
0	≥ 14	–	–	–	–	–
0	≥ 15	–	–	–	–	–
0	≥ 16	–	–	–	–	–
0	≥ 17	–	–	–	–	–
0	≥ 18	–	–	–	–	–
0	≥ 19	–	–	–	–	–
0	≥ 20	–	–	–	–	–
0	21	–	–	–	–	–

(continued)

Table N20g. (continued) Sensitivity/Specificity Analysis of the Relationship between Food Group Diversity (FGI-21) and MPA, by Diversity Cutoffs, NPNL Women [a]

n	Cutoff	Sensitivity	Specificity	Proportion of false positives	Proportion of false negatives	Total proportion misclassified
				MPA > 70%		
299	≥ 1	100.0	0.0	96.0	0.0	96.0
299	≥ 2	100.0	0.0	96.0	0.0	96.0
298	≥ 3	100.0	0.3	95.7	0.0	95.7
288	≥ 4	100.0	3.8	92.3	0.0	92.3
271	≥ 5	100.0	9.8	86.6	0.0	86.6
226	≥ 6	100.0	25.4	71.6	0.0	71.6
140	≥ 7	91.7	55.1	43.1	0.3	43.5
78	≥ 8	66.7	75.6	23.4	1.3	24.7
30	≥ 9	41.7	91.3	8.4	2.3	10.7
7	≥ 10	16.7	98.3	1.7	3.3	5.0
1	≥ 11	8.3	100.0	0.0	3.7	3.7
0	≥ 12	–	–	–	–	–
0	≥ 13	–	–	–	–	–
0	≥ 14	–	–	–	–	–
0	≥ 15	–	–	–	–	–
0	≥ 16	–	–	–	–	–
0	≥ 17	–	–	–	–	–
0	≥ 18	–	–	–	–	–
0	≥ 19	–	–	–	–	–
0	≥ 20	–	–	–	–	–
0	21	–	–	–	–	–

[a] Diversity scores are from a single (R1) observation day. MPA is calculated based on both observation days.

Table N20h. Sensitivity/Specificity Analysis of the Relationship between Food Group Diversity (FGI-21R) and MPA, by Diversity Cutoffs, NPNL Women [a]

n	Cutoff	Sensitivity	Specificity	Proportion of false positives	Proportion of false negatives	Total proportion misclassified
				MPA > 50%		
299	≥ 1	100.0	0.0	80.3	0.0	80.3
297	≥ 2	100.0	0.8	79.6	0.0	79.6
271	≥ 3	98.3	11.3	71.2	0.3	71.6
211	≥ 4	88.1	33.8	53.2	2.3	55.5
132	≥ 5	74.6	63.3	29.4	5.0	34.4
67	≥ 6	45.8	83.3	13.4	10.7	24.1
25	≥ 7	18.6	94.2	4.7	16.1	20.7
7	≥ 8	5.1	98.3	1.3	18.7	20.1
2	≥ 9	0.0	99.2	0.7	19.7	20.4
0	≥ 10	–	–	–	–	–
0	≥ 11	–	–	–	–	–
0	≥ 12	–	–	–	–	–
0	≥ 13	–	–	–	–	–
0	≥ 14	–	–	–	–	–
0	≥ 15	–	–	–	–	–
0	≥ 16	–	–	–	–	–
0	≥ 17	–	–	–	–	–
0	≥ 18	–	–	–	–	–
0	≥ 19	–	–	–	–	–
0	≥ 20	–	–	–	–	–
0	21	–	–	–	–	–

(continued)

Table N20h. (continued) Sensitivity/Specificity Analysis of the Relationship between Food Group Diversity (FGI-21R) and MPA, by Diversity Cutoffs, NPNL Women [a]

n	Cutoff	Sensitivity	Specificity	Proportion of false positives	Proportion of false negatives	Total proportion misclassified
			MPA > 60%			
299	≥ 1	100.0	0.0	93.0	0.0	93.0
297	≥ 2	100.0	0.7	92.3	0.0	92.3
271	≥ 3	100.0	10.1	83.6	0.0	83.6
211	≥ 4	95.2	31.3	63.9	0.3	64.2
132	≥ 5	95.2	59.7	37.5	0.3	37.8
67	≥ 6	61.9	80.6	18.1	2.7	20.7
25	≥ 7	23.8	92.8	6.7	5.4	12.0
7	≥ 8	0.0	97.5	2.3	7.0	9.4
2	≥ 9	0.0	99.3	0.7	7.0	7.7
0	≥ 10	–	–	–	–	–
0	≥ 11	–	–	–	–	–
0	≥ 12	–	–	–	–	–
0	≥ 13	–	–	–	–	–
0	≥ 14	–	–	–	–	–
0	≥ 15	–	–	–	–	–
0	≥ 16	–	–	–	–	–
0	≥ 17	–	–	–	–	–
0	≥ 18	–	–	–	–	–
0	≥ 19	–	–	–	–	–
0	≥ 20	–	–	–	–	–
0	21	–	–	–	–	–
			MPA > 70%			
299	≥ 1	100.0	0.0	96.0	0.0	96.0
297	≥ 2	100.0	0.7	95.3	0.0	95.3
271	≥ 3	100.0	9.8	86.6	0.0	86.6
211	≥ 4	91.7	30.3	66.9	0.3	67.2
132	≥ 5	91.7	57.8	40.5	0.3	40.8
67	≥ 6	75.0	79.8	19.4	1.0	20.4
25	≥ 7	33.3	92.7	7.0	2.7	9.7
7	≥ 8	0.0	97.6	2.3	4.0	6.4
2	≥ 9	0.0	99.3	0.7	4.0	4.7
0	≥ 10	–	–	–	–	–
0	≥ 11	–	–	–	–	–
0	≥ 12	–	–	–	–	–
0	≥ 13	–	–	–	–	–
0	≥ 14	–	–	–	–	–
0	≥ 15	–	–	–	–	–
0	≥ 16	–	–	–	–	–
0	≥ 17	–	–	–	–	–
0	≥ 18	–	–	–	–	–
0	≥ 19	–	–	–	–	–
0	≥ 20	–	–	–	–	–
0	21	–	–	–	–	–

[a] Diversity scores are from a single (R1) observation day. MPA is calculated based on both observation days.

FIGURES

Histograms of intakes for 11 micronutrients (R1 data): Figures N1-N11

Histograms for intra-individual SDs of intake, based on data from two rounds: Figures N12-N22

Histograms for FGIs (R1 data): Figures N23-N30

Histograms of PA for 11 micronutrients, based on data from two rounds: Figures N31-N41

Histogram of MPA, based on data from two rounds: Figure N42

Figure N1. Distribution of Thiamin Intakes, NPNL Women

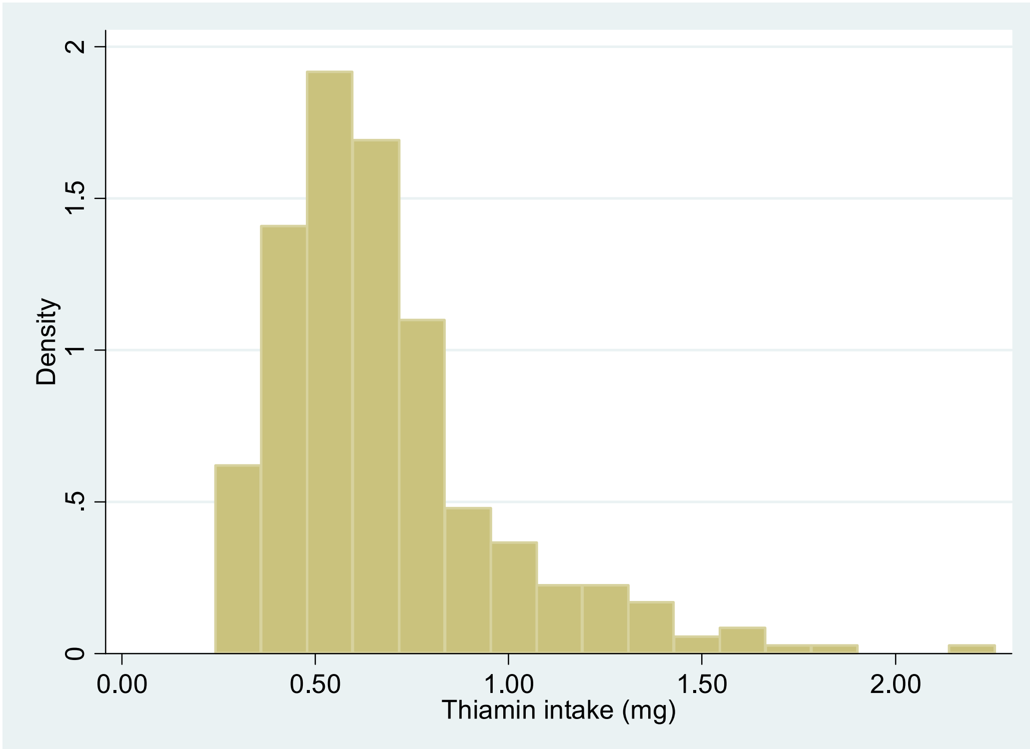


Figure N2. Distribution of Riboflavin Intakes, NPNL Women

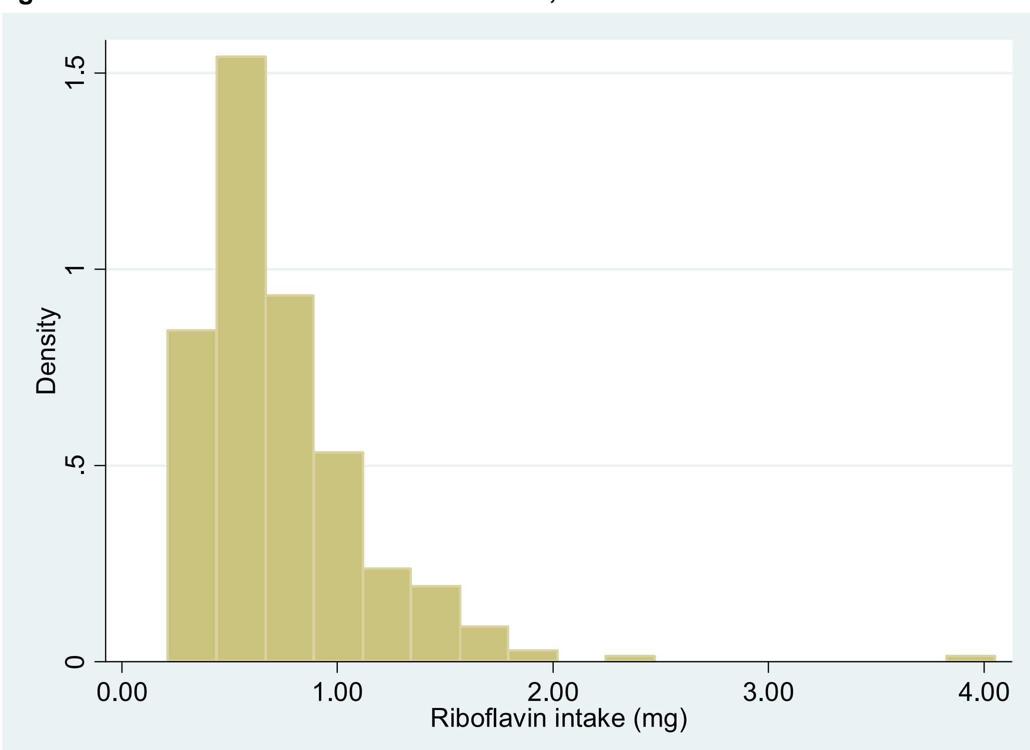


Figure N3. Distribution of Niacin Intakes, NPNL Women

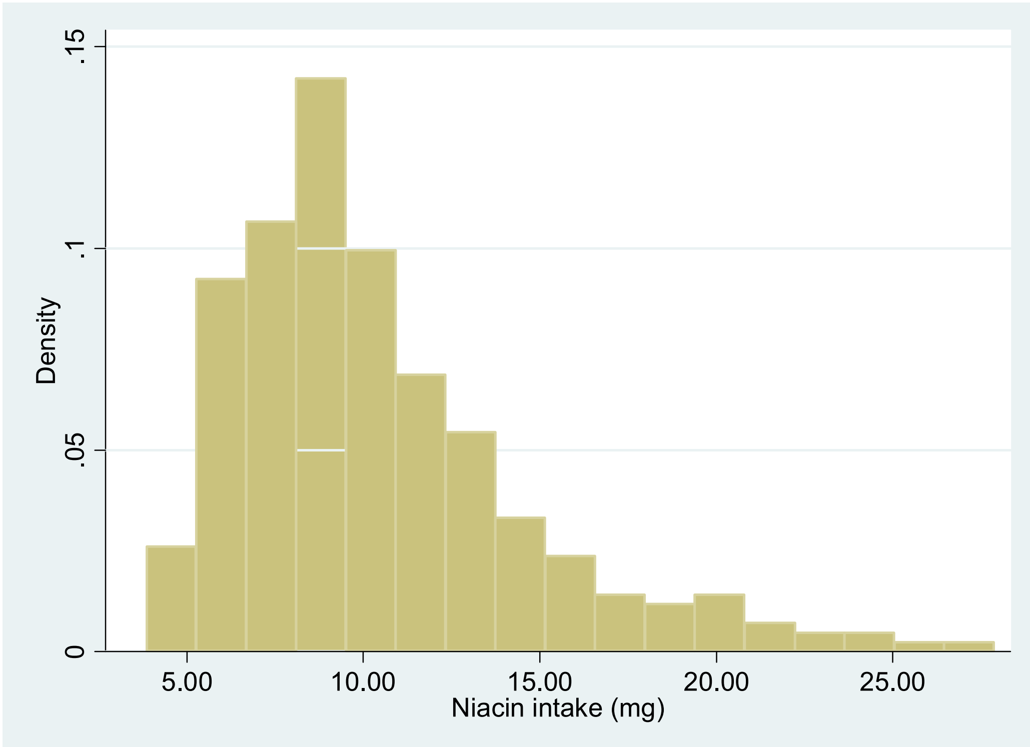


Figure N4. Distribution of Vitamin B6 Intakes, NPNL Women

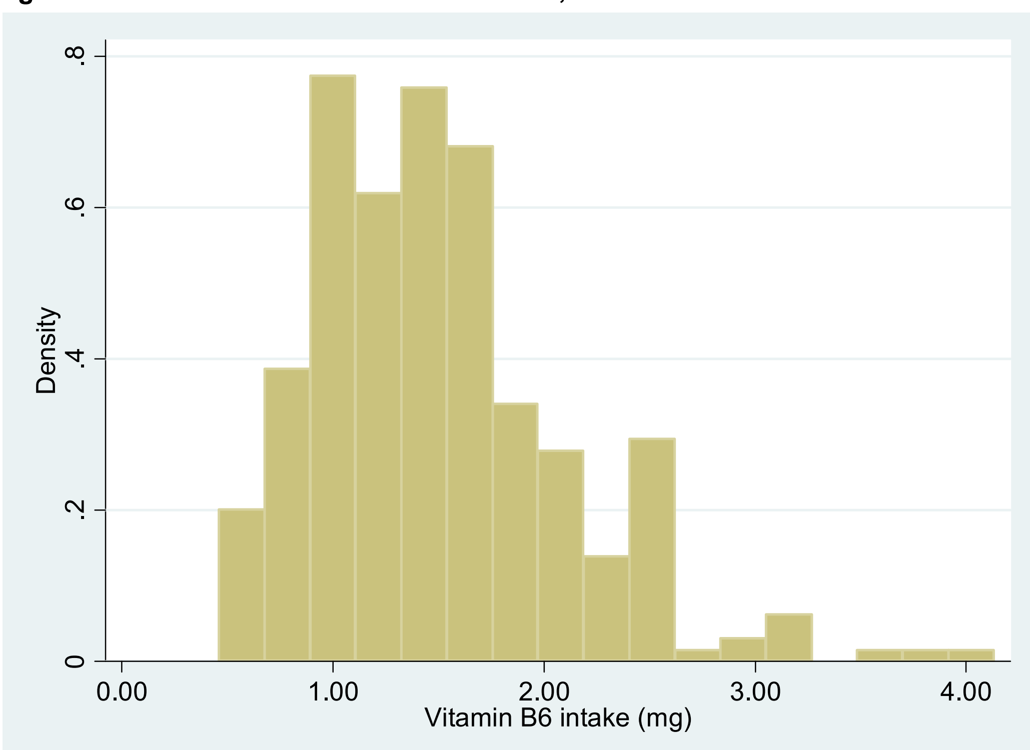


Figure N5. Distribution of Folate Intakes, NPNL Women

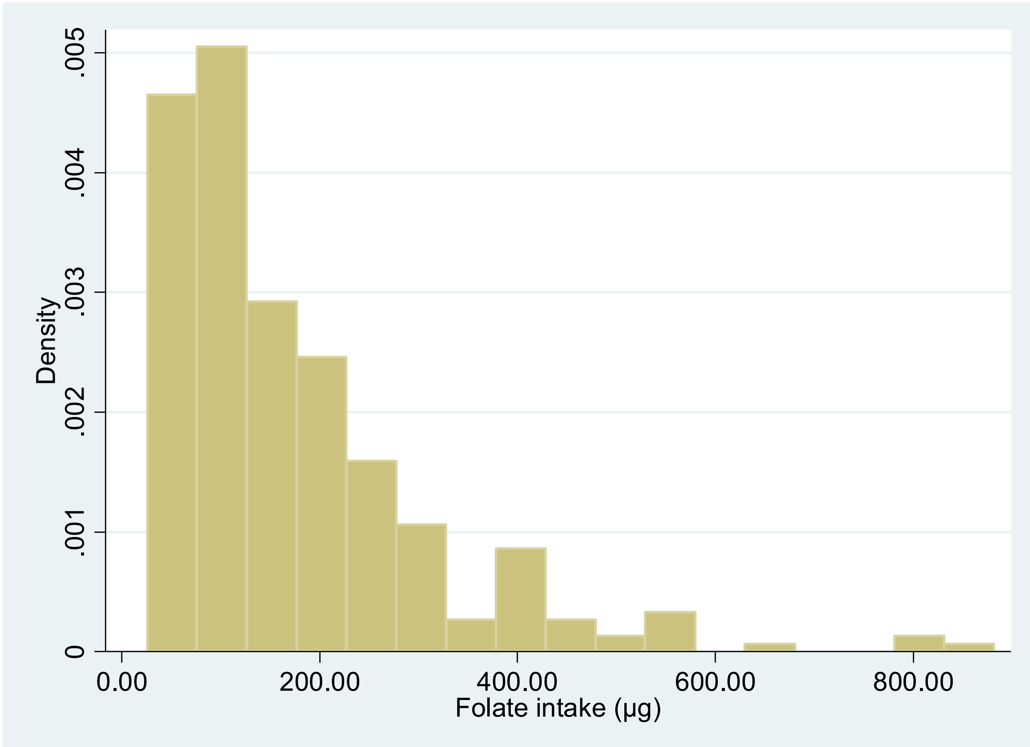


Figure N6. Distribution of Vitamin B12 Intakes, NPNL Women

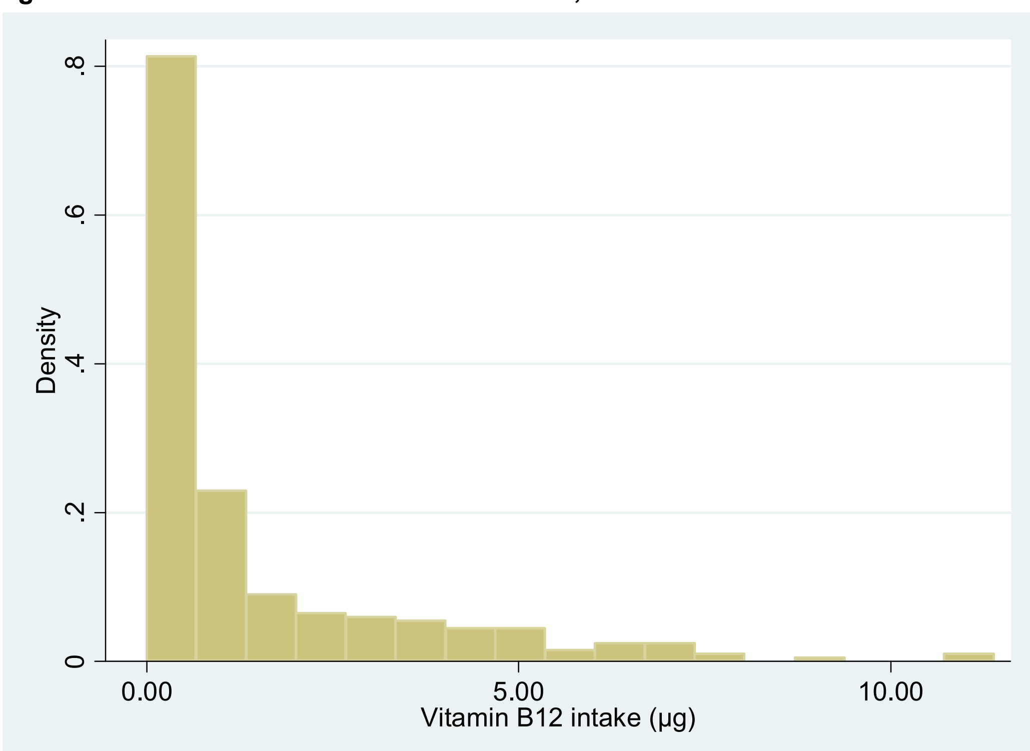


Figure N7. Distribution of Vitamin C Intakes, NPNL Women

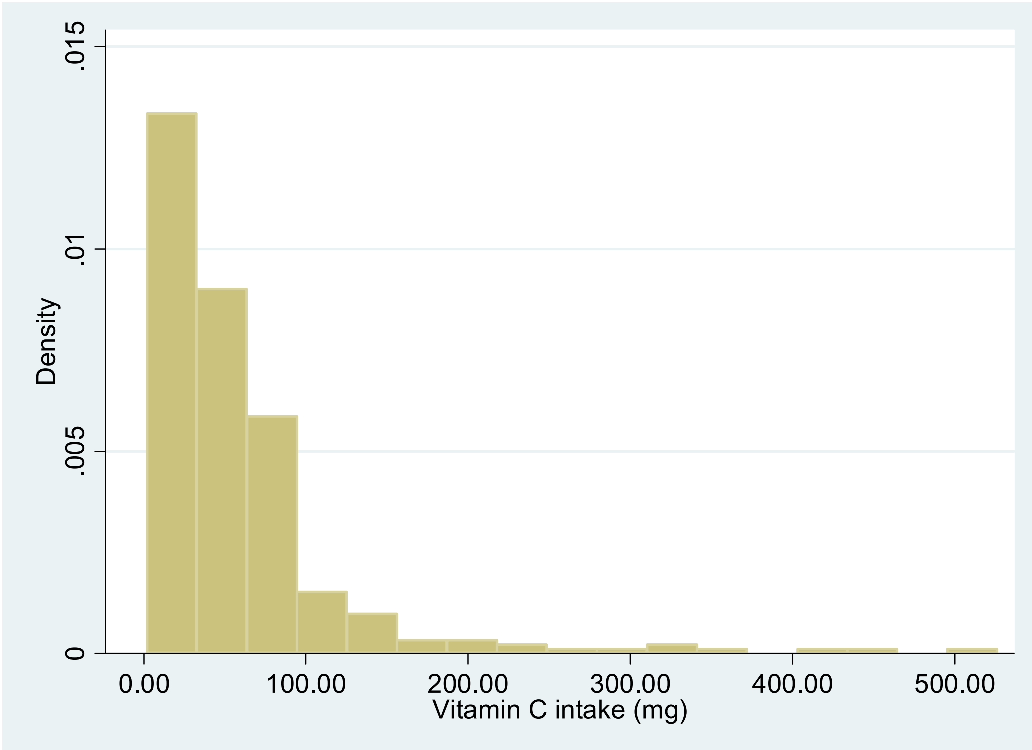


Figure N8. Distribution of Vitamin A Intakes, NPNL Women

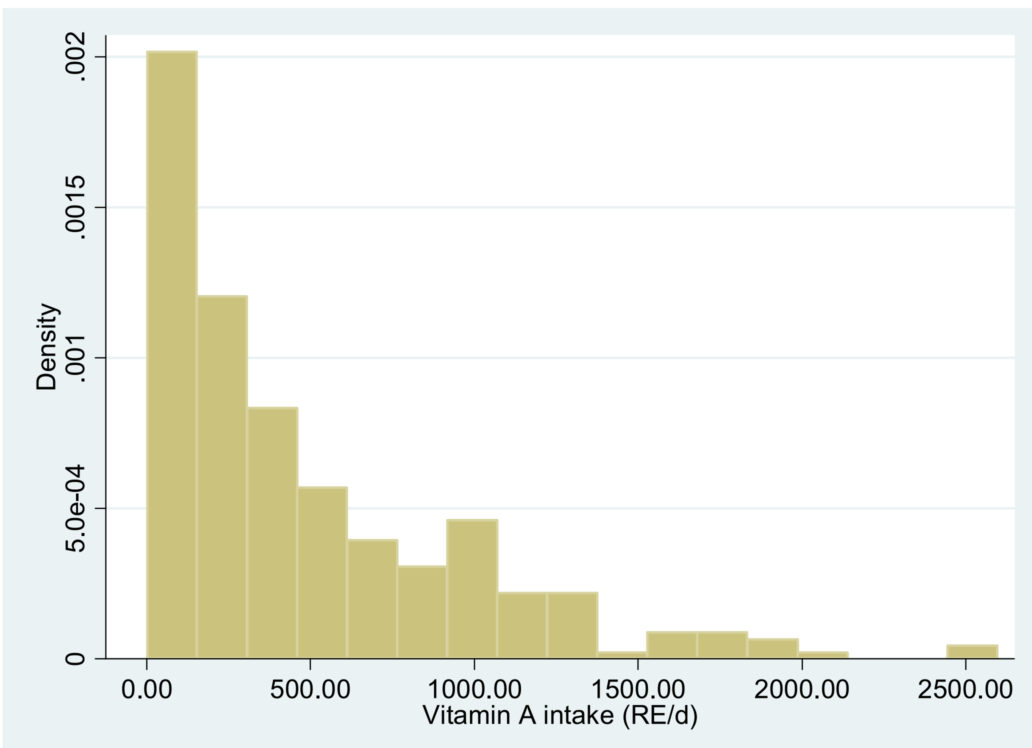


Figure N9. Distribution of Calcium Intakes, NPNL Women

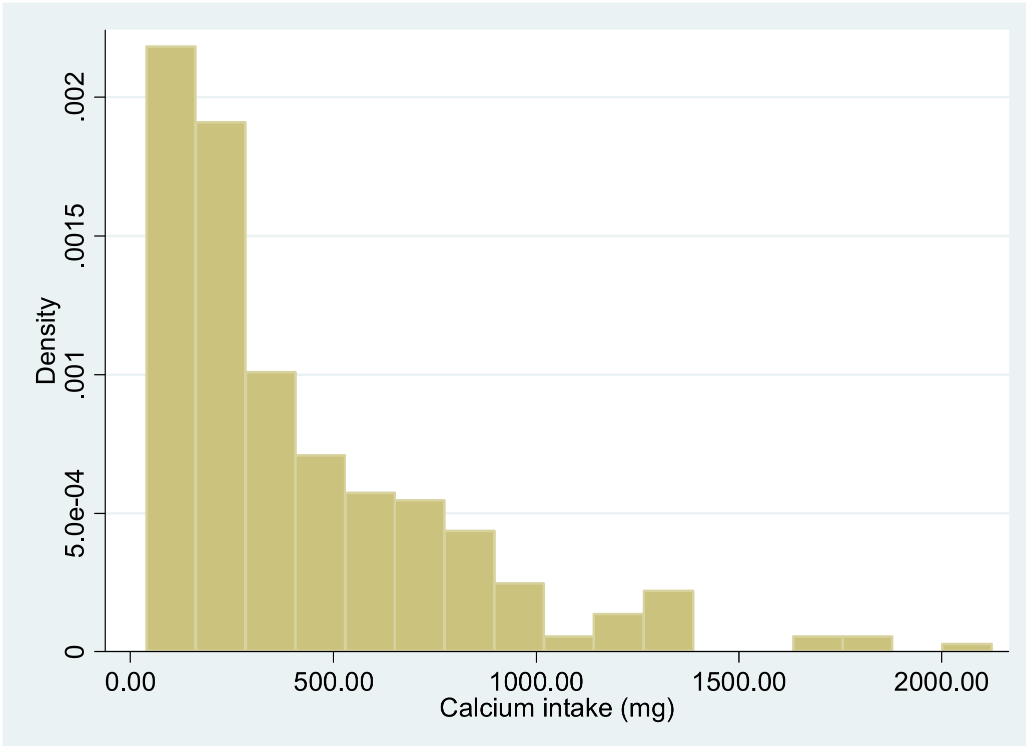


Figure N10. Distribution of Iron Intakes, NPNL Women

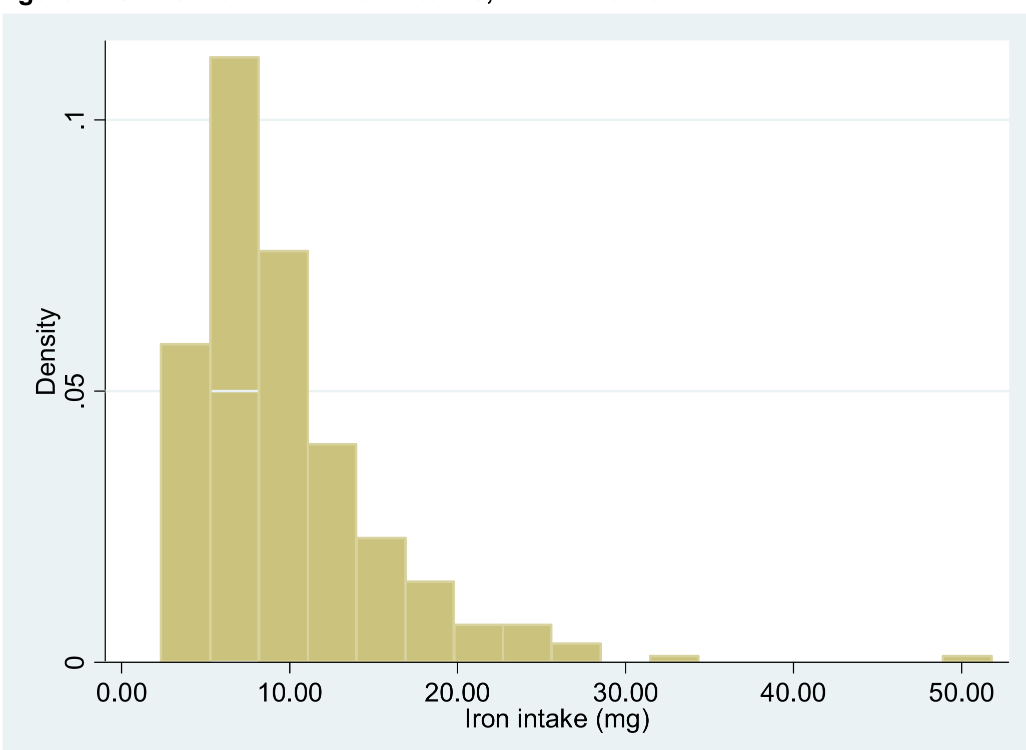


Figure N11. Distribution of Zinc Intakes, NPNL Women

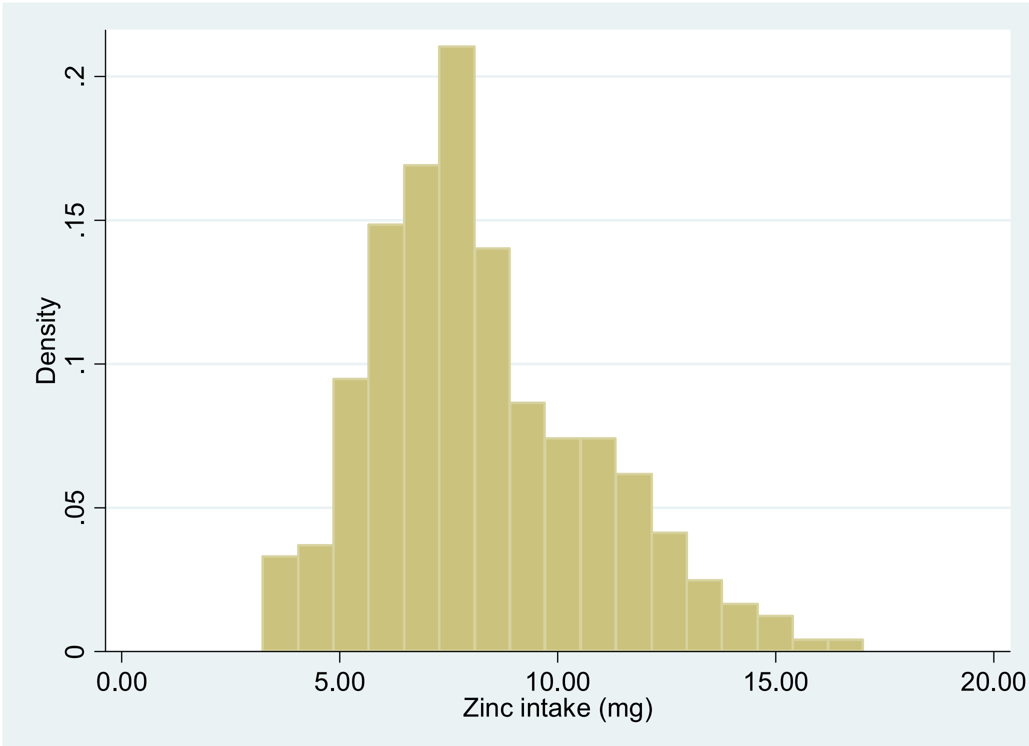


Figure N12. Intra-Individual SD of Thiamin Intakes, NPNL Women

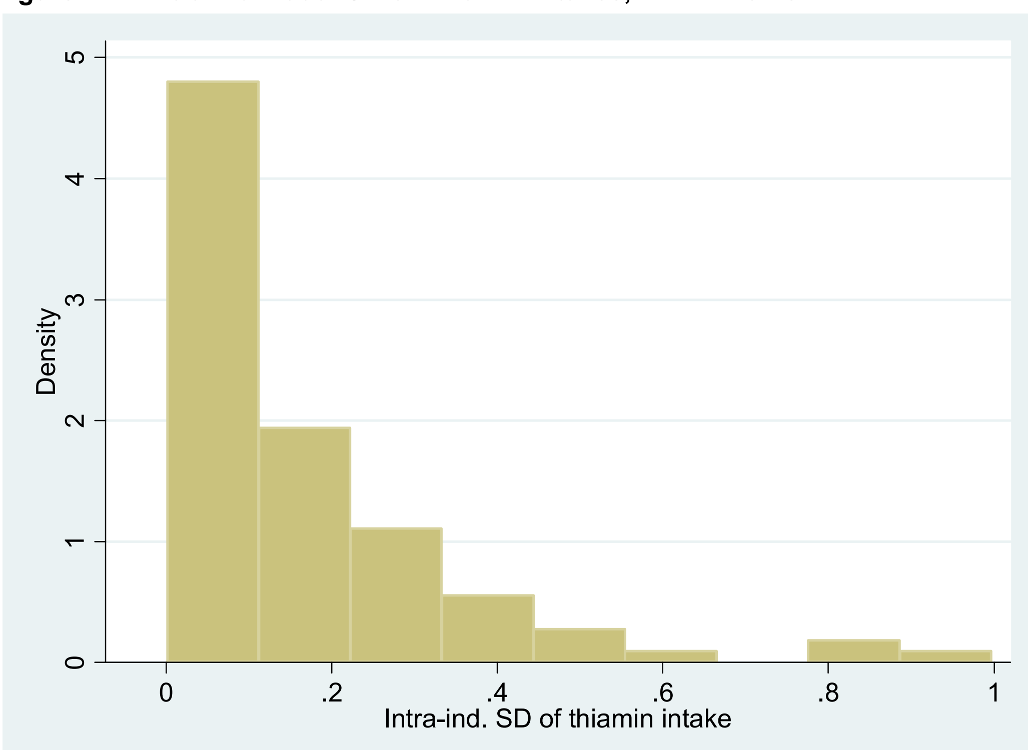


Figure N13. Intra-Individual SD of Riboflavin Intakes, NPNL Women

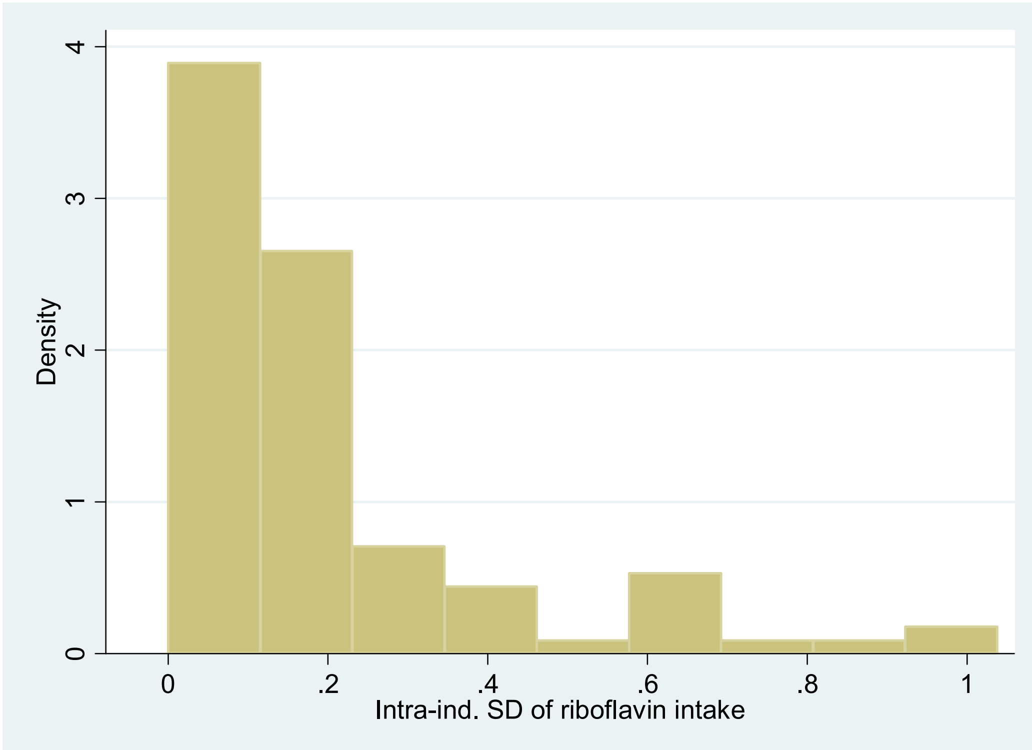


Figure N14. Intra-Individual SD of Niacin Intakes, NPNL Women

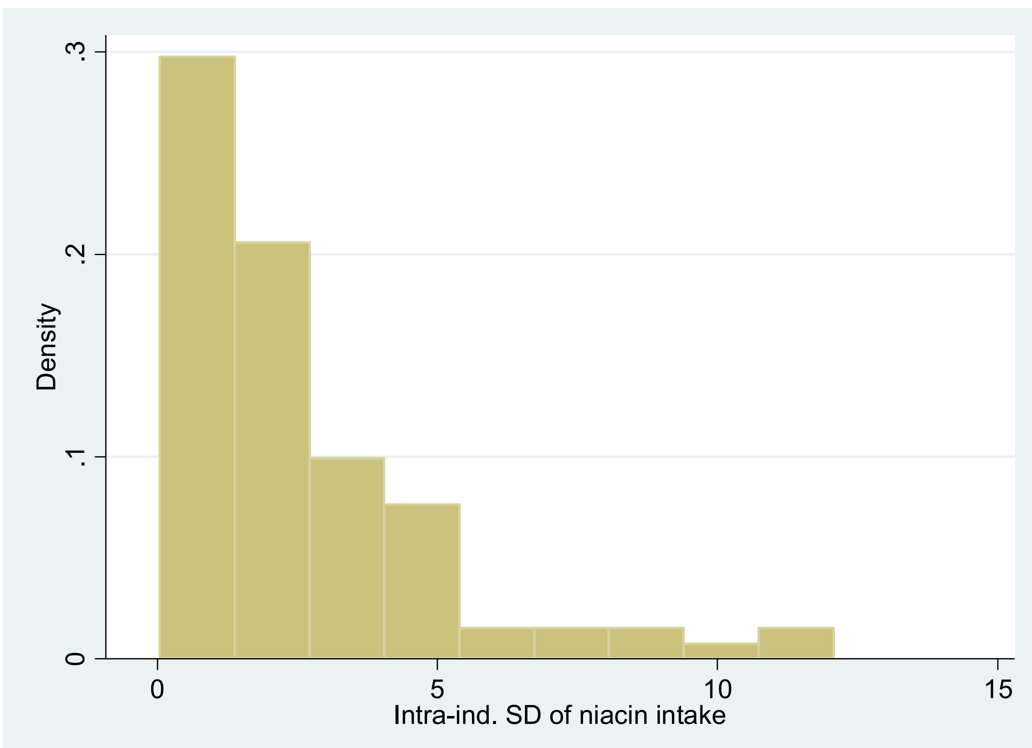


Figure N15. Intra-Individual SD of Vitamin B6 Intakes, NPNL Women

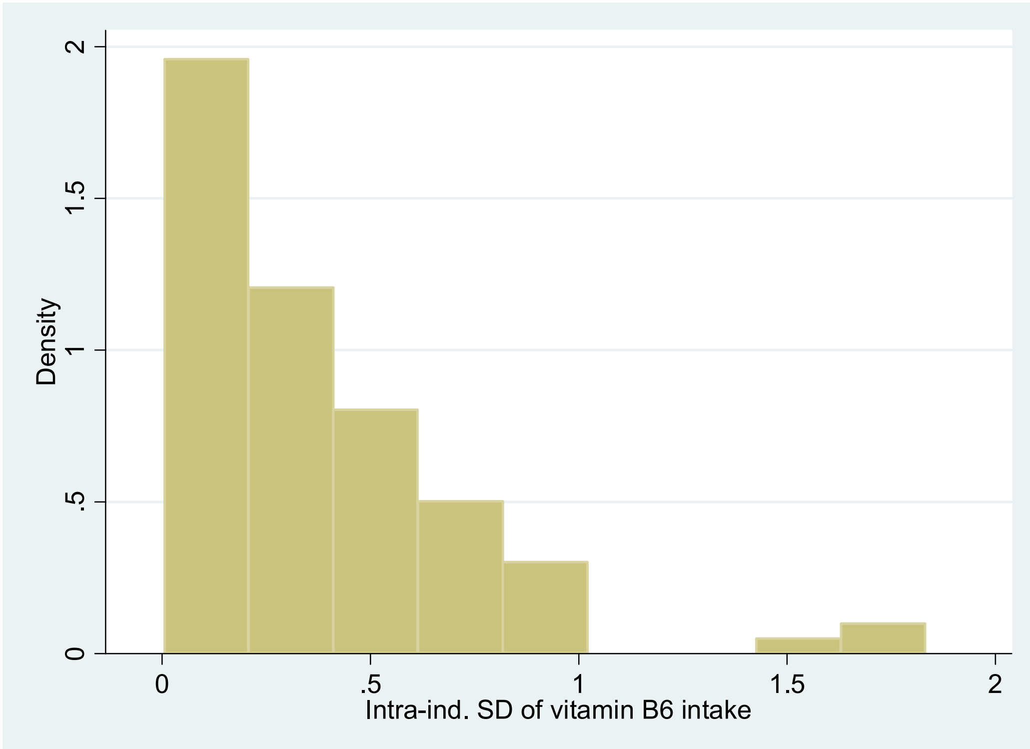


Figure N16. Intra-Individual SD of Folate Intakes, NPNL Women

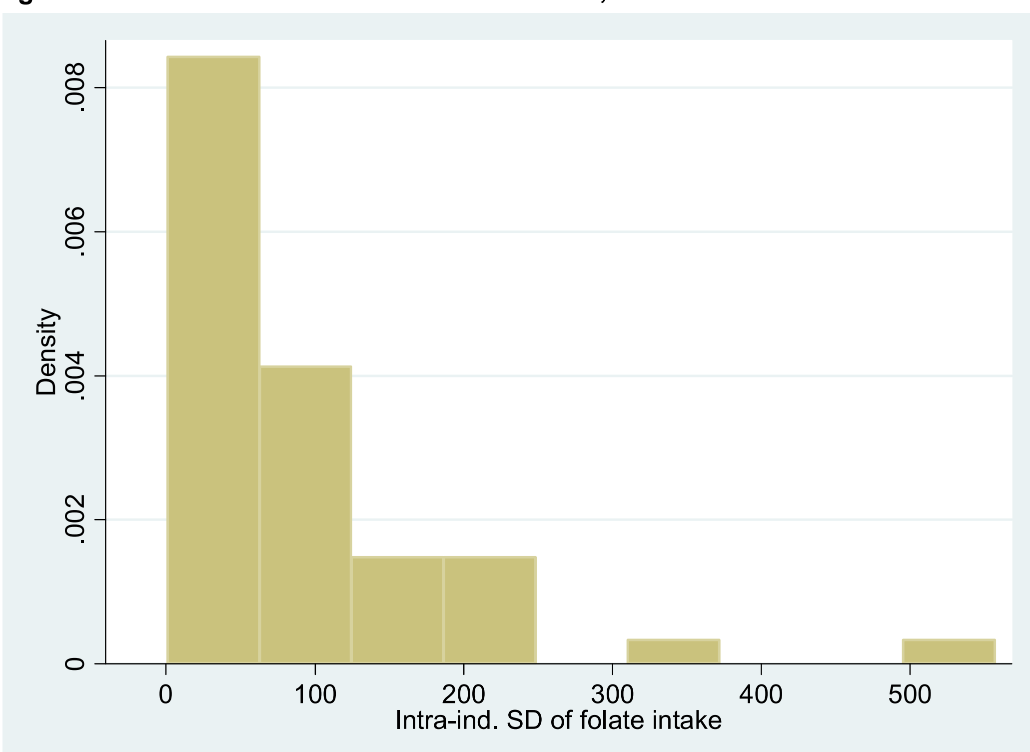


Figure N17. Intra-Individual SD of Vitamin B12 Intakes, NPNL Women

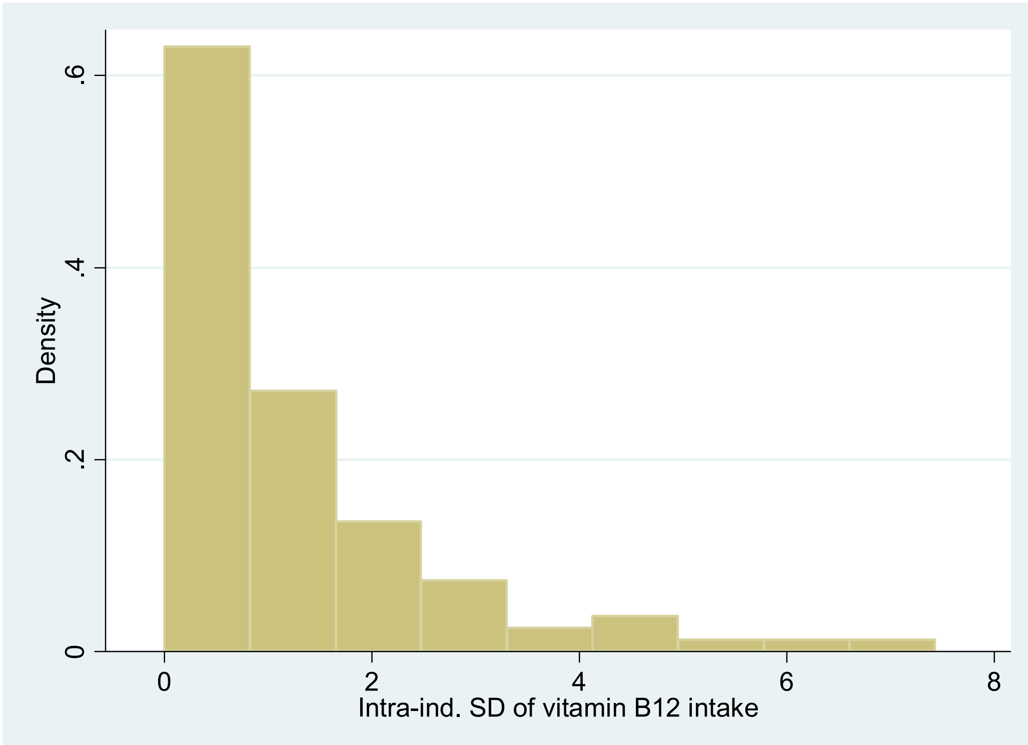


Figure N18. Intra-Individual SD of Vitamin C Intakes, NPNL Women

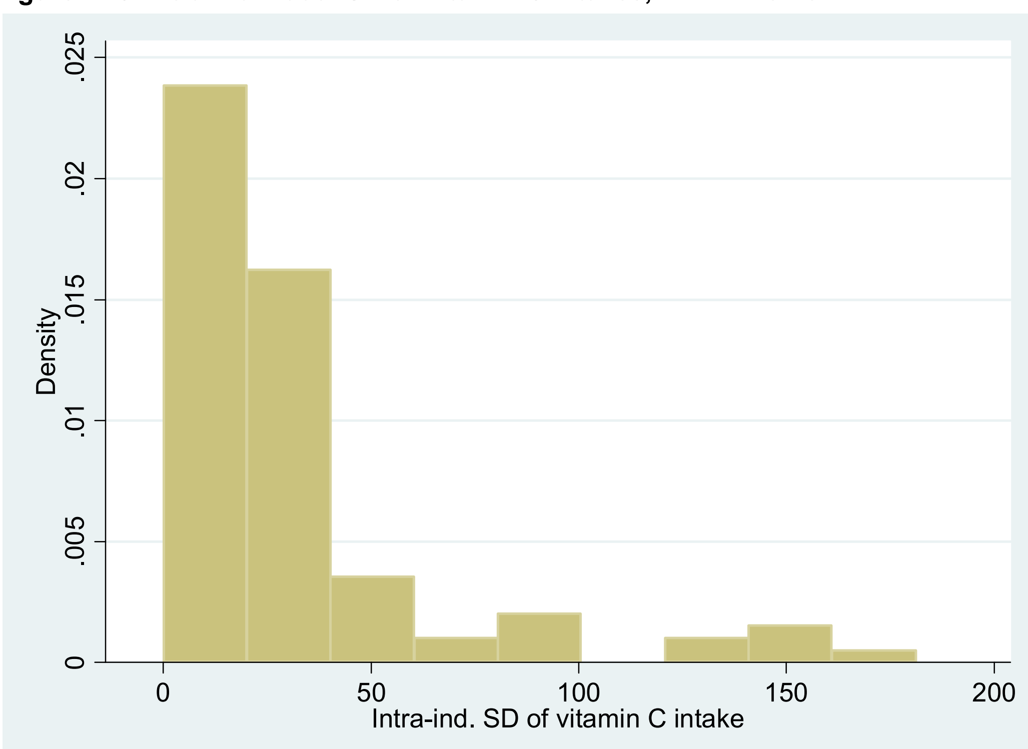


Figure N19. Intra-Individual SD of Vitamin A Intakes, NPNL Women

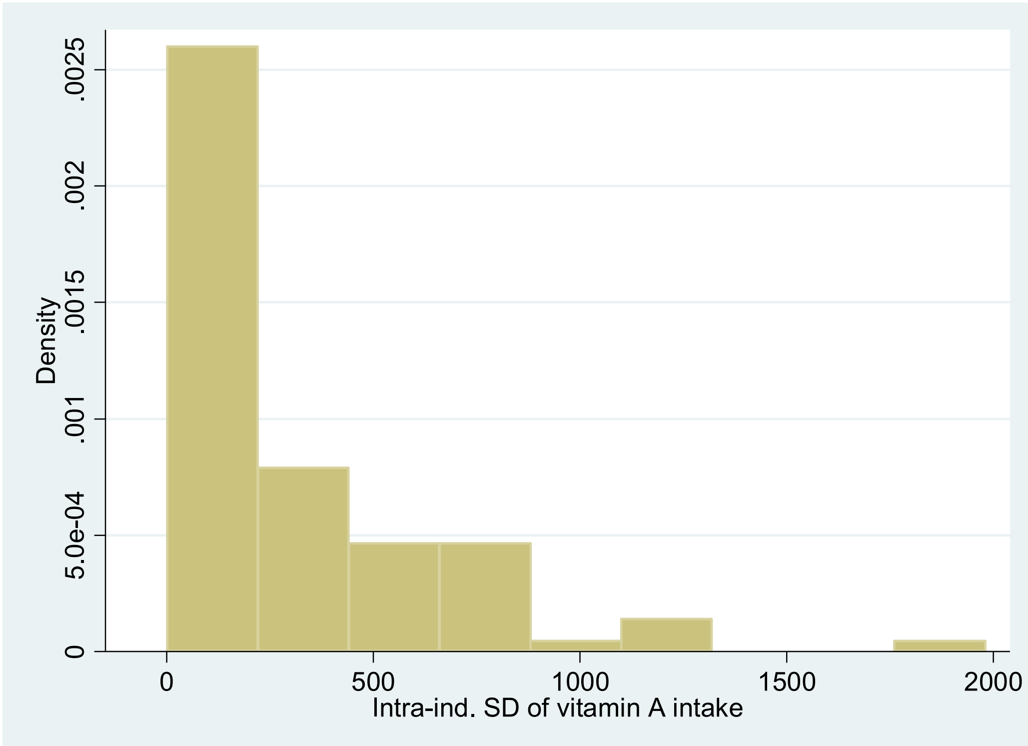


Figure N20. Intra-Individual SD of Calcium Intakes, NPNL Women

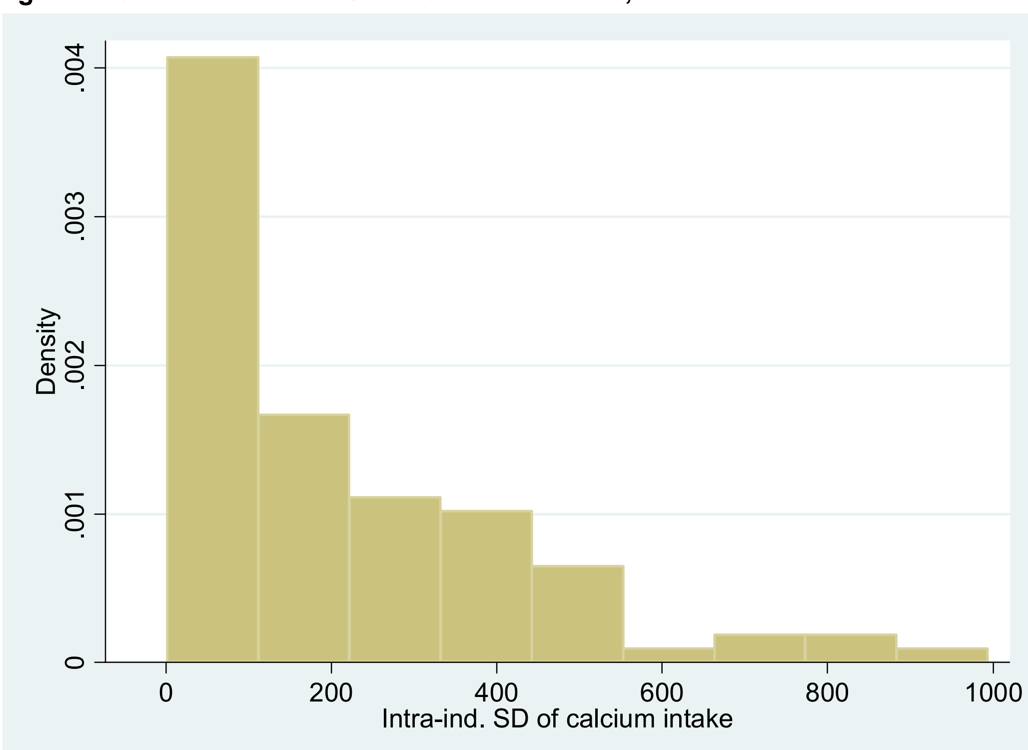


Figure N21. Intra-Individual SD of Iron Intakes, NPNL Women

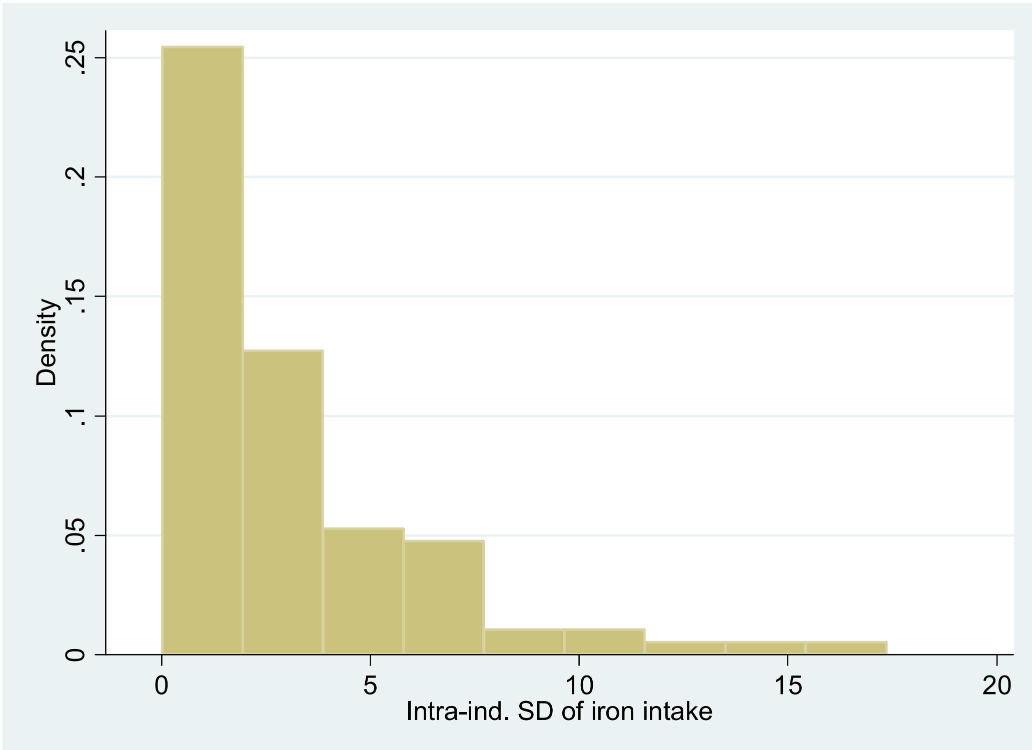


Figure N22. Intra-Individual SD of Zinc Intakes, NPNL Women

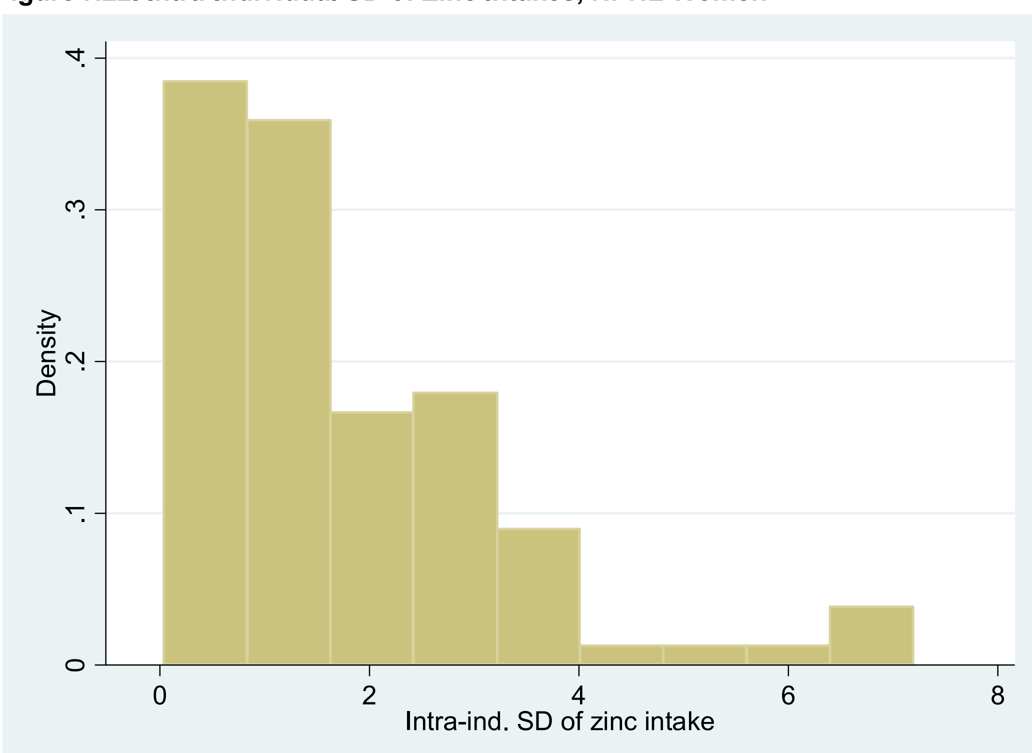


Figure N23. Distribution of Scores for FGI-6, NPNL Women

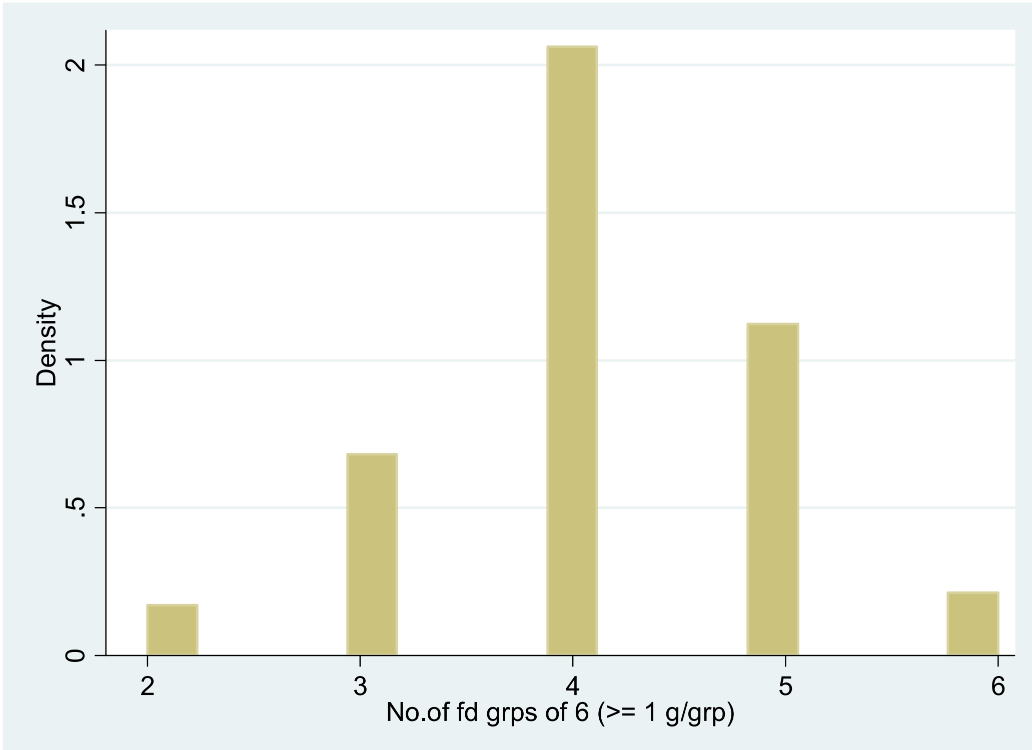


Figure N24. Distribution of Scores for FGI-6R, NPNL Women

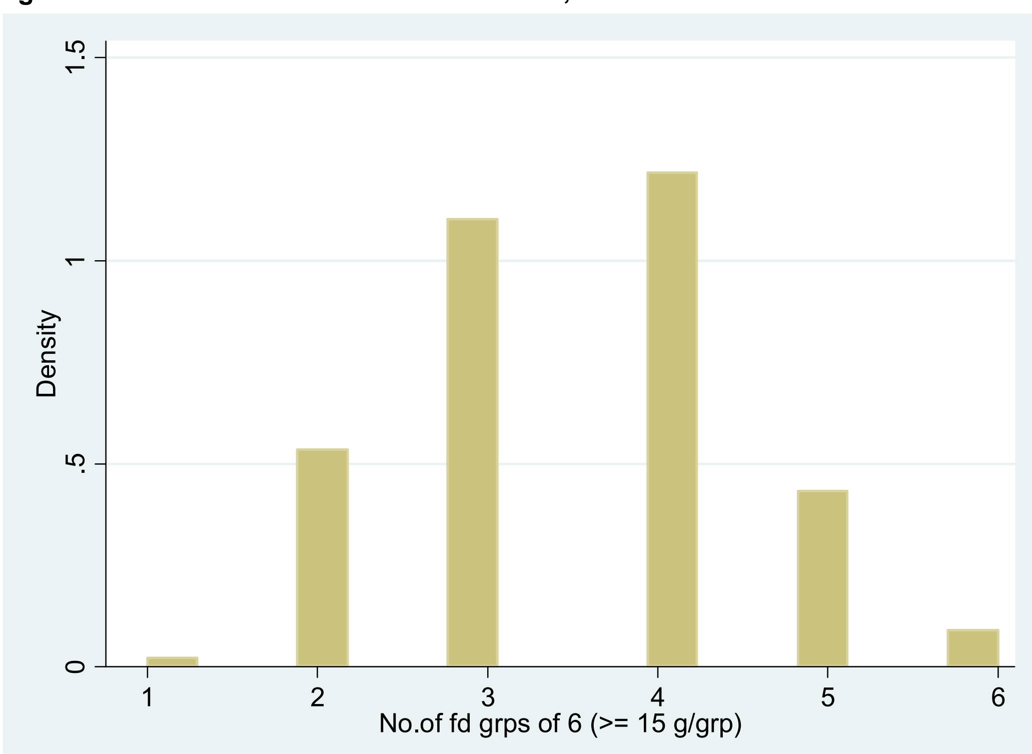


Figure N25. Distribution of Scores for FGI-9, NPNL Women

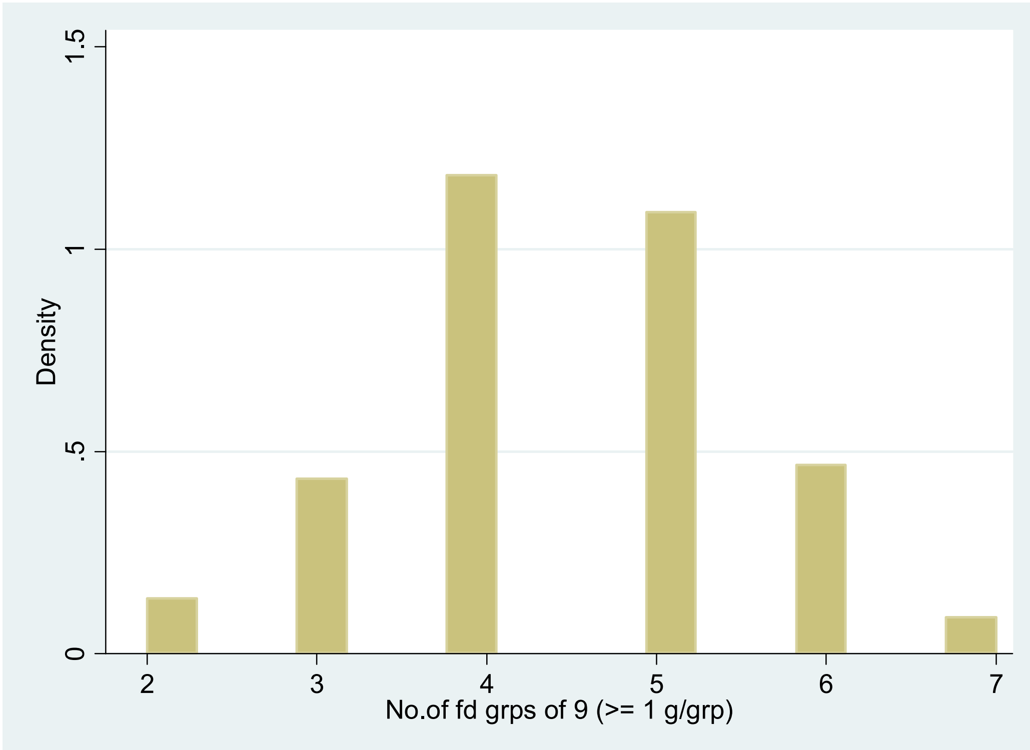


Figure N26. Distribution of Scores for FGI-9R, NPNL Women

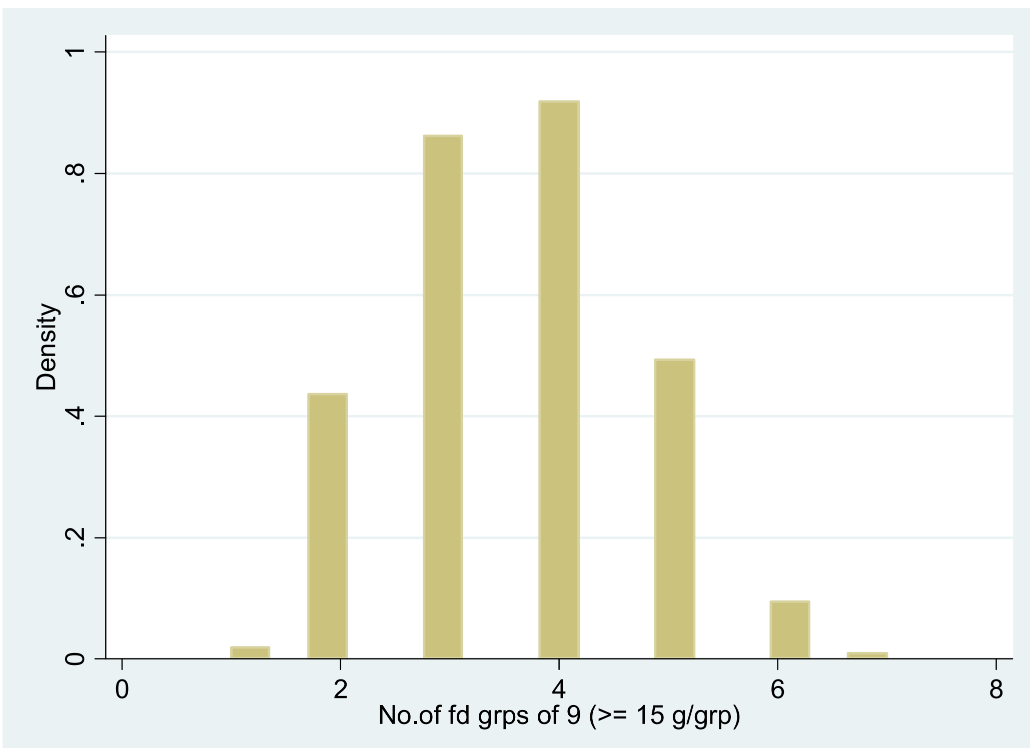


Figure N27. Distribution of Scores for FGI-13, NPNL Women

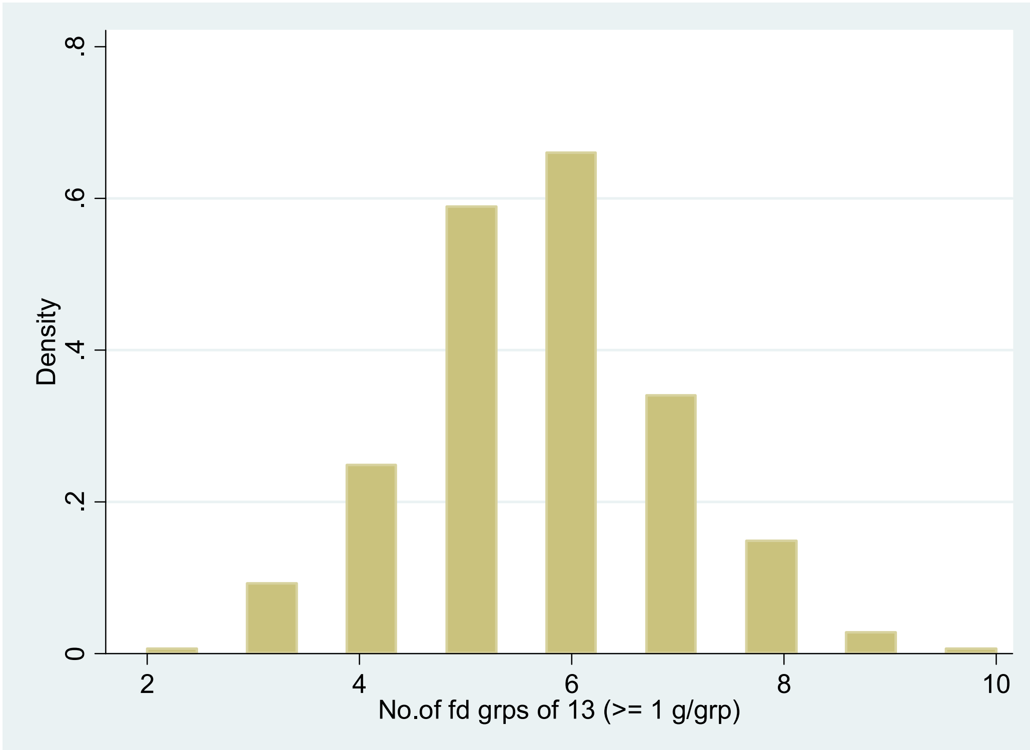


Figure N28. Distribution of Scores for FGI-13R, NPNL Women

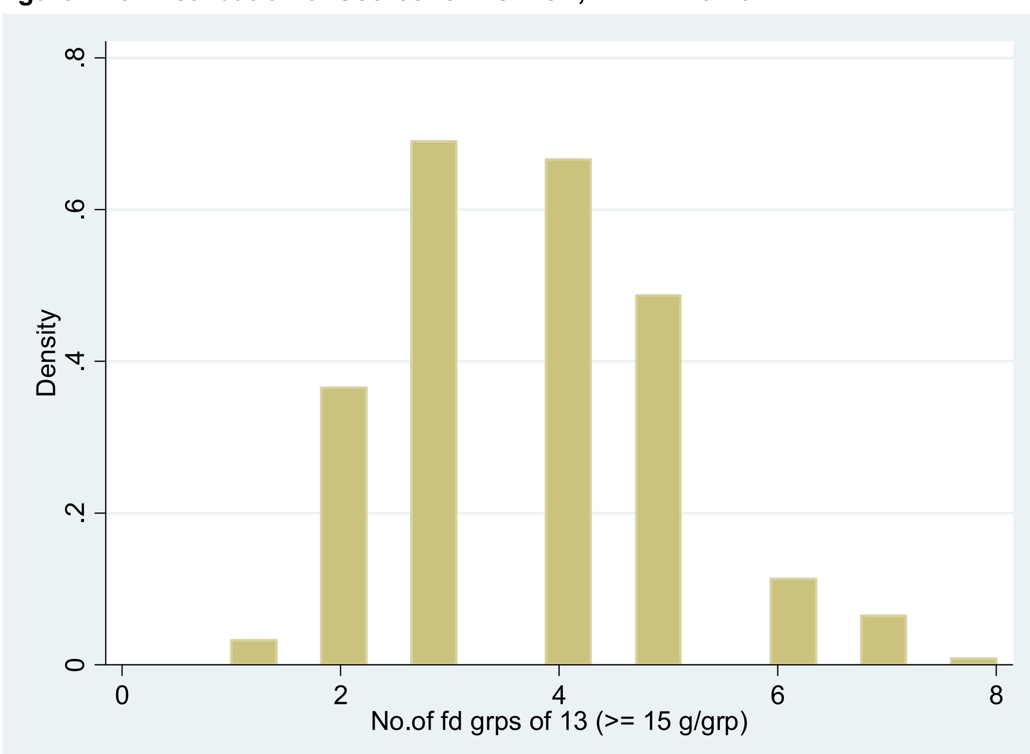


Figure N29. Distribution of Scores for FGI-21, NPNL Women

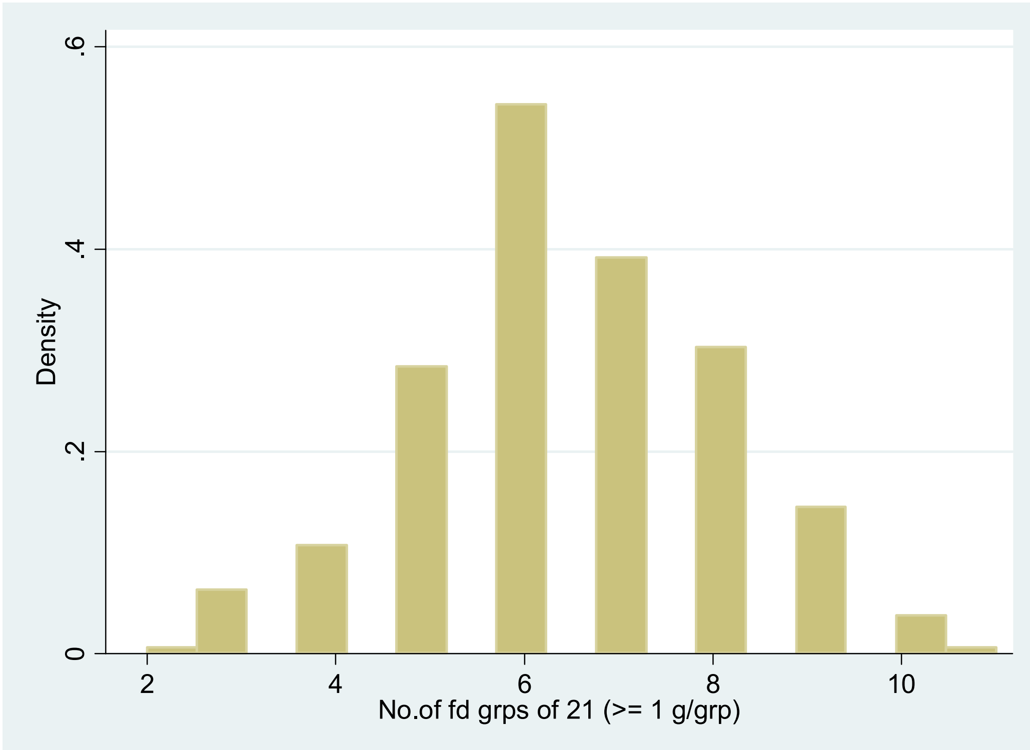


Figure N30. Distribution of Scores for FGI-21R, NPNL Women

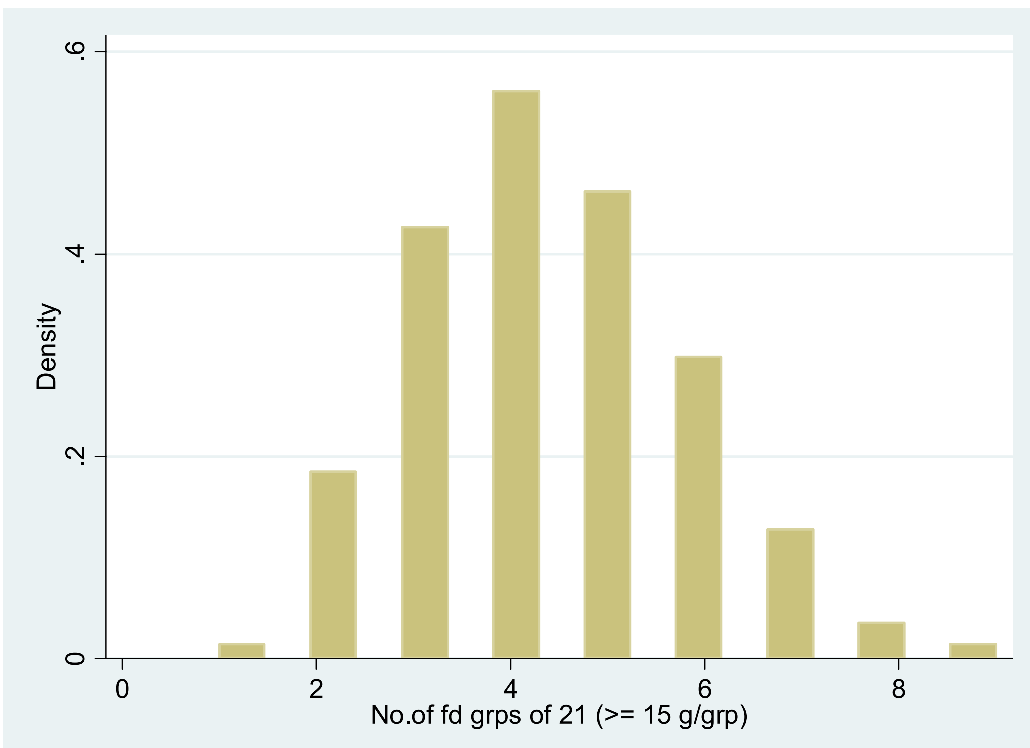


Table N6. Percent of Observation Days at Each Food Group Diversity Score, NPNL Women, R1

Number of food groups eaten	Diversity indicators							
	FGI-6	FGI-6R	FGI-9	FGI-9R	FGI-13	FGI-13R	FGI-21	FGI-21R
1	0	1	0	1	0	1	0	1
2	4	16	4	15	0	15	0	9
3	16	32	13	30	4	28	3	20
4	49	36	35	32	12	27	6	26
5	26	13	32	17	28	20	15	22
6	5	3	14	3	31	5	29	14
7			3	0	16	3	21	6
8			0	0	7	0	16	2
9			0	0	1	0	8	1
10					0	0	2	0
11					0	0	0	0
12					0	0	0	0
13					0	0	0	0
14							0	0
15							0	0
16							0	0
17							0	0
18							0	0
19							0	0
20							0	0
21							0	0

Figure N31. Distribution of PA for Thiamin, NPNL Women

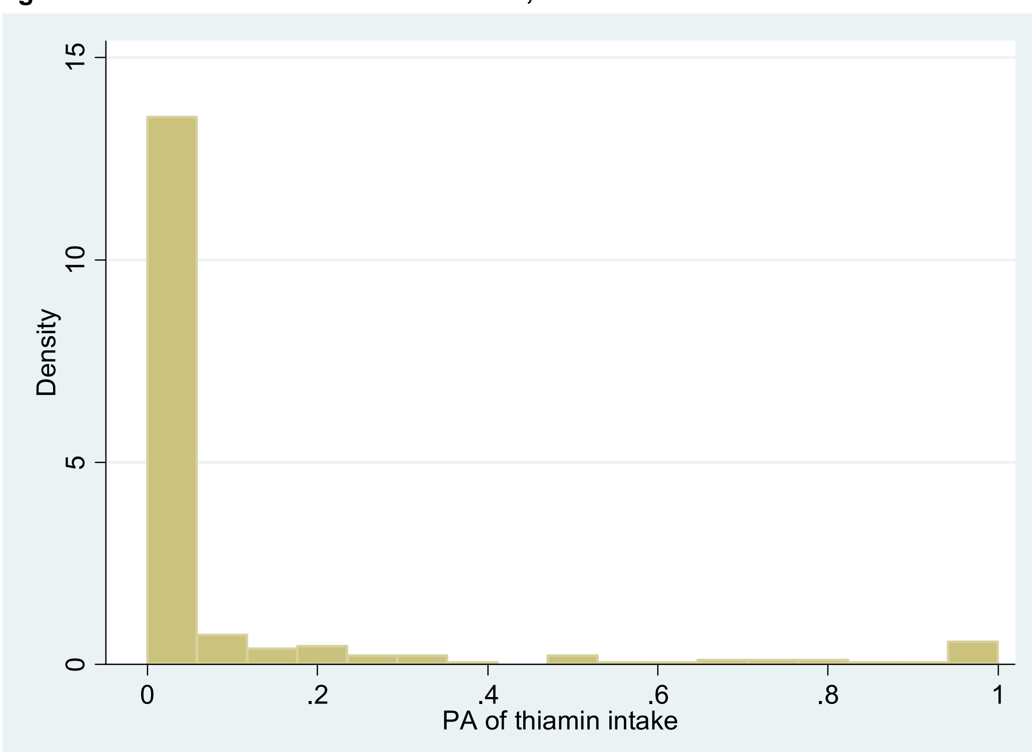


Figure N32. Distribution of PA for Riboflavin, NPNL Women

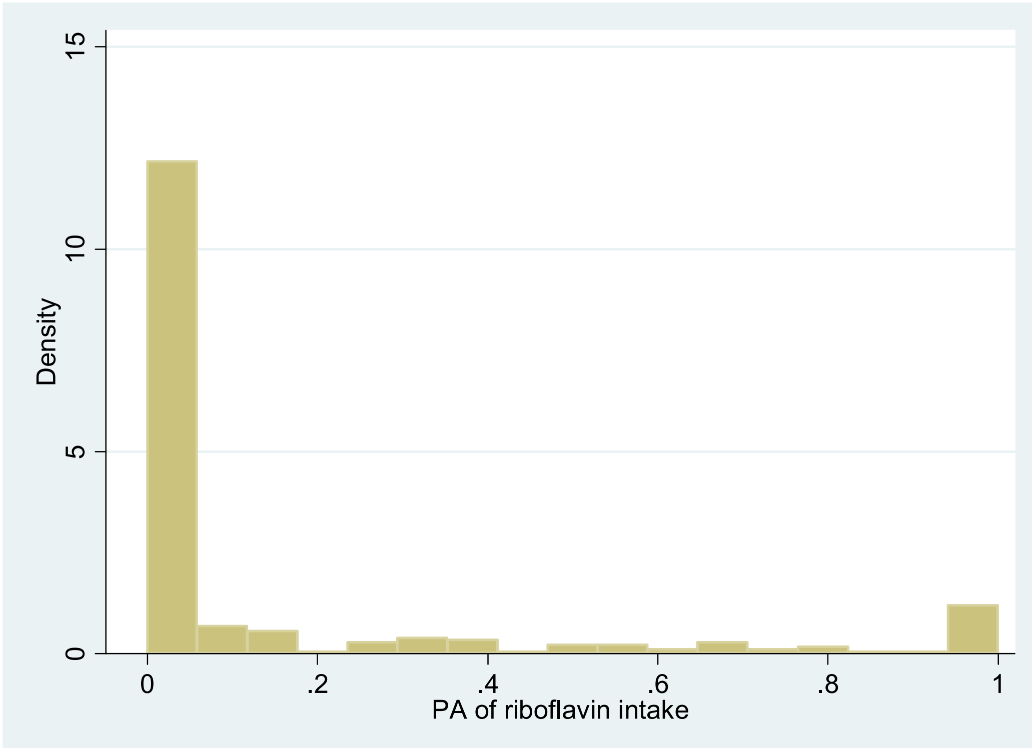


Figure N33. Distribution of PA for Niacin, NPNL Women

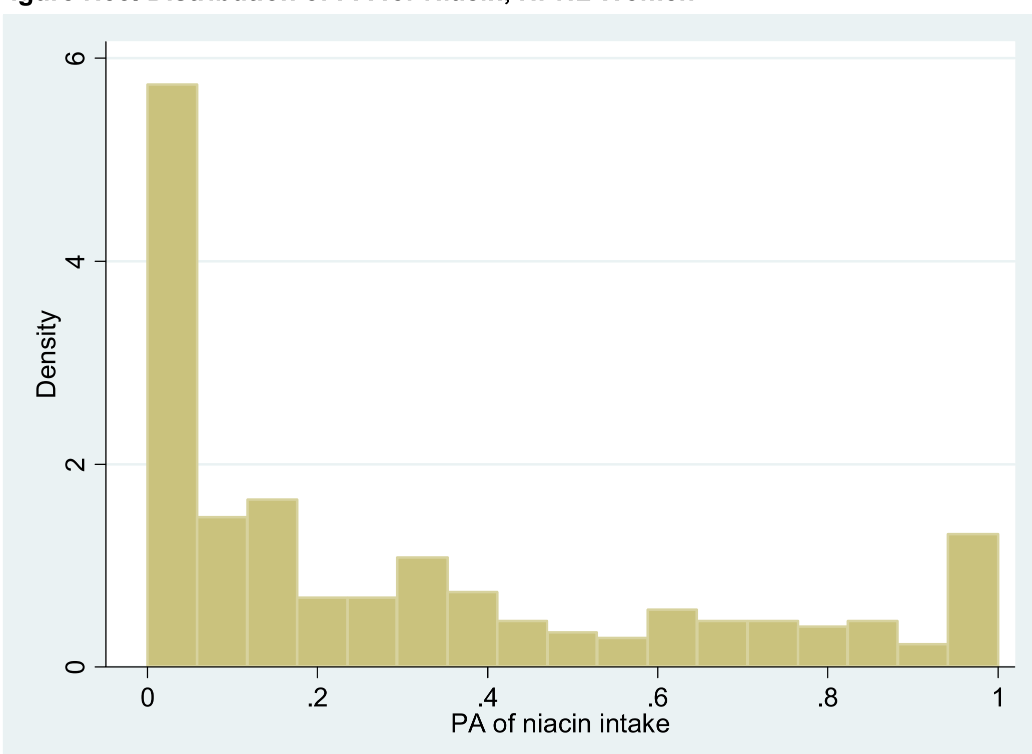


Figure N34. Distribution of PA for Vitamin B6, NPNL Women

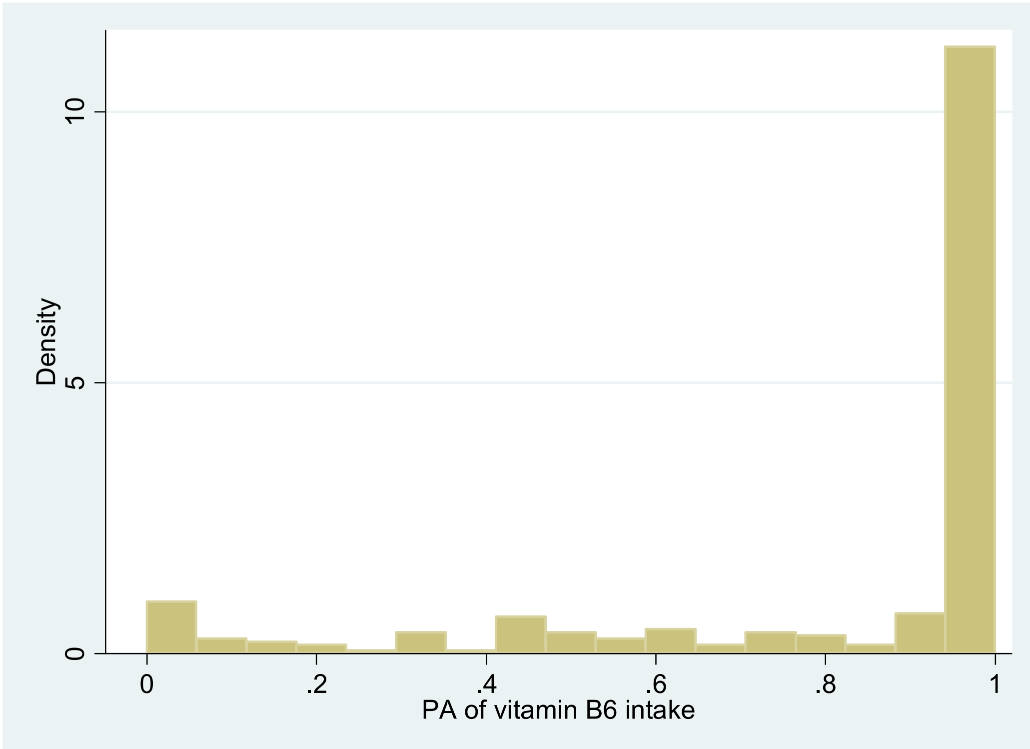


Figure N35. Distribution of PA for Folate, NPNL Women

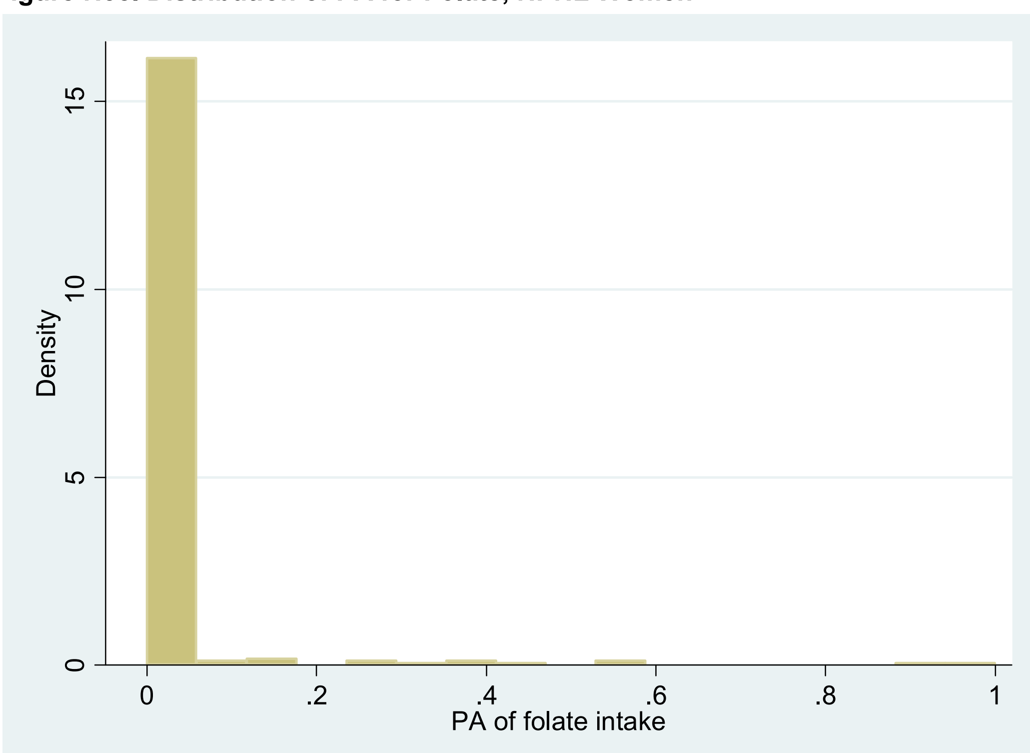


Figure N36. Distribution of PA for Vitamin B12, NPNL Women

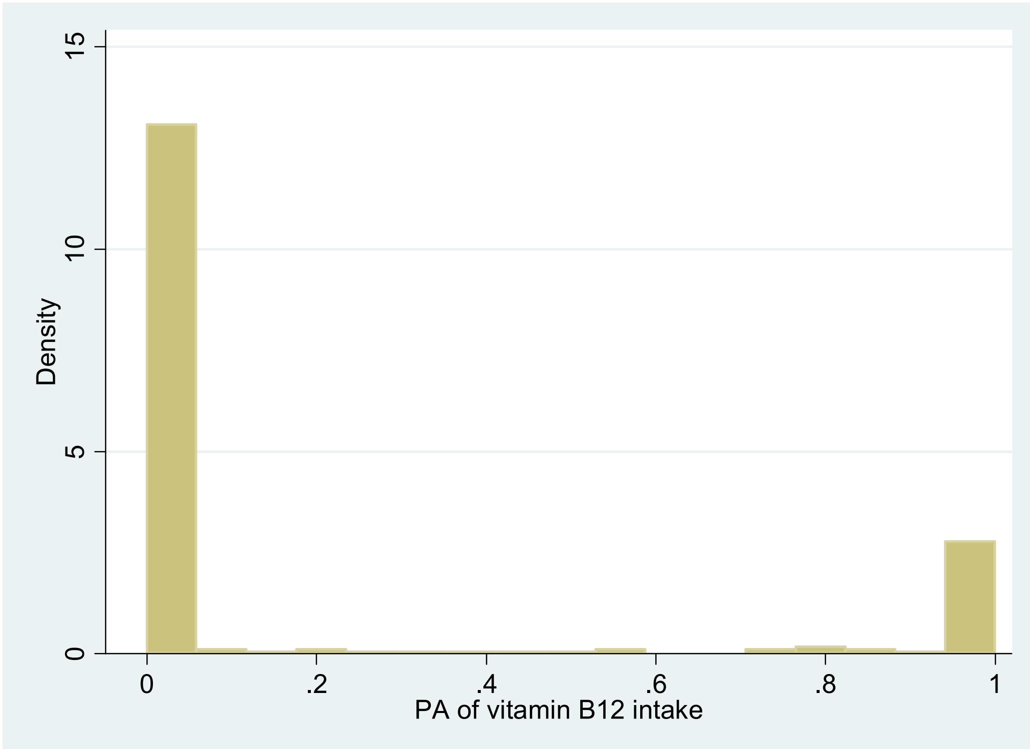


Figure N37. Distribution of PA for Vitamin C, NPNL Women

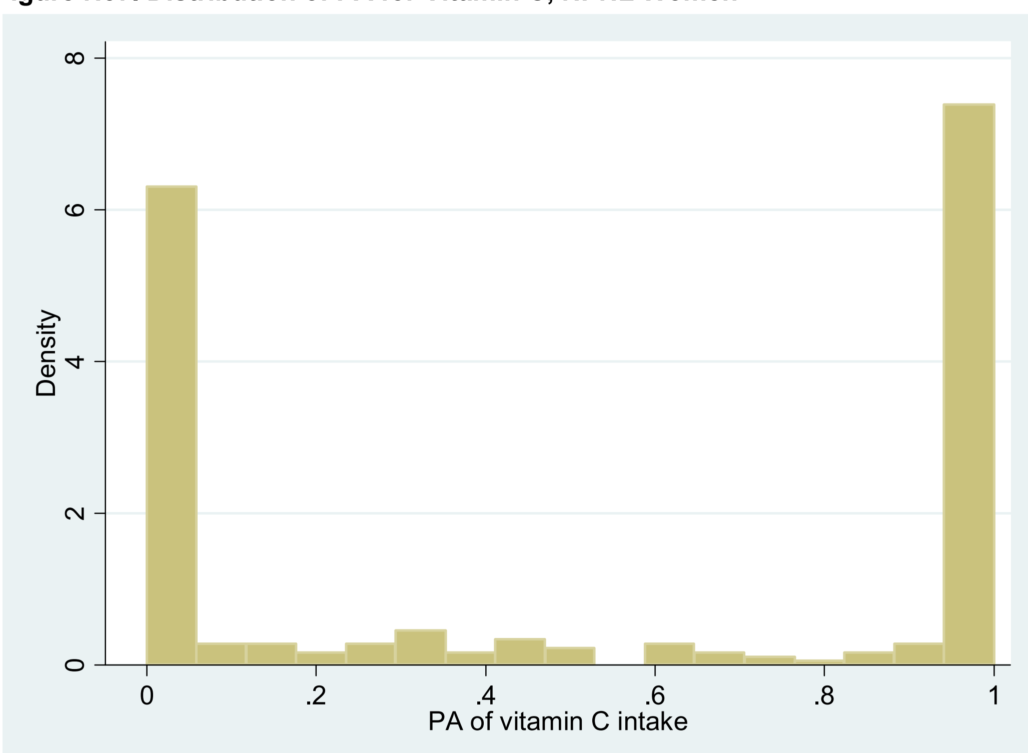


Figure N38. Distribution of PA for Vitamin A, NPNL women

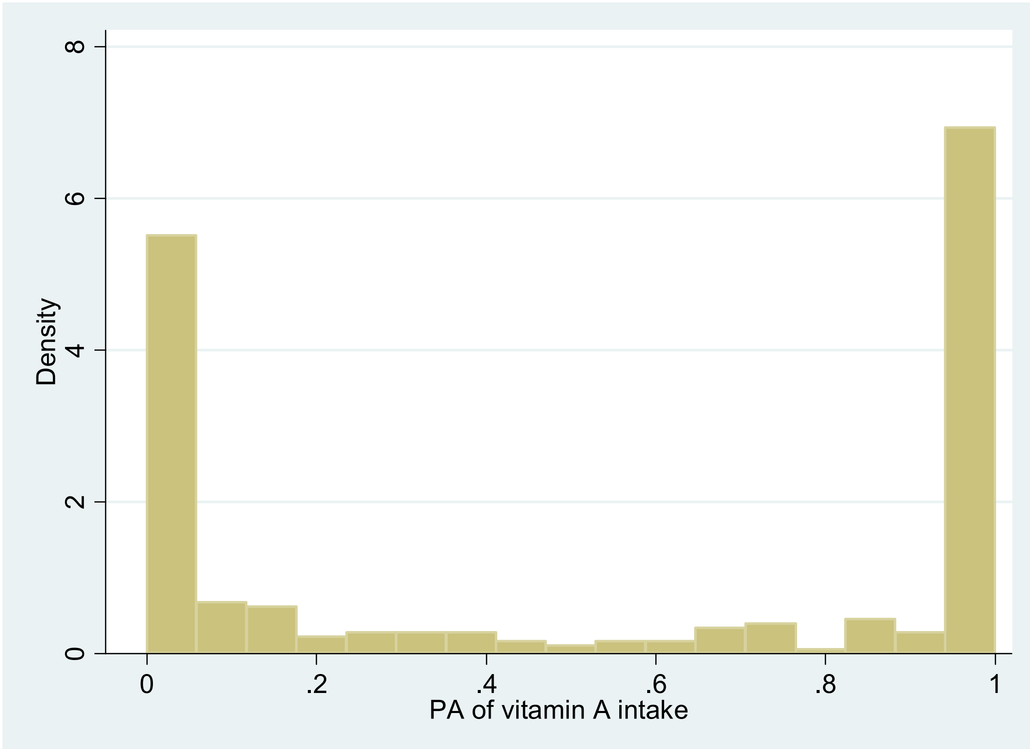


Figure N39. Distribution of PA for Calcium, NPNL Women

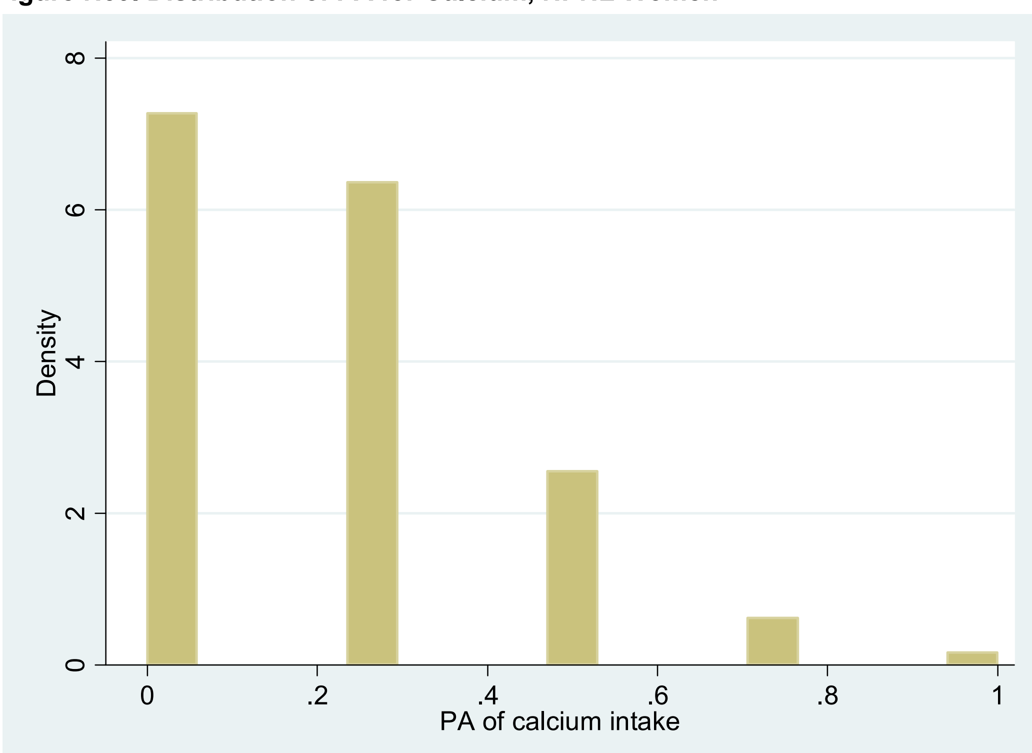


Figure N40. Distribution of PA for Iron, NPNL Women

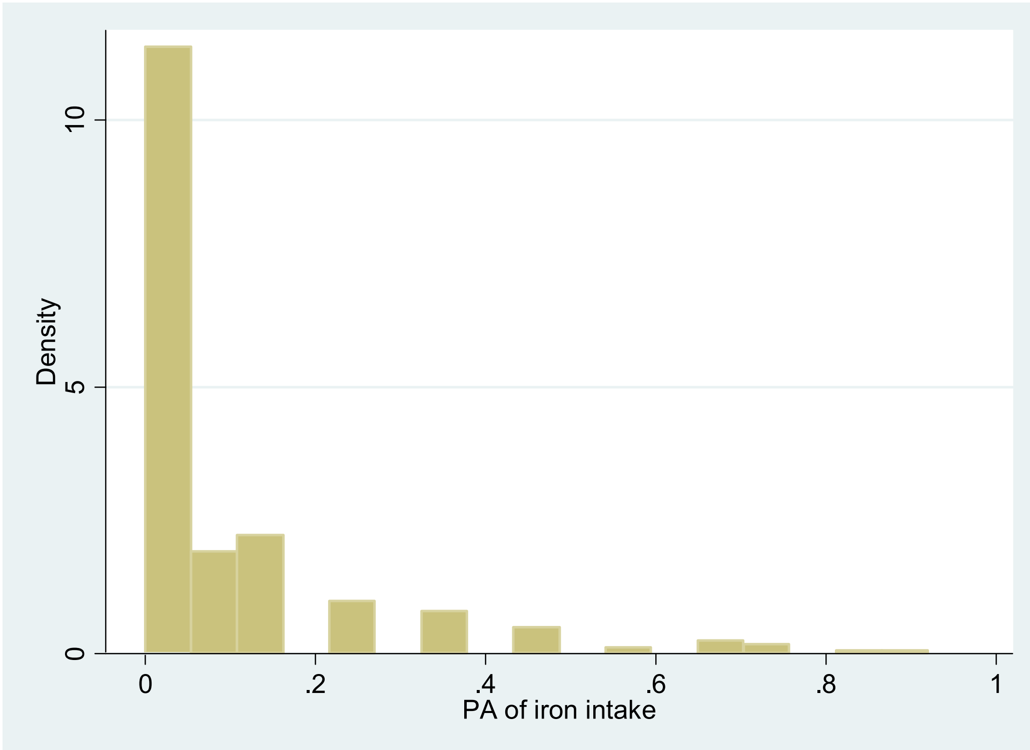


Figure N41. Distribution of PA for Zinc, NPNL Women

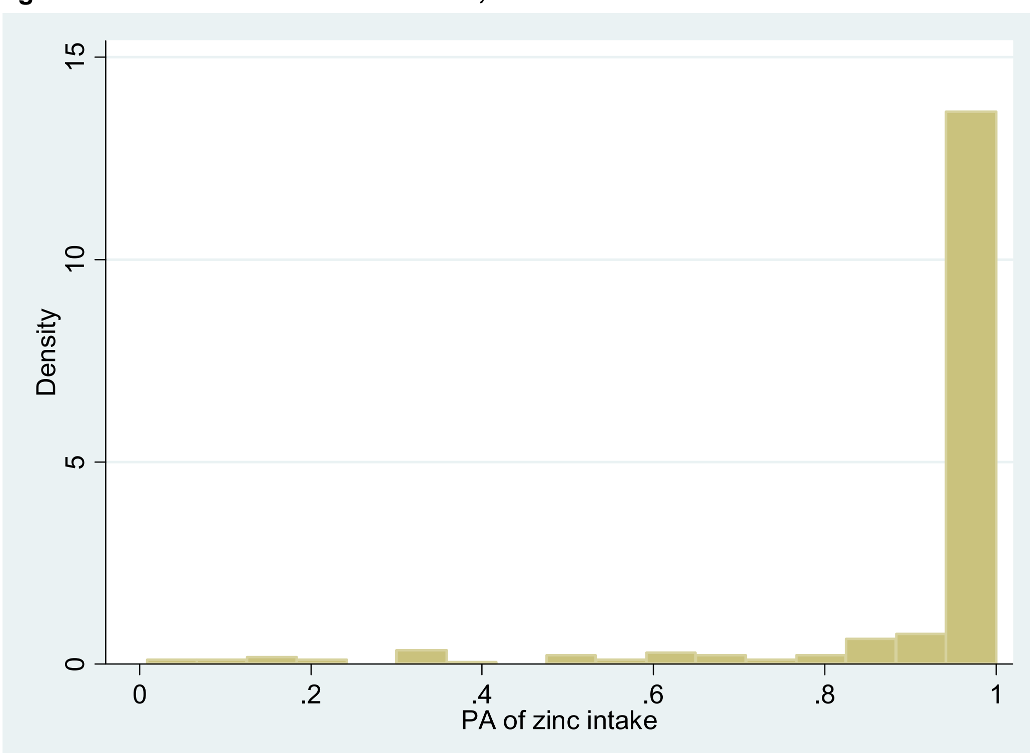
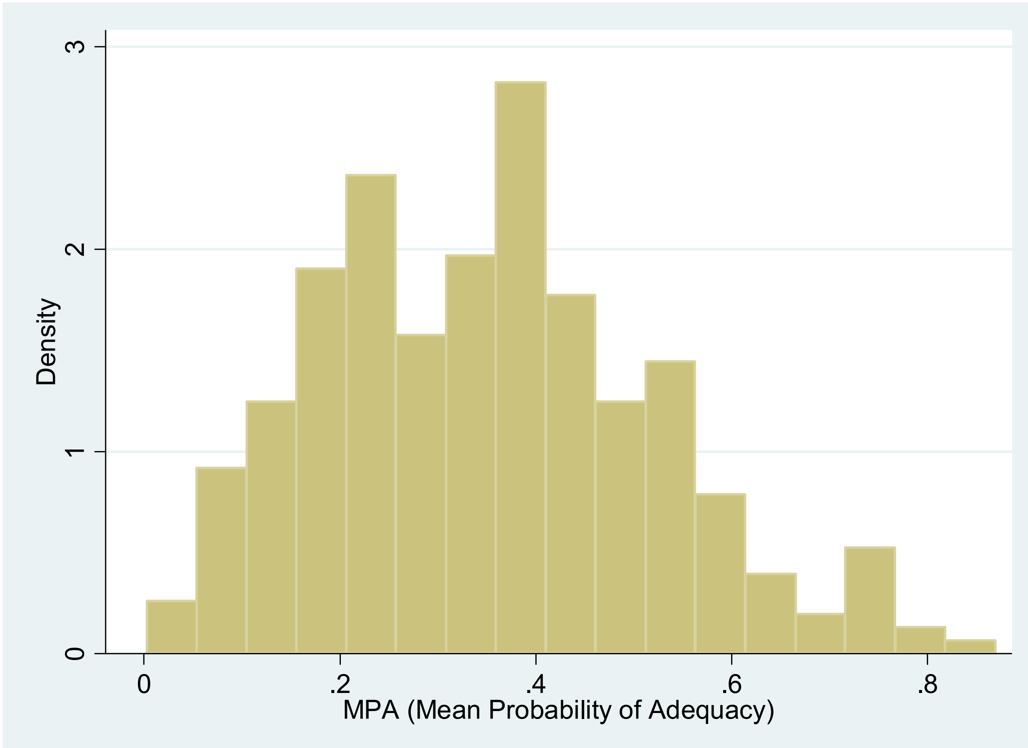


Figure N42. Distribution of MPA across 11 Micronutrients, NPNL Women



Appendix 4: Tables for Second Observation Day

Table A4-1. Description of Sample, All Women, R2

	n	Mean	SD	Median	Range
Age (year)	147	33.0	8.6	34.0	15.0-49.0
Height (cm)	147	150.1	4.9	149.8	138.2-161.4
Weight (kg)	147	41.7	6.0	41.3	30.0-72.0
BMI	147	18.5	2.3	18.0	14.3-27.6
% Illiterate	147	73.5			
% Lactating	144	33.3			
% Pregnant	147	0.0			
	n	**Percent**			
BMI <16	12	8.2			
BMI 16-16.9	30	20.4			
BMI 17-18.49	43	29.3			
BMI 18.5-24.9	60	40.8			
BMI 25-29.9	2	1.4			
BMI ≥ 30	0	0.0			

Table A4-2. Energy and Macronutrient Intakes, All Women, R2

	Mean	SD	Median	Range	Percent of kcal
Energy (kcal)	2,242.9	543.3	2,243.6	1,066.9-3,643.4	
Protein (g)	53.9	16.4	52.7	20.0-108.2	10
Animal source (g)	11.6	11.0	8.8	0.0-57.2	2
Plant source (g)	42.4	11.4	41.9	14.8-82.4	8
Total carbohydrate (g)	463.9	117.1	458.0	184.9-760.2	83
Sugars (g)	7.4	16.0	2.4	0.8-96.3	1
Total fat (g)	13.6	8.6	11.7	1.9-70.7	6
Saturated fat (g)	3.5	1.9	3.1	0.8-12.8	1

Table A4-8. Mean and Median Nutrient Intake, All Women, R2

Nutrient	Mean	SD	Median	EAR [a]	SD [a]
Energy	2,243	543	2,244		
Protein (all sources) (% of kcal)	10	2	9		
Protein from animal sources (% of kcal)	2	2	2		
Total carbohydrate (% of kcal)	83	4	83		
Sugars (% of kcal)	1	3	0		
Total fat (% of kcal)	6	4	4		
Saturated fat (% of kcal)	1	1	1		
Thiamin (mg/d)	0.59	0.18	0.57	0.9	0.09
Riboflavin (mg/d)	0.58	0.24	0.56	0.9	0.09
Niacin (mg/d)	9.56	2.82	9.36	11	1.6
Vitamin B6 (mg/d)	1.37	0.44	1.31	1.1	0.11
Folate (µg/d)	147.85	123.09	106.98	320	32
Vitamin B12 (µg/d)	1.94	2.19	1.03	2.0	0.2
Vitamin C (mg/d)	44.43	48.86	28.97	38.0	3.8
Vitamin A (RE/d)	466.46	568.92	227.50	270.0	54.0
Calcium (mg/d)	418.53	347.47	283.71	1000.0 [b]	[b]
Iron (mg/d)	7.72	3.40	7.13	See Table A6-2	
Zinc (mg/d)	8.15	2.25	8.06	6	0.75

[a] See Table A6-1 for sources for each EAR and SD. Requirements for NPNL women are presented here; see Tables A6-1 and A4-L8 for requirements for lactating women. There were no pregnant women in the study sample.
[b] There is no EAR and no SD for calcium; 1,000 mg is the Adequate Intake (AI) for NPNL women.

Table A4-L1. Description of Sample, Lactating Women, R2

	n	Mean	SD	Median	Range
Age (year)	48	27.7	6.5	26.5	18.0-46.0
Height (cm)	48	150.7	5.4	149.9	138.2-161.4
Weight (kg)	48	41.5	5.2	41.6	31.0-54.0
BMI	48	18.3	1.9	17.6	14.8-23.1
% Illiterate	48	77.1			
% Lactating	48	100.0			
% Pregnant	48	0.0			
	n	**Percent**			
BMI <16	2	4.2			
BMI 16-16.9	11	22.9			
BMI 17-18.49	17	35.4			
BMI 18.5-24.9	18	37.5			
BMI 25-29.9	0	0.0			
BMI ≥ 30	0	0.0			

Table A4-L2. Energy and Macronutrient Intakes, Lactating Women, R2

	Mean	SD	Median	Range	Percent of kcal
Energy (kcal)	2,299.8	558.0	2,312.8	1,164.9-3,319.1	
Protein (g)	54.2	15.3	52.8	32.2-87.5	10
Animal source (g)	10.5	9.7	8.8	0.0-37.1	2
Plant source (g)	43.7	11.0	44.4	14.8-63.3	8
Total carbohydrate (g)	480.7	124.2	487.5	184.9-738.8	83
Sugars (g)	4.6	13.8	2.3	1.0-96.3	1
Total fat (g)	11.9	6.5	10.4	3.9-43.2	5
Saturated fat (g)	3.2	1.5	3.0	1.5-11.9	1

Table A4-L8. Mean and Median Nutrient Intake, Lactating Women, R2

Nutrient	Mean	SD	Median	EAR [a]	SD [a]
Energy	2,300	558	2,313		
Protein (All Sources) (% of kcal)	9	1	9		
Protein from animal sources (% of kcal)	2	2	2		
Total carbohydrate (% of kcal)	83	5	85		
Sugars (% of kcal)	1	2	0		
Total fat (% of kcal)	5	4	4		
Saturated fat (% of kcal)	1	1	1		
Thiamin (mg/d)	0.59	0.17	0.57	1.2	0.12
Riboflavin (mg/d)	0.61	0.26	0.58	1.3	0.13
Niacin (mg/d)	9.72	2.80	9.15	13	2.0
Vitamin B6 (mg/d)	1.39	0.42	1.37	1.7	0.17
Folate (µg/d)	140.02	106.89	102.96	450	45.0
Vitamin B12 (µg/d)	1.80	2.03	0.96	2.4	0.24
Vitamin C (mg/d)	54.69	53.79	33.44	58	5.8
Vitamin A (RE/d)	615.85	683.26	304.18	450	90
Calcium (mg/d)	419.14	345.16	326.55	1000 [b]	[b]
Iron (mg/d)	8.00	3.42	7.39	11.7	3.51
Zinc (mg/d)	8.28	2.10	8.24	7	0.88

[a] See Table A6-1 for sources for each EAR and SD, requirements for lactating women.
[b] There is no EAR and no SD for calcium; 1,000 mg is the is the Adequate Intake (AI) for lactating women.

Table A4-N1. Description of Sample, NPNL Women, R2

	n	Mean	SD	Median	Range
Age (year)	96	35.4	8.5	37.5	15.0-49.0
Height (cm)	96	149.7	4.7	149.8	140.2-161.4
Weight (kg)	96	41.8	6.4	41.1	30.0-72.0
BMI	96	18.6	2.4	18.2	14.3-27.6
% Illiterate	96	71.9			
% Lactating	96	0.0			
% Pregnant	96	0.0			
	n	**Percent**			
BMI < 16	10	10.4			
BMI 16-16.9	18	18.8			
BMI 17-18.49	25	26.0			
BMI 18.5-24.9	41	42.7			
BMI 25-29.9	2	2.1			
BMI ≥ 30	0	0.0			

Table A4-N2. Energy and Macronutrient Intakes, NPNL Women, R2

	Mean	SD	Median	Range	Percent of kcal
Energy (kcal)	2,211.9	542.3	2,215.1	1,066.9-3,643.4	
Protein (g)	53.7	17.0	52.0	20.0-108.2	10
Animal source (g)	12.2	11.7	9.4	0.0-57.2	2
Plant source (g)	41.5	11.6	40.5	15.0-82.4	8
Total carbohydrate (g)	455.1	114.7	454.1	193.8-760.2	82
Sugars (g)	8.9	17.0	2.6	0.8-96.3	2
Total fat (g)	14.3	9.4	12.3	1.9-70.7	6
Saturated fat (g)	3.7	2.1	3.2	0.8-12.8	2

Table A4-N8. Mean and Median Nutrient Intake, NPNL Women, R2

Nutrient	Mean	SD	Median	EAR [a]	SD [a]
Energy	2,212	542	2,215		
Protein (All Sources) (% of kcal)	10	2	9		
Protein from animal sources (% of kcal)	2	2	2		
Total carbohydrate (% of kcal)	82	4	83		
Sugars (% of kcal)	2	4	0		
Total fat (% of kcal)	6	4	5		
Saturated fat (% of kcal)	2	1	1		
Thiamin (mg/d)	0.59	0.19	0.57	0.9	0.09
Riboflavin (mg/d)	0.57	0.23	0.54	0.9	0.09
Niacin (mg/d)	9.48	2.85	9.36	11	1.6
Vitamin B6 (mg/d)	1.36	0.46	1.30	1.1	0.11
Folate (µg/d)	149.08	130.53	107.65	320	32
Vitamin B12 (µg/d)	2.01	2.29	1.12	2.0	0.2
Vitamin C (mg/d)	40.10	46.32	29.14	38.0	3.8
Vitamin A (RE/d)	399.65	498.48	198.82	270.0	54.0
Calcium (mg/d)	422.43	352.68	282.76	1,000.0 [b]	[b]
Iron (mg/d)	7.58	3.41	6.85	See Table A6-2	
Zinc (mg/d)	8.08	2.33	7.94	6	0.75

[a] See Table A6-1 for sources for each EAR and SD, requirements for NPNL women.
[b] There is no EAR and no SD for calcium; 1,000 mg is the is the Adequate Intake (AI) for NPNL women.

Appendix 5. Women's Food Group Recall in DHS 5

579 Now I would like to ask you about (other) liquids or foods that (NAME FROM 577)/you may have had yesterday during the day or night. I am interested in whether your child/you had the item even if it was combined with other foods. **(15)**

Did (NAME FROM 577)/you drink (eat):

			CHILD			MOTHER		
			YES	NO	DK	YES	NO	DK
a)	Milk such as tinned, powdered, or fresh animal milk?	**a**	1	2	8	1	2	8
b)	Tea or coffee?	**b**	1	2	8	1	2	8
c)	Any other liquids?	**c**	1	2	8	1	2	8
d)	Bread, rice, noodles, or other foods made from grains? **(16)**	**d**	1	2	8	1	2	8
e)	Pumpkin, carrots, squash, or sweet potatoes that are yellow or orange inside? **(17)**	**e**	1	2	8	1	2	8
f)	White potatoes, white yams, manioc, cassava, or any other foods made from roots?	**f**	1	2	8	1	2	8
g)	Any dark green, leafy vegetables? **(18)**	**g**	1	2	8	1	2	8
h)	Ripe mangoes, papayas, or [INSERT ANY OTHER LOCALLY AVAILABLE VITAMIN A-RICH FRUITS]?	**h**	1	2	8	1	2	8
i)	Any other fruits or vegetables?	**i**	1	2	8	1	2	8
j)	Liver, kidney, heart, or other organ meats?	**j**	1	2	8	1	2	8
k)	Any meat, such as beef, pork, lamb, goat, chicken, or duck?	**k**	1	2	8	1	2	8
l)	Eggs?	**l**	1	2	8	1	2	8
m)	Fresh or dried fish or shellfish?	**m**	1	2	8	1	2	8
n)	Any foods made from beans, peas, lentils, or nuts?	**n**	1	2	8	1	2	8
o)	Cheese, yogurt, or other milk products?	**o**	1	2	8	1	2	8
p)	Any oil, fats, or butter, or foods made with any of these?	**p**	1	2	8	1	2	8
q)	Any sugary foods such as chocolates, sweets, candies, pastries, cakes, or biscuits?	**q**	1	2	8	1	2	8
r)	Any other solid or semi-solid foods?	**r**	1	2	8	1	2	8

[15] A separate category for any foods made with red palm oil, palm nut, or palm nut pulp sauce must be added in countries where these items are consumed. A separate category for any grubs, snails, insects or other small protein food must be added in countries where these items are eaten. Items in each food group should be modified to include only those foods that are locally available and/or consumed in the country. Local terms should be used.

[16] Grains include millet, sorghum, maize, rice, wheat, or other local grains. Start with local foods (e.g., ugali, nshima, fufu, chapatti) then follow with bread, rice, noodles, etc.

[17] Items in this category should be modified to include only vitamin A rich tubers, starches, or yellow/orange/red vegetables that are consumed in the country.

[18] These include cassava leaves, bean leaves, kale, spinach, pepper leaves, taro leaves, amaranth leaves or other dark green, leafy vegetables.

Source: ORC Macro DHS website at: http://www.measuredhs.com/aboutsurveys/dhs/questionnaires.cfm. Accessed September 7, 2007.

Appendix 6: Estimated Average Requirements

Note that WHO/FAO requirements are not given separately for pregnant or lactating adolescents. For girls aged 15-18 who were pregnant or lactating, we used the requirements for pregnant/lactating adult women for most nutrients, as the requirements are higher. The exception to this is calcium, for which the requirement is higher for adolescents (1,300 mg/d), so this value (AI) was used for pregnant and lactating adolescents.

Table A6-1. EAR to be Used for Assessing PA [a, b]

	Females 19-50 years		Females 15-18 years		Pregnant women		Lactating women	
	EAR	SD [c]	EAR	SD [c]	EAR	SD [c]	EAR	SD [c]
Vit A (RE/d) [d]	270 [e]	54	365 [e]	73	370 [e]	74	450 [e]	90
Vit C (mg/d)	38 [f]	3.8	33 [f]	3.3	46 [f]	4.6	58 [f]	5.8
Thiamin (mg/d)	0.9 [f]	0.09	0.9 [f]	0.09	1.2 [f]	0.12	1.2 [f]	0.12
Riboflavin (mg/d)	0.9 [f]	0.09	0.8 [f]	0.08	1.2 [f]	0.12	1.3 [f]	0.13
Niacin (mg/d)	11 [f]	1.6	12 [f]	1.8	14 [f]	2.1	13 [f]	2.0
Vit B_6 (mg/d)	1.1 [f]	0.11	1.0 [f]	0.1	1.6 [f]	0.16	1.7 [f]	0.17
Folate (µg/d)	320 [e]	32	330 [e]	33	520 [e]	52.0	450 [e]	45.0
Vit B_{12} (µg/d)	2.0 [e]	0.2	2.0 [e]	0.2	2.2 [e]	0.22	2.4 [e]	0.24
Calcium (mg/d) [g]	1,000	-	1,300	-	1,000		1,000	
Iron (mg/d)	See table A6-2	-	See Table A6-3	-	22 [h]	2.07	10% bioavail: 11.7 [i] 5% bioavail: 23.40	3.51 7.02
Zinc (mg/d)	Lower bioavail: 7 [j] Higher bioavail: 6 [k]	0.88 0.75	Lower bioavail: 9 Higher bioavail: 7	1.13 0.88	Lower bioavail: 10 Higher bioavail: 8	1.25 1.0	Lower bioavail: 8 Higher bioavail: 7	1.00 0.88

[a] All values are taken from WHO/FAO (2004) unless otherwise stated.
[b] Values for EAR are adjusted for an assumed bioavailability (WHO/FAO 2004). Thus, EAR refers to intake of the nutrients and not the physiological need for the absorbed nutrient.
[c] All SDs were calculated based on EAR and CV (SD = CV*EAR/100). CV is assumed to be 10 percent for all micronutrients except 15 percent for niacin (IOM 2000a), 20 percent for vitamin A (IOM 2000a), and 12.5 percent for zinc (IZiNCG 2004), 9.4 percent and 30 percent for iron, for pregnant and lactating women, respectively (IOM 2000a).
[d] One µg RE is equal to 1 µg all-trans-retinol, 6 µg β-carotene and 12 µg α-carotene or β-cryptoxanthin (WHO/FAO 2004). Note also the EAR for vitamin A refers to intake adequate to prevent the appearance of deficiency-related syndromes (WHO/FAO 2004).
[e] EAR taken from WHO/FAO (2004).
[f] EAR back-calculated from RNI (Recommended Nutrient Intake) (WHO/FAO 2004).
[g] This is not an EAR, but rather AI from IOM (1997). Following Foote et al. (2004), we calculate probabilities of adequacy to be 0 percent when intake ≤ 1/4 of the AI; 25 percent for intakes > 1/4 and ≤ 1/2 of the AI; 50 percent for intakes > 1/2 and ≤ 3/4 of the AI; 75 percent for intakes > 3/4 and ≤ AI; and 100 percent for intakes above the AI.
[h] EAR for iron intake, as presented in IOM (2000a, page 347). IOM estimates that bioavailability is 18 percent in the first trimester and 25 percent in the second and third. As information on month of pregnancy will not be available in most data sets, a weighted average of 23 percent absorption was used for all pregnant women.
[i] Gives EAR for iron for two levels of absorption for lactating women, based on IOM (2006). According to WHO/FAO (2004), either a very low (5 percent) or low (10 percent) absorption level can be assumed in a developing country setting.
[j] This is the estimated median requirement of zinc to be used for diets with a lower bioavailability (unrefined, cereal based diets), as suggested by IZiNCG (2004).
[k] This is the estimated median requirement of zinc to be used for diets with a higher bioavailability (mixed or refined vegetarian diets), as suggested by IZiNCG (2004).

Table A6-2. PA of Iron (mg/d) and Associated Ranges of Usual Intake in Adult Women Not Using Oral Contraceptives (OC) [a]

PA	Total absorbed iron	10% bioavailability	5% bioavailability
0	<0.796	<7.96	<15.91
0.04	0.796-0.879	7.96-8.79	15.91-17.59
0.07	0.880-0.981	8.80-9.81	17.60-19.65
0.15	0.982-1.120	9.82-11.20	19.66-22.42
0.25	1.121-1.237	11.21-12.37	22.43-24.76
0.35	1.238-1.343	12.38-13.43	24.77-26.88
0.45	1.344-1.453	13.44-14.53	26.89-29.08
0.55	1.454-1.577	14.54-15.77	29.09-31.56
0.65	1.578-1.734	15.78-17.34	31.57-34.69
0.75	1.735-1.948	17.35-19.48	34.70-38.98
0.85	1.949-2.349	19.49-23.49	38.99-47.01
0.92	2.350-2.789	23.50-27.89	47.02-55.79
0.96	2.790-3.281	27.90-32.81	55.80-65.63
1	>3.28	>32.81	>65.63

[a] This table was adapted from Table G-7 in IOM (2006), which gives PA for various levels of iron intake, assuming 18 percent absorption. In order to construct the table above, the associated level of *absorbed* iron was back-calculated from Table G-7. The table above presents usual intake levels to achieve the same amount of absorbed iron, but adjusted for absorption at two lower levels (10 percent and 5 percent).

Table A6-3. PA of Iron (mg/d) and Associated Ranges of Usual Intake in Adolescent Girls (15-18 Years) Not Using Oral Contraceptives (OC) [a]

PA	Total absorbed iron	10% bioavailability	5% bioavailability
0	<0.833	<8.33	<16.67
0.04	0.833-0.911	8.33-9.11	16.67-18.22
0.07	0.912-1.010	9.12-10.10	18.23-20.20
0.15	1.011-1.136	10.11-11.36	20.21-22.72
0.25	1.137-12.37	11.37-12.37	22.73-24.73
0.35	1.238-1.330.	12.38-13.30	24.74-26.60
0.45	1.331-1.424	13.31-14.24	26.61-28.49
0.55	1.425-1.526	14.25-15.26	28.50-30.53
0.65	1.526-1.647	15.27-16.47	30.54-32.94
0.75	1.648-1.805	16.48-18.05	32.95-26.11
0.85	1.806-2.077	18.06-20.77	36.12-41.54
0.92	2.078-2.354	20.78-23.54	41.55-47.09
0.96	2.355-2.664	23.55-26.64	47.10-53.28
1	>2.664	>26.64	>53.28

[a] This table was adapted from Table G-6 in IOM (2006), which gives PA for various levels of iron intake, assuming 18 percent absorption. In order to construct the table above, the associated level of *absorbed* iron was back-calculated from Table G-6. The table above presents usual intake levels to achieve the same amount of absorbed iron, but adjusted for absorption at two lower levels (10 percent and 5 percent).

DISCUSSION ON THE SELECTION OF EAR AND CV

Vitamin A

According to WHO/FAO,[1] the CV for vitamin A requirements is unknown. IOM, however, has used 20 percent. The WDDP uses the EAR of WHO/FAO with a CV of 20 percent. For adolescents (ages 15-18), WHO/FAO give a range for the EAR of 330-400 µg/d. The WDDP uses the mid-point of this range.

Calcium

WHO/FAO's EAR for calcium is quite high, and based on WDDP working group discussions, the justification for these high levels does not appear to be strong/persuasive. The group therefore proposed to use the method described in Foote et al.,[2] which takes the AI of 1,000 mg/d as a starting point (or 1,300 mg/d for adolescents). The DRI include AI when insufficient evidence is available to set an EAR and CV. The AI is an observed estimate of nutrient intake by a defined group of healthy people. Some seemingly healthy individuals may require higher intakes and some individuals may be at low risk on even lower intakes. The AI is believed to cover their needs, but lack of data or uncertainty in the data prevent being able to specify with confidence the percentage of individuals covered by this intake.[3] An individual with a usual intake of calcium at or above AI can be assumed to have an AI. Foote et al.[4] estimated probabilities of adequacy as follows:

0 percent when intake ≤ 1/4 of the AI,
25 percent for intakes > 1/4 and ≤ 1/2 of the AI,
50 percent for intakes > 1/2 and ≤ 3/4 of the AI,
75 percent for intakes > 3/4 and ≤ AI,
100 percent for intakes above the AI.

The AI is the same for pregnant and lactating women and adolescents and for NPNL women (1,000 mg/d for women and 1,300 mg/d for adolescents).

Iron

For estimating the probability of AI of iron for **NPNL women** the WDDP used a modified version of the PA tables in IOM.[5] The table is based on an assumption of 18 percent absorption, which is higher than expected in most developing country settings. The WDDP adjusted the table to find the PA for the two levels of absorption: five percent and ten percent. The tables above (one for adult women and one for adolescents) are thus entirely based on IOM.[6] Each researcher must select an assumed level of absorption (five percent or ten percent), based on his/her own expertise/knowledge of the local food intake.

For pregnant and lactating women, CVs have been given by the IOM. We therefore used the usual method of EAR for estimating PA for these two groups.

For pregnant women, the WDDP used the EAR suggested by IOM, because WHO/FAO[7] does not provide a requirement level for pregnant women. However, WHO and FAO state that iron absorption can increase up to approximately four times NPNL levels by the third trimester. Therefore, using IOM requirements – which assume 18 percent absorption in first trimester and 25 percent absorption in second and third

[1] 2004.
[2] 2004.
[3] IOM 1997.
[4] 2004.
[5] Table I-6 and I-7; 2000b.
[6] 2000b.
[7] 2004.

trimesters – seems reasonable, in the absence of more specific guidance from WHO and FAO on absorption during pregnancy.

For lactating women, IOM gives an EAR for iron intake of 6.5 mg/d, assuming 18 percent absorption. We calculated the EAR of absorbed iron (6.5 mg times 18/100) as 1.17 mg/d. This is similar to the WHO/FAO EAR for lactating women (1.1 mg/day).[8] In the table above, we give EARs for two levels of absorption (five percent and ten percent). Researchers should apply the same levels of absorption as used for NPNL women. This study used coefficient of variation from IOM (30 percent) for lactating women.

Zinc

IZiNCG recently presented revised dietary zinc requirements, including EAR.[9] It also estimated a CV for the requirement distribution of 12.5 percent, indicating a narrower requirement distribution than implied by the WHO/FAO[10] CV of 25 percent. Hotz[11] assessed the internal validity of these new requirements and found that they predicted zinc status. They also yielded similar estimates of prevalence of zinc deficiency as did biochemical indicators, including among pregnant and non-pregnant women. Therefore, we adopted these requirements for the purposes of the WDDP.

As with the WHO/FAO requirements, researchers must choose a requirement depending on an assumption for absorption, which is based on knowledge of diet patterns and likely bioavailability. For mixed or refined vegetarian diets (with a phytate to zinc molar ratio of 4-18) an absorption level of 34 percent is suggested. For high phytate, unrefined cereal-based diets (molar ratio greater than 18), an absorption level of 25 percent is suggested.[12] Note that the level of absorption IZiNCG suggests for high phytate diets (25 percent) is considerably higher than the absorption level suggested by the WHO/FAO requirements document (15 percent).

[8] WHO/FAO 2004, page 265.
[9] IZiNCG 2004.
[10] 2004.
[11] 2007.
[12] IZiNCG 2004.

Appendix 7. Nutrient Intake and Probability of Adequacy When "Low" Absorption Is Assumed for Iron and Zinc

Table A7-1. Mean and Median Nutrient Intake and PA, All Women [a]

Nutrient	Mean	SD	Median	EAR [b]	SD [b]	PA (Mean)	PA (Median)
Energy	2,188	529	2,163				
Protein (All Sources) (% of kcal)	10	2	9				
Protein from animal sources (% of kcal)	2	2	1				
Total carbohydrate (% of kcal)	82	4	83				
Sugars (% of kcal)	2	2	1				
Total fat (% of kcal)	6	4	5				
Saturated fat (% of kcal)	2	1	1				
Thiamin (mg/d)	0.68	0.28	0.63	0.9	0.09	0.07	0.00
Riboflavin (mg/d)	0.75	0.40	0.66	0.9	0.09	0.11	0.00
Niacin (mg/d)	10.72	4.22	9.86	11.0	1.6	0.28	0.14
Vitamin B6 (mg/d)	1.54	0.60	1.45	1.1	0.11	0.67	0.94
Folate (µg/d)	171.93	131.83	132.50	320	32	0.01	0.00
Vitamin B12 (µg/d)	1.56	2.30	0.57	2.0	0.2	0.19	0.00
Vitamin C (mg/d)	58.53	62.27	41.40	38	3.8	0.44	0.24
Vitamin A (RE/d)	491.92	497.04	322.36	270	54	0.49	0.41
Calcium (mg/d)	441.54	390.82	307.96	1,000 [d]	[d]	0.22	0.25
Iron (mg/d)	9.96	5.54	8.53	See Table A6-2		0.01	0.00
Zinc (mg/d)	8.45	2.54	7.97	7	0.88	0.65	0.80
MPA across 11 micronutrients	0.29	0.17	0.28				

[a] Mean and median nutrient intakes are for first observation day; PA are based on estimated usual intake, calculated using repeat observations for a subset of the sample.
Thus, PA incorporate information from both rounds of data collection.
[b] See Table A6-1 for sources for each EAR and SD. Requirements for NPNL women are presented here; see tables A6-1 and L8 for requirements for lactating women. There were no pregnant women in the study sample.
[c] This documents the transformation parameters selected for each nutrient. The power transformations result in approximately normal distributions.
[d] There is no EAR and no SD for calcium; 1,000 mg is the Adequate Intake (AI) for NPNL women.

Table A7-2. Mean and Median Nutrient Intake and PA, Lactating Women [a]

Nutrient	Mean	SD	Median	EAR [b]	SD [b]	PA (Mean)	PA (Median)
Energy	2,340	545	2,360				
Protein (All Sources) (% of kcal)	10	2	10				
Protein from animal sources (% of kcal)	2	3	1				
Total carbohydrate (% of kcal)	83	4	83				
Sugars (% of kcal)	1	2	1				
Total fat (% of kcal)	6	3	5				
Saturated fat (% of kcal)	1	1	1				
Thiamin (mg/d)	0.70	0.24	0.70	1.2	0.12	0.00	0.00
Riboflavin (mg/d)	0.79	0.39	0.68	1.3	0.13	0.02	0.00
Niacin (mg/d)	11.61	4.33	11.08	13	2.0	0.21	0.10
Vitamin B6 (mg/d)	1.64	0.60	1.60	1.7	0.17	0.28	0.11
Folate (μg/d)	172.93	125.52	136.57	450	45.0	0.00	0.00
Vitamin B12 (μg/d)	1.88	2.87	0.77	2.4	0.24	0.18	0.00
Vitamin C (mg/d)	56.65	50.53	42.26	58	5.8	0.23	0.00
Vitamin A (RE/d)	527.25	553.46	362.73	450	90	0.38	0.16
Calcium (mg/d)	505.62	455.67	357.99	1,000[d]	[d]	0.26	0.25
Iron (mg/d)	10.57	5.40	9.39	23.4	7.02	0.03	0.02
Zinc (mg/d)	8.98	2.56	8.98	8	1.00	0.61	0.75
MPA across 11 micronutrients	0.20	0.14	0.20				

[a] Mean and median nutrient intakes are for first observation day; PA are based on estimated usual intake, calculated using repeat observations for a subset of the sample. Thus, PA incorporate information from both rounds of data collection.
[b] See Table A6-1 for sources for each EAR and SD, requirements for lactating women.
[c] This documents the transformation parameters selected for each nutrient. The power transformations result in approximately normal distribution
[d] There is no EAR and no SD for calcium; 1,000 mg is the Adequate Intake (AI) for lactating women.

Table A7-3. Mean and Median Nutrient Intake and PA, NPNL Women [a]

Nutrient	Mean	SD	Median	EAR [b]	SD [b]	PA (Mean)	PA (Median)
Energy	2,130	514	2,083				
Protein (All Sources) (% of kcal)	10	2	9				
Protein from animal sources (% of kcal)	2	2	1				
Total carbohydrate (% of kcal)	82	5	83				
Sugars (% of kcal)	2	3	1				
Total fat (% of kcal)	6	4	5				
Saturated fat (% of kcal)	2	1	1				
Thiamin (mg/d)	0.68	0.30	0.61	0.9	0.09	0.09	0.00
Riboflavin (mg/d)	0.73	0.40	0.63	0.9	0.09	0.15	0.00
Niacin (mg/d)	10.38	4.15	9.33	11.0	1.6	0.30	0.16
Vitamin B6 (mg/d)	1.50	0.60	1.41	1.1	0.11	0.82	1.00
Folate (µg/d)	171.70	134.51	132.24	320	32	0.02	0.00
Vitamin B12 (µg/d)	1.43	2.03	0.54	2.0	0.2	0.20	0.00
Vitamin C (mg/d)	59.46	66.29	41.56	38	3.8	0.52	0.50
Vitamin A (RE/d)	481.36	475.48	315.69	270	54	0.53	0.64
Calcium (mg/d)	418.06	362.44	283.41	1,000 [d]	[d]	0.21	0.25
Iron (mg/d)	9.75	5.60	8.22	See Table A6-2		0.00	0.00
Zinc (mg/d)	8.25	2.51	7.76	7	0.88	0.66	0.81
MPA across 11 micronutrients	0.32	0.17	0.32				

[a] Mean and median nutrient intakes are for first observation day; PA are based on estimated usual intake, calculated using repeat observations for a subset of the sample. Thus, PA incorporate information from both rounds of data collection.
[b] See Table A6-1 for sources for each EAR and SD.
[c] This documents the transformation parameters selected for each nutrient. The power transformations result in approximately normal distributions.
[d] There is no EAR and no SD for calcium; 1,000 mg is the Adequate Intake (AI) for NPNL women.