TECHNICAL REPORT

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FOOD AND NUTRITION TECHNICAL ASSISTANCE

USAID FROM THE AMERICAN PEOPLE

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

Doris Wiesmann, Mary Arimond and Cornelia Loechl

December 2009

AED
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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 Mozambique 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.

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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).

Funding for data collection, data entry and initial processing was provided by the HarvestPlus project, in the context of the Reaching End Users Project (REU) in Zambézia Province, Mozambique. We are very grateful to the HarvestPlus project for sharing these data.

We also acknowledge financial support for this project from the German Federal Ministry for Economic Cooperation and Development.

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

Alicia Carriquiry	Iowa State University
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. We are very grateful to Maria Joseph and Alicia Carriquiry of Iowa State University for their substantial input into development of the analytic methods and the original draft Stata syntax, which was adapted and used by all WDDP researchers. We are also grateful to Wahid Quabili for excellent research assistance, and to Jay Willis for helping finalize this document. Finally, we thank Christine Hotz of HarvestPlus for generously sharing her expertise in the area of dietary assessment. 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
CI	Confidence interval
CIAT	International Center for Tropical Agriculture
CIP	International Potato Center
cm	Centimeters
CV	Coefficient of variation
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)
g/L	Gram(s) per liter
h	Hour
IFPRI	International Food Policy Research Institute
IOM	Institute of Medicine (United States National Academy of Sciences)
IRD	Institute of Research for Development
IZiNCG	International Zinc Nutrition Consultative Group
kcal	Kilocalories
kg	Kilograms
LSHTM	London School for Hygiene and Tropical Medicine
µg	Micrograms
mg	Milligram(s)
mg/d	Milligram(s) per day
ml	Milliliters
MPA	Mean probability of adequacy
NHANES	United States National Health and Nutrition Examination Survey
NPNL	Non-pregnant non-lactating
NRV	Nutrient reference values of the Codex Alimentarius
OC	Oral contraceptives
OFSP	Orange-fleshed sweet potato
ORC Macro	Opinion Research Corporation Macro International, Inc.
PA	Probability of adequacy
R1	Round 1 of data collection, November-December, 2006
R2	Round 2 of data collection, November-December, 2006
RAE	Retinol activity equivalents

RE	Retinol equivalent
REU	HarvestPlus Reaching End Users project
RNI	Recommended nutrient intake
ROC	Receiver-operating characteristic
SD	Standard deviation
SEM	Standard error of the mean
UNICEF	United Nations Children's Fund
UNU	United Nations University
UK	United Kingdom
US	United States
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 were collected by the International Food Policy Research Institute (IFPRI) and collaborators in Zambézia Province, Mozambique, in November-December 2006, as part of an impact evaluation of an ongoing HarvestPlus project. The project aims to reduce vitamin A deficiency through encouraging the cultivation, marketing and consumption of vitamin A-rich orange-fleshed sweet potato (OFSP). The survey was originally designed to establish a baseline prior to the implementation of interventions. The evaluation design is quasi-experimental: 36 villages in four districts were selected, then each village was randomly assigned to one of two intervention groups or a control group. Within villages, the sampling frame consisted of households participating in community groups (though this criterion was not strictly applied), and with young children aged 6-36 months. Dietary data were gathered in 12 households per village, selecting one mother/child pair per household. Data collection was repeated in 18 villages for five to seven households per village. All repeat recalls were done on a different day of the week than the first recall.

METHODS

Quantitative 24-h recall data for mothers and children were collected by two enumeration teams, adapting a methodology from an interactive, multiple-pass method developed previously for use in Malawi. Enumerators attended a two-week training session, with emphasis on anthropometric measurements and on the 24-h recall. A project-specific food composition table (FCT) was compiled, and conversion factors and standard recipes were gathered by direct observation. Intake was calculated for energy, protein, animal-source protein, fat, carbohydrates, thiamin, riboflavin, niacin, vitamin B6, folate, vitamin B12, vitamin C, vitamin A, calcium, iron and zinc.

Extreme intakes were examined and some observations were excluded, yielding a final sample of 409 women. Most women (252) were lactating and 58 were pregnant; 4 were both pregnant and lactating, while 103 were neither pregnant nor lactating. Second observations were available for 94 women (51 lactating women, 30 non-pregnant non-lactating [NPNL] women and only 14 pregnant women, with 1 woman both pregnant and lactating). Data were analyzed separately for physiological groups when sub-sample sizes allowed. For analyses based on a single recall (description of dietary patterns) results are presented for all three physiological sub-groups. For pregnant women, we could not report results related to nutrient intakes and adequacy, which depend on data from two 24-h recalls.

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 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 little difference in food group diversity scores for 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 small differences observed were accounted for by intake of onions (other vegetables food group) and tomatoes (vitamin C-rich vegetables), which were consumed in very small amounts by some of the women. For all other food groups, those who had 1 g also tended to have at least 15 g. Dietary patterns for lactating, pregnant and NPNL women were similar.

The women's diets were dominated by starchy staples (largely maize, rice and cassava), which contributed 68 percent of total energy. Starchy staples also provided over half of the protein and zinc, and more than two-fifths of the thiamin, niacin, vitamin B6 and iron in the diets. While starchy staples contributed large proportions of these micronutrients, women with higher intakes of starchy staples had diets with poorer micronutrient density.

Vitamin A-rich fruits (largely mango) were eaten in substantial quantities and provided 60 percent of vitamin C, about two-thirds of vitamin A and roughly one quarter of vitamin B6. Animal source foods were eaten in very small quantities and provided virtually all the vitamin B12 in the diet. Other nutritionally important food groups consumed were legumes and nuts, dark green leafy vegetables, vitamin C-rich vegetables, other vegetables, and fish. Dairy products, usually an important source of calcium, were not consumed at all by the women in this study site.

Median micronutrient intakes were well below estimated average requirements (EARs) for most of the 11 micronutrients assessed. Consequently, the estimated prevalence of adequate intake was very low (5-17 percent) for iron, calcium and riboflavin; low (19-30 percent) for folate, vitamin B12 and niacin; moderate (43-64 percent) for thiamin, vitamin B6 and zinc; and high (74-83 percent) only for vitamins A and C. 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 low quality of the women's diets: over two-thirds of all women had an MPA below 50 percent (79 percent of lactating women and 49 percent of NPNL women). The MPA was 54 percent for NPNL women and only 34 percent for lactating women.

Since mango consumption is seasonal and clearly had a strong impact on intakes and adequacy, we examined the role of mango in contributing to MPA. First, we examined MPA by number of days mango was consumed for the 95 women with two days of data. There was a strong and clear relationship: MPA averaged 24 percent if mango was not consumed, 38 percent if consumed one day and 47 percent if consumed both days.

All eight diversity indicators were significantly correlated with micronutrient intakes, with few exceptions for individual nutrients; each food group diversity indicator was also significantly associated with MPA. Because both diversity and MPA were also associated with 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 all 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-group, 13-group and 21-group indicators, where 15 g was used as the cutoff for each food group to "count."

ROC analysis confirmed that the predictive power of the diversity indicators increased with higher levels of disaggregation. Indicator performance also increased slightly when imposing a 15 g restriction in order for a food group to "count." Examination of various cutoffs for MPA (a necessary step prior to evaluating indicator characteristics) revealed that indicators of good micronutrient adequacy could not be examined in this population because of the generally low values of MPA.

Examination of indicator characteristics using MPA cutoffs of 50 percent, 60 percent and 70 percent showed indicator performance was moderate for NPNL women, and poor for lactating women.

Among NPNL women, a number of indicators performed reasonably, depending on the MPA cutoff and the food group diversity cutoff employed. The 9-group, 13-group and 21-group indicators, with the 15 g restriction, each yielded acceptable balance between sensitivity and specificity and total misclassification in the range of 29-35 percent for one or more of the MPA cutoffs. These levels of misclassification may be acceptable for indicators of this type; that is, population-level indicators for assessment and monitoring and evaluation.

GENERALIZABILITY

Characteristics of the study sampling frame and survey timing impact generalizability. Most households in the sampling frame participated in some type of community group (usually a church group) and included young children. Therefore, results can only be generalized to households that share these characteristics. Perhaps more importantly, implementation of the survey during mango season strongly influenced results for nutrient intake and adequacy. Our results show that mango consumption is associated with higher intakes of a wide range of micronutrients, and not just of vitamin A.

Because of all these considerations, our results are not representative of women of reproductive age in rural Mozambique generally, or for all seasons. However, based on diet patterns and likely "substitutions" for mango, there is no reason to believe micronutrient intakes and adequacy would be substantially better in other seasons. The general picture that emerges is likely to be typical for areas where families remain impoverished and heavily reliant on starchy staples, with little access to animal-source foods: low nutrient adequacy prevails, and nutrient-dense foods that are seasonally available (such as mango) can have a large, time-limited effect on micronutrient adequacy.

For the main purpose of the exercise – developing indicators of micronutrient adequacy – neither the sample selection nor the seasonality issue invalidate our findings: for women with similar diets, 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 work at higher levels of overall nutrient adequacy.

CONCLUSIONS

The findings from rural Mozambique indicate that intakes of most nutrients were inadequate. This was particularly true for nutrients for which animal-source foods are the best sources: vitamin B12, calcium and iron. Yet, we note that intakes were also very low for folate and riboflavin, and were inadequate for nearly all micronutrients, with the exception of vitamins A and C due to seasonally high intakes of mango. Diets of lactating women were particularly deficient relative to their micronutrient needs. Gaps between intakes and requirements extended beyond the few micronutrients that are the usual focus of micronutrient supplementation programs.

We considered the potential of food group diversity indicators as proxies for micronutrient adequacy separately for lactating women and NPNL women. For lactating women, associations of diversity indicators with MPA were comparatively weak for this study site, and overall indicator performance was poor.

For NPNL women of reproductive age, our results suggest that food group diversity indicators have potential for use in population-level assessment. The best diversity indicators explored in this report were correlated not only with overall micronutrient adequacy, averaged across 11 micronutrients, but with most individual micronutrient intakes. Associations were not driven by one or a few micronutrients; this strengthens the case for use of food group diversity indicators as proxies for overall micronutrient adequacy.

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.

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[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. Mozambique Study: Original Research Objectives and Context [8]

The data used in this report were collected by IFPRI and collaborators in Zambézia Province, Mozambique. The survey was undertaken in November-December 2006 as part of an impact evaluation of an ongoing HarvestPlus Reaching End Users project (REU), and was designed to establish a baseline prior to the implementation of interventions.

The REU project aims to reduce vitamin A deficiency through encouraging adoption of vitamin A-rich orange-fleshed sweet potatoes (OFSP) as an agricultural crop and a household food; infants and young children, and women of reproductive age constitute two targeted groups. The project takes a three-pronged approach, simultaneously aiming to increase access to planting materials, develop markets for OFSP and increase demand for OFSP. Agricultural and nutrition extensionists work with volunteer "promoters" to reach larger numbers of households with new knowledge and practices.

The evaluation design is quasi-experimental and prospective, with the baseline survey providing information on two intervention groups ("Model 1" and "Model 2") and one control group. A group of villages was selected purposively, and then each village was randomly assigned to Model 1, Model 2, or to the control group. Within villages, the sampling frame consisted of households participating in community groups (usually a church group), and with young children aged 6-36 months. However, in many villages all households with age-eligible children were included, in order to achieve the desired sample size; in the end approximately two-thirds of the households reported membership in a community group. The villages constituted the clusters and the three groups the strata in the survey design; sampling weights were not used for this data set.[9]

The study area in Mozambique is characterized by a very poor resource base, low levels of literacy and high levels of malnutrition. Few households have regular cash income and most practice subsistence agriculture, in some cases supplemented by fishing and other activities. Much of the area is drought and/or flood-prone, although some areas of higher elevation are less so. Literacy is 63 percent among men and 23 percent among women aged 15 years and older. Among study children (most aged 6-36 months) 56 percent were stunted, though prevalence of wasting was low (5 percent). Survey results documented a very high burden of disease among young children.

The diet in the study area is very monotonous: maize and, to a lesser extent, cassava are the primary staples. Both are cooked as a paste and served with simple sauces, usually of beans, dark green leaves, and/or dried or fresh fish. Coconut is available in some parts of the study area. Importantly, the baseline survey occurred during mango season, and most women and children had eaten mango regularly in the previous week, and also one or more times on the recall day. Qualitative food frequency data[10] were available for children only; these showed that few nutrient-rich foods were eaten regularly by the focus children. In particular, animal-source foods and foods rich in fat were not regularly consumed, and almost no children received fortified products. Similarly, the women in our sample did not consume any fortified products. In general, very little food was purchased other than locally produced and marketed fish and crops.

No information was gathered on iron/folate supplement use during pregnancy. Government protocols include supplementation for pregnant women, but access to health services is extremely limited in the study area. The most recent DHS results for Zambézia Province showed that only 31 percent of all

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[8] Except as noted, all information for Section 4 is taken from Arimond et al. 2008.

[9] There were no census data nor other listing of households available in study areas and we did not have resources to conduct our own census, therefore no sampling weights could be devised. De Brauw et al. (2007) provide further details on evaluation objectives and design, sample size and sampling.

[10] Mothers were asked how many days in the last seven days the focus child had consumed food items or groups. The list of items/groups was most disaggregated for vitamin-A rich foods and animal source foods. The list included all commonly eaten foods.

women received iron syrup during pregnancy.[11] This figure is for urban and rural areas combined, and represents the lowest provincial-level prevalence in the country. The proportion of women receiving iron supplements in rural Zambézia would have been even lower.

[11] Instituto Nacional de Estatistica, Ministerio da Saude and ORC Macro/DHS Program 2005.

5. Methods

5.1. DATA COLLECTION FOR 24-HOUR RECALL AND CALCULATION OF NUTRIENT INTAKES [12]

The 24-h recall data were collected by two enumeration teams, each with one supervisor; Cornelia Loechl (CL) was responsible for overall coordination and supervision. Supervisors were seconded from the International Potato Center (CIP) office in Quelimane and all had previous survey experience. All enumerators had completed secondary school, but none had education beyond this level. Enumerators and field team supervisors received two weeks of training, with emphasis on anthropometric measurements and the 24-h dietary recall, including a one-day pre-test of dietary assessment tools. Training was conducted by the survey coordinator and the senior supervisor.

Data were gathered in 36 villages in four districts of Zambézia Province. For the 24-h recall module, one mother/child pair was selected in each of 12 households per village. The target age range for focus children was 6-36 months. In order to construct a summary variable for nutrient adequacy that takes into account day-to-day (intra-individual) variation in nutrient intakes, repeat 24-h recalls must be performed with a sub-sample of households. Based on feasibility of timely data collection, 18 villages were purposively selected from the original 36. The 24-h recall was repeated in a total of 106 households (five to seven households per village). All repeat recalls were done on a different day of the week than the first recall, one to two days after the first 24-h recall. Anthropometric measurements and data on physiological status were collected only once, several days prior to the first dietary recall.

The dietary data collection methods were based on and adapted from an interactive, multiple-pass method developed by Gibson and Ferguson.[13] Key features of the method include a group sensitization or "training" session for mothers two days prior to data collection in the home, and a "multiple pass" approach to gathering information on foods and recipes eaten. In a "multiple pass" 24-h recall, the respondent is first asked to list all foods and dishes eaten in order through the previous day. On the next "pass" she is asked to provide descriptive details (e.g., state when eaten [raw, boiled, roasted, etc.], details of processing [chopped, pounded, etc.]) and recipes for mixed dishes, and then to estimate quantities for each food or dish. Multiple pass methods are now considered optimal for aiding recall and are widely used, including in the United States (US) National Health and Nutrition Examination Survey (NHANES).[14]

Depending on the type of food and availability in the home, the following methods were used for estimating and measuring quantities: direct weighing, determining volume equivalent using beakers with marked volumes, using playdough models and measuring water volume displacement, estimating size using photographs, estimating proportions (e.g., half a banana), and assessing dimensions (length and thickness). For mixed dishes, the respondent was asked to estimate raw quantities for all ingredients in the recipe, including water, as well as the total volume of the mixed dish. The exception to this was for green leafy vegetables: respondents were asked to estimate the cooked volume of leaves included in the recipes because it was felt that the women could estimate this better.

In general, the 24-h recall was very challenging both for the enumerators and the respondents. Ideally, enumerators for 24-h recalls would have post-secondary education, a very high level of numeracy and a nutrition background. Enumerators with these qualifications, but also with relevant language skills, were not available. In addition, levels of literacy and numeracy were very low among the respondents. Therefore, several efforts were made to reduce the burden on enumerators and respondents, and to improve data quality. These included the pre-survey sensitization described above.

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[12] Except as noted, all information for Section 5.1 is taken from Arimond et al. 2008.
[13] 1999.
[14] Blanton et al. 2006.

In addition, in order to reduce the number of household-level recipes (and thus the burden on enumerators and respondents), standard recipes were developed for “chima” (stiff thick porridge made with maize or cassava), boiled rice and thinner porridges (“papas”). Project staff observed preparation of these dishes multiple times and in different parts of the project area. Ingredients were weighed before adding to the dish, and both weight and volume of the final cooked dish were recorded. Values were averaged across observations to create “standard” recipes.

Recipe observations were also conducted for other common “sauce” dishes (several types of bean sauces, several sauces made with dark green leafy vegetables and one recipe each for a sauce of small dried fish and chicken stew). The standard sauce recipes were used in evaluating the plausibility of household-level recipes (specifically, the ratio of main ingredient to total recipe volume). In cases where household level recipes were implausible (density of main ingredient fell well outside the range observed for the standard recipe), household recipes were “recalibrated” based on the observed range in standard recipes.

A project-specific food composition table (FCT) was developed because there is no FCT for national use in Mozambique. The United States Department of Agriculture (USDA) FCT, version 19,[15] was selected as the primary source due to completeness and high standards in relation to sampling and analytic methods. Secondary sources were selected for a small number of foods (or in some cases for individual nutrients) when group consensus was that the foods in the USDA were not similar enough to the Mozambican food items or when individual nutrients were missing. In order to calculate nutrient content for foods and recipes prepared in the households, USDA retention factors for similar foods and the appropriate cooking method (e.g., boiled, roasted) were applied.[16]

Three different types of conversion factors were used: 1) conversion factors for all measurement units to grams; 2) edible portion factors; and 3) raw-to-cooked conversion factors (“yield factors”). For the most commonly eaten foods, conversions from measurement units to grams (e.g., volume to grams [g], size to g) were calculated from repeat measurements by CL, who was the project nutritionist responsible for fieldwork. For less commonly eaten foods, conversion factors were taken from a variety of sources, including a report from a previous project in the study area[17] and the USDA FCT, version 19. Edible portion factors were applied for certain foods when the food or ingredient was directly weighed (e.g., mango, sugar cane, fresh cassava). Yield factors were used when foods were directly weighed raw, but consumed cooked, and when pictures were used to estimate (raw) weights but foods were eaten cooked. As with conversion factors, most edible portion and yield factors were gathered by CL.

To calculate the nutrient content of mixed dishes, ingredient quantities were converted to g, and the nutrient content was calculated per 100 milliliters (ml) of total cooked volume. The volume of mixed dishes eaten was estimated in ml, and then linked with the recipe data to yield individual intake of nutrients from each mixed dish. For single food items (e.g., mango, banana, roasted fish, boiled cassava), quantities eaten were converted to grams and then linked to the FCT to calculate individual nutrient intakes.

5.2. EXCLUSIONS FROM THE ORIGINAL SAMPLE

The original round 1 (R1) sample included 441 women aged 15-54. Two women were excluded because their age exceeded 49 years, which was defined as the upper limit for use in this study of women of reproductive age. A number of extreme energy outliers were identified when examining energy intakes: 16 women had energy intakes below a basal metabolic rate (BMR) factor of 0.9 and 27 women above a factor of 3.0.[18] Energy deficiency is common in the study area, and it is probable that some women were

[15] USDA 2006.
[16] USDA 2003.
[17] Low et al. 2005.
[18] Goldberg et al. (1991) provide 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-

losing weight. Against this background and after a careful evaluation of food intakes, all women with low energy intake were retained in the data set. Two women were kept in the sample despite having a BMR factor above 3.0, since their high energy intakes resulted from consumption of energy-dense nuts and were therefore plausible. In total, 25 women were excluded based on high energy intakes (most of them also reported extremely high consumption quantities of certain foods). In addition, two women had energy intakes within the acceptable range, but had to be dropped from the sample because of implausibly high intakes of rat or mango. Three more women were excluded because conversion factors for some foods or recipe ingredients were inadequate or missing, and there was no appropriate substitute.

The total number of exclusions was 32 and the final R1 sample size was 409 (including 103 non-pregnant non-lactating [NPNL], 54 pregnant and 248 lactating women, and 4 women who were both pregnant and lactating). The high share of lactating women resulted from the sample selection of the original study: young children and their mothers were surveyed. Because of the small number of pregnant women, results are not presented separately for this physiological group. However, pregnant women were included for the analysis of all women. For the analysis by physiological group, the four lactating women who were also pregnant were grouped with other lactating women (using the requirement for pregnant or lactating, depending on whichever was higher for a specific nutrient).

The original round 2 (R2) data included 106 women, since data collection on dietary intakes was only repeated for a sub-sample of women. 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. There were no problems with missing conversion factors in R2, and a lower proportion of women were identified as energy outliers (one woman with BMR factor < 0.9 who remained included and two women with BMR factor > 3.0 who were excluded). Two more women reported implausible intakes of certain foods in R2, and another 8 women were excluded because data were not available from the final R1 sample.

After a total of 12 exclusions, the final R2 sample consisted of 94 women (51 lactating women, 30 NPNL women and only 14 pregnant women, with 1 woman both pregnant and lactating). It is not problematic that the final R2 subset has substantially fewer women than the R1 sample, because the analysis protocol established for the WDDP (described below) requires that repeat measures be available for a subset of women only. Data were analyzed separately for physiological groups when sub-sample sizes allowed. For analyses based on a single recall (description of dietary patterns) results are presented for all three physiological sub-groups. For pregnant women, results related to nutrient intakes and adequacy could not be reported separately, which depend on a sufficient number of observations from two 24-h recalls.

5.3. DEVELOPMENT OF ANALYTIC 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. 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.[19] These discussions and exercises formed the basis for a detailed analysis protocol.[20] The protocol details a number of decisions, which are also summarized below, including:

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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. 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.

[19] See Joseph 2007.

[20] Arimond et al. 2008.

- Selection of key nutrients
- Selection of 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, adequate diet quality was 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.

Macronutrient intakes are reported for descriptive purposes. In addition, we present results relating the FGIs to energy intake. This is because in many previous studies, energy intakes have been shown to increase with increases in dietary diversity.[21] 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.

5.4. KEY NUTRIENTS

The selection of a set of micronutrients was discussed at the Copenhagen meeting. Considerations included known public health relevance, as well as 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.[22] 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[23] 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.[24] 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.[25] Consequences for child-bearing and lactation are not the only concerns; micronutrient deficiencies affect women's health from adolescence through aging.

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.

[21] See, for example, Ogle, Hung and Tuyet 2001; Foote et al. 2004; Torheim et al. 2004.
[22] WHO/UNICEF 1998.
[23] Kennedy and Meyers 2005.
[24] Allen 2005.
[25] Bartley, Underwood and Deckelbaum 2005.

5.5. REQUIREMENTS AND REQUIREMENT DISTRIBUTIONS

Appendix 6 defines the EAR and SDs (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 this 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[26] 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 US "Adequate Intake" value (AI)[27] 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.[28]

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.[29] 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 G-7, with the US requirements, has been adapted for absorption levels of either 5 percent or 10 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,[30] and these were adopted for the WDDP.

In addition to the use of US and IZiNCG values for mineral requirements, US values were also used when SD/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 Mozambique data, we assumed low levels of absorption for iron and zinc. In the case of zinc, this choice was clear: a low absorption level of 25 percent is recommended for "unrefined, cereal-based diets." [31] The Mozambique study site meets the criteria for this type of diet because of the very high intakes of maize and assumed high phytate : zinc molar ratio.

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[26] 840 mg/d is the WHO/FAO (2004) EAR for NPNL women, and is the same for lactating women. The EAR for pregnant women is 940 mg/d.
[27] 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).
[28] 2004.
[29] Table G-7 in IOM 2006.
[30] IZiNCG 2004; Hotz 2007.
[31] Gibson and Ferguson 2008.

For iron, the choice between an assumption of low (5 percent) or intermediate (10 percent) absorption was more difficult. WHO/FAO[32] 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[33] suggest interpreting "minimal" to describe diets in which the main meal includes at least 50 g of flesh foods and 30 mg of vitamin C. Only 22 percent of the women in this sample had a *total daily intake* of at least 50 g of flesh foods and miscellaneous small animal protein. Overall intake from this food group was therefore considered negligible. Eighty-nine percent of the women had a total daily vitamin C intake above the cutoff of 30 mg, but this was mainly due to high intakes of mango; analysis by eating episode revealed that mango was consumed as a snack food and not with meals.

On the other hand, iron absorption is estimated to be increased by 50 percent in the presence of anemia.[34] Data on anemia are not available for this study site, but results from other studies from Mozambique reported in the WHO Global Database show a prevalence of approximately 50 percent low hemoglobin (< 120 g per liter [g/L]) among adult women at two points in time (1996; 2001-2002).[35] Thus, for this study area, the available guidance on the selection of absorption levels still leaves room for judgment. Consequently, descriptive results for both low and intermediate absorption of iron are presented, but low bioavailability is assumed in further analyses, including construction of a summary variable for micronutrient adequacy.

5.6. 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. See Arimond et al.[36] for details on discussions and criteria leading to selection of the candidate food group diversity indicators (FGIs) used in this study.

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. At present, only the two most aggregated (6-group and 9-group) indicators can be constructed from the DHS questions. However, with slight modification in a future round, a 13-group indicator could be constructed.[37] In general, the intent was to provide indicators that represent all major food groups, while emphasizing the contributions of micronutrient dense food groups. To do this, animal-source foods, fruits and vegetables were more disaggregated than were starchy staples.

For each of the four groupings (6, 9, 13 and 21 groups), two indicators were constructed. One had a 1 g requirement for minimum consumption in order for a group to count in the score; these are referred to as FGI-6, FGI-9, FGI-13 and FGI-21. The other had a 15 g minimum consumption criterion; 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).This allowed exploration of the impact of inclusion of foods eaten in very trivial amounts, which might nevertheless be counted in simple recalls (e.g., if small quantities of chilies in a sauce were scored positively as vegetables).

[32] 2004.
[33] 2008.
[34] Gibson and Ferguson 2008.
[35] From http://www.who.int/vmnis/anaemia/data/database/countries/ (accessed October 5, 2008).
[36] 2008.
[37] In order to construct the 13-group indicator, 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, etc.).
[b] "Vitamin A-rich" is defined as > 60 RAE/100 g (equivalent to 120 RE for plant foods); "vitamin C-rich" is defined as > 9 mg/100 g; these represent 15 percent of the nutrient reference values of the Codex Alimentarius (NRV).

5.7. 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.[38] 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 the population level.

[38] Barr, Murphy and Poos 2002; IOM 2000a.

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 non-symmetric for iron). The PA associated with "usual intake" is calculated for each individual in the sample, 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 for each individual. This average, in turn, can be correlated with dietary diversity indicators, and further analyses performed.

5.8. SUMMARY OF ANALYTICAL APPROACH AND STATISTICAL METHODS

Applying the WDDP analysis protocol to the Mozambique 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 5.6**)
2. Constructed the summary indicator "mean probability of micronutrient adequacy" (MPA), incorporating information on nutrient requirement distributions and on day-to-day variability in intakes (see **Section 5.7** 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

Analysis was performed using Stata version 9. For all statistical tests, values of $P < 0.05$ were considered significant. For comparisons between R1 and R2, and between physiological groups (NPNL women, pregnant and lactating women, with women who were pregnant and lactating included in the lactating group), adjusted Wald tests were used to evaluate the statistical significance of differences when variables were continuous or discrete. For categorical variables, the Pearson's chi-square statistic was used to evaluate differences in proportions. In all cases, survey design (clustering and stratification) was accounted for; sampling weights were not available. In the case of skewed variables, medians are presented for descriptive purposes, but statistical tests compared means of transformed variables; there are no tests available in Stata for comparing medians, while accounting for survey design.

The survey design is taken into account for **Tables 1-8**, since those results reflect population-level characteristics and stratification and clustering affect the SDs reported. For the remaining tables and figures, consideration of the survey design was not necessary, as those results reflect relationships investigated at the individual level in correlations, regressions and analysis of indicator characteristics.

The second task – construction of MPA – required a series of steps that can be summarized as follows:[39]

- 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**.[40]

[39] See Arimond et al. 2008 and Joseph 2007 for a more detailed description of construction of MPA.
[40] Distributions of the food group diversity indicators were considered acceptable (approximately normal) for use without transformation in correlations and regressions. Statistical tests of differences between physiological groups were performed on the transformed values of nutrient intakes.

- 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 for the transformed intake variables, taking into account clustering and stratification for between-person variances.
- Using these variances, calculated the "best linear unbiased predictor" (BLUP) of the *usual* intake for each nutrient, for each woman.
- Using the BLUPs, calculated the PA for iron (NPNL women) from the table in **Appendix 6**. The PA for calcium was also calculated, using the method of Foote et al.[41] (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 and pregnant 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 calcium and iron, were averaged to form MPA. The distribution of MPA was also transformed to approximate normality. The untransformed values are presented in descriptive tables. The transformed values were used in correlation and regression analyses.

[41] 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 appendices 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**). Results are not presented separately for pregnant women because of the small sub-sample size. Where relevant, differences between physiological groups (including pregnant women) were tested for significance; test results are reported in the text.

6.1. CHARACTERISTICS OF WOMEN, AND ENERGY AND MACRONUTRIENT INTAKES

Descriptive statistics are presented in **Table 1** for the full sample (n = 409, R1) and in **Table A4-1** for R2 (n = 94). Mean age was 29-30 years and did not vary between the R1 sample and the R2 sub-sample. Average age among lactating women was slightly lower than among NPNL women (28 vs. 30 years at R1; P = 0 .042). Women's heights and weights did not vary between rounds and reflected small stature, with an average height of 154 centimeters (cm) and an average weight of 50 kilograms (kg) (not including pregnant women).[42] These anthropometric characteristics did not differ for lactating and NPNL women.

Body mass index (BMI) was in the normal range (18.5-24.9) for most lactating and NPNL women. Only about 7 percent of the women had low BMI. The distribution of BMI was nearly identical for the R2 sub-sample. In R1, there were no significant differences by lactation status for the proportion of women with very low (< 17), low (< 18.5), normal and high BMI.[43]

Mean energy intake was 2,114 kilocalories (kcal) for R1 and 2,159 for R2, with a wide range in each round (738-4,208 in R1; 928-3,457 in R2) (**Tables 2** and **A4-2**). Energy intakes were not significantly different between rounds or by physiological status. In the absence of information on physical activity, it is difficult to assess adequacy of energy intakes. Estimated energy requirements depend on BMR (which, in turn, varies with age, height, weight and body composition) and, critically, on physical activity levels. 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.[44] Median intakes for our sample of slightly larger women fell near the mid-point of that range.

Median intake of protein was 58-60 g; this amount exceeds the WHO/FAO safe intake[45] for NPNL women and is close to the safe intake during lactation (55-61 g, depending on the age of the baby).[46] In contrast, median fat intake was very low at 10-12 g. Protein and fat intakes did not differ significantly by round or

[42] Pregnant women were only slightly heavier, at 54-55 kg (R1-R2).
[43] Pregnant women were not included in this comparison, because the weight gain during pregnancy influences BMI.
[44] FAO/WHO/UNU 2001.
[45] The "safe level of intake" is similar to a recommended nutrient intake (RNI) in that it is set at the high end of a requirement distribution. This concept was retained from earlier (1988) FAO/WHO documents setting requirements.
[46] WHO/FAO/UNU 2002.

physiological status. Energy intake from carbohydrates was 82 percent, far exceeding the upper limit of the 55-75 percent range recommended by WHO[47] for populations. Protein contributed 11 percent, within the range of the WHO recommendation (10-15 percent). However, only 2 percent of energy was from animal-source protein, which is generally of higher quality than plant-source protein. Fat intake provided only 7 percent of total energy intake, far below the WHO population-level recommendation of 15-30 percent. The proportion of energy from macronutrients did not differ by physiological status.

6.2. DESCRIPTION OF DIETARY PATTERNS

Dietary patterns from R1 are detailed in **Tables 3-7**. **Tables 3a-d** and **Figure A** show the proportion of women who consumed each food group on the first recall day.[48] **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.

Patterns for lactating, pregnant 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 eggs (8 percent vs. 2 percent of NPNL women) and at least 1 g of grains and grain products (95 percent vs. 87 percent). A lower proportion of lactating women consumed vitamin A-rich dark green leafy vegetables (31 percent vs. 42 percent). P-values were < 0.05 for these comparisons. When the 15 g cutoff was used, the proportion of women consuming small fish eaten whole with bones differed by physiological status, with the highest proportion among pregnant women (28 percent vs. 17 percent for lactating and 14 percent for NPNL women). NPNL women were more likely to consume at least 15 g of dark green leafy vegetables (42 percent vs. 31 percent for lactating women) while lactating women were more likely to consume grains (95 percent vs. 87 percent). However, overall, consumption patterns were very similar across physiological groups, and results for all women are described in the text below.

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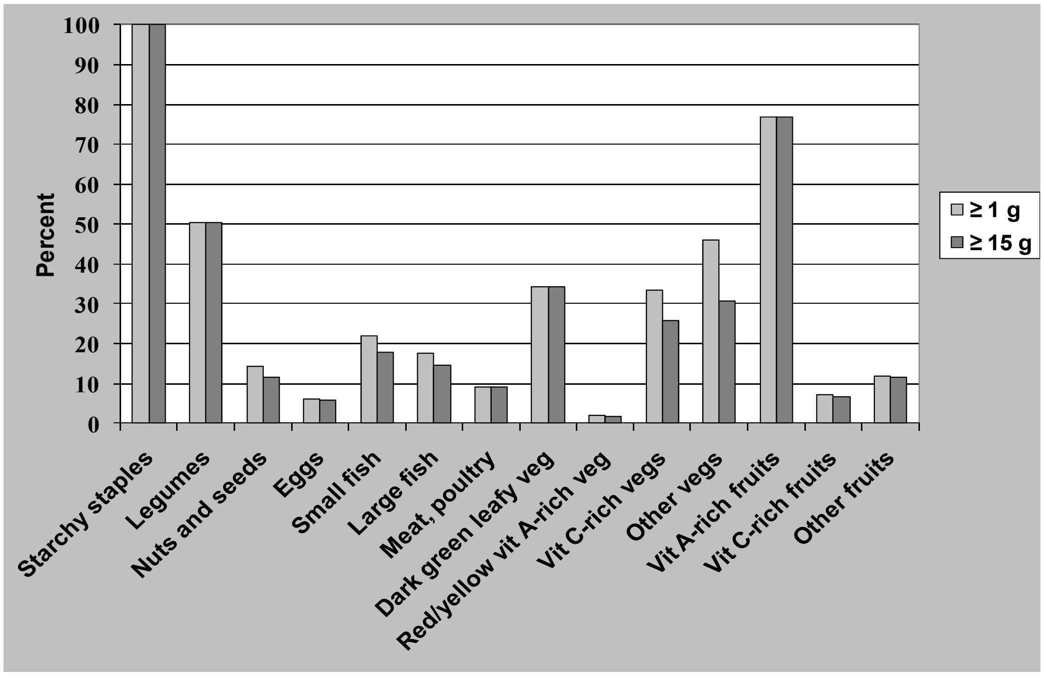
[47] 2003.

[48] The food groups in Figure A do not correspond exactly with the groupings listed in Table A. The Figure corresponds most closely to the 13-group list, but several disaggregated food groups, included only in the 21-group listing, were also included in the Figure, to allow illustration of all groups where the 1 g vs. the 15 g minimum made a difference.

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



At the highest level of aggregation (**Table 3a**), all women reported consuming starchy staples, and more than half reported consuming legumes/nuts. Dairy was not consumed at all, and other animal source foods were eaten by half of the women. Four in five women reported consuming vitamin A-rich fruits and vegetables, and roughly two-thirds reported eating other fruits and vegetables. Except for the latter food group, there were no substantial differences between the 1 g and the 15 g cutoffs; that is, those who had 1 g of these food groups also tended to have at least 15 g. When imposing the 15 g cutoff, "other fruits and vegetables" was the only food group that dropped by more than five percentage points, from 63 percent to 53 percent.

Even when food groups are further disaggregated (**Tables 3b-d**) results for the 1 g and the 15 g cutoffs were very similar, except for vitamin C-rich vegetables and other vegetables. There were very minor differences of 3-4 percentage points for nuts and seeds, large fish, and small fish (**Figure A**). Even for the vegetables, differences were not very large: vitamin C-rich vegetables dropped from 34 percent to 26 percent, and other vegetables from 46 percent to 31 percent when imposing the 15 g cutoff. The difference for vitamin C-rich vegetables was mainly due to the consumption of tomato in very small quantities by some women. For other vegetables, the difference was traced to onion: 28 percent of women consumed at least 1 g of onion, but only 13 percent at least 15 g.

In **Figure A**, the high proportion of women consuming vitamin A-rich fruits is noteworthy. The survey was conducted during mango season, and 74 percent of women consumed ripe mango on the first observation day (R1). Ripe papaya, the second most frequent vitamin A-rich fruit in the diet, was consumed by 18 percent of the women.

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 (6 groups) and **Table 4d** showing the most disaggregated. **Table 4a** shows a diet dominated by staple foods, with median intake of 1,318 kcal from starchy staples. For all women (consumers and non-consumers taken together), intakes are noteworthy for two other groups: legumes and nuts (median 158 kcal), and vitamin A-rich fruits and vegetables (median 194 kcal). Median intakes for other animal source foods and other fruits and vegetables are below 10 kcal, and dairy was not consumed at all. The same pattern is reflected among those consuming: median intakes are highest for starchy staples, legumes and nuts (386 kcal), and vitamin A-rich fruits and vegetables (253 kcal); median intakes for non-dairy animal source foods, and other fruits and vegetables are low (108 and 34 kcal).

Further disaggregation (**Tables 4b-d**) shows the same picture, with no food group other than starchy staples, legumes and nuts and vitamin A-rich fruits and vegetables providing substantial energy when considering the whole sample. For higher levels of disaggregation, median intakes for all other food groups except for starchy staples, legumes/nuts (i.e., beans and peas in the 21-food group classification) and vitamin A-rich fruits dropped to zero (**Tables 4c-d**). However, **Table 4d** shows that the following groups, when eaten, were eaten in substantially larger amounts than others: other starchy staples (mostly cassava and white-fleshed sweet potatoes), cooked dry beans and peas, vitamin A-rich deep yellow/orange/red vegetables (consumed by two percent of the women, predominantly yellow- and orange-fleshed sweet potatoes), and vitamin A-rich fruits. For these food sub-groups, median consumption quantities among those who consumed were 239-434 g, and were highest for vitamin A-rich fruits because of widespread availability and consumption of mango. Median energy intakes for these four groups ranged from 242-386 kcal.

In contrast, median consumption quantities were small among those who consumed small fish, large fish and other seafood, nuts and seeds, vitamin C-rich vegetables, and other vegetables (29-40 g). For vitamin C-rich vegetables (mostly tomato) and other vegetables (mostly onion), median energy intakes were trivial (11-14 kcal). Vitamin A-rich dark green leafy vegetables were eaten in moderate amounts (median 135 g among those who consumed), but contributed little energy (26 kcal) because of their low energy content. Other food groups consumed in moderate amounts when eaten are red meat, poultry, vitamin C-rich fruits and other fruits (85-174 g / 95-261 kcal).

Dietary intakes by food group were similar for lactating, pregnant and NPNL women. With consumers and non-consumers taken together, significant differences were found at the highest level of disaggregation: lactating women consumed more grain and grain products than NPNL women (median 1,210 kcal vs. 1,121 kcal, $P < 0.05$ for comparison of transformed means), and pregnant women consumed less cooked dry beans and peas than lactating women (median of 0 kcal vs. 154 kcal, $P < 0.05$).[49]

Table 5 presents mean and median scores for all eight food group indicators. There was little difference in mean and median diversity scores for 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. However, imposing the 15 g requirement lowered the minimum values of most diversity indicators. For example, scores for the first, 6-food group indicator (FGI-6), ranged from 2 to 5; when the 15 g cutoff was imposed (FGI-6R), the scores ranged from 1-5. The maximum values of the other 6 indicators fell even further below the highest possible score. Consequently, medians for the most aggregated indicators fell at mid-point or higher on the possible range of scores (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 did not differ by physiological status.

Table 6 shows the percent of observations at each score for each indicator, and provides a picture of the tight clustering of scores, even for the more disaggregated indicators with a broader range of possible scores. For the less disaggregated indicators (FGI-6 through FGI-9R) and for FGI-13R, scores clustered on a 3-point range. For the more disaggregated indicators beside FGI-13R (i.e. FGI-13, FGI-21, FGI-21R) over 90 percent of women clustered on 4 scores. Note that the limited variability observed for a FGI constrains the potential for detecting associations with MPA.

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[49] For some more highly disaggregated food groups, testing for significant differences by physiological status was not possible for the entire sample (those who consumed and those who did not consume the food group). Intakes of food groups were skewed, which required transformation prior to testing for differences in means. However, for some of the more highly disaggregated food groups, a considerable proportion of women had zero intakes, which prevented transformation to approximately normal distributions.

Cross-tabulations of food group diversity scores against the individual food groups illustrate how diets diversify (e.g., what is the most common second food group when the score is 2; **Tables 7a-h**). Focusing on FGI-21R (**Table 7h**), the most common "2nd" food groups were cooked dry beans and peas (26 percent), followed by other starchy staples (primarily cassava) and other vegetables (primarily onions), with 16 percent each. At scores of 3, vitamin A-rich fruits (68 percent, primarily mangos) and vitamin A-rich dark green leafy vegetables (23 percent) were most likely to be included in the diet (in addition to the foods mentioned at a score of 2). At scores of 4, vitamin C-rich vegetables (20 percent, mainly tomatoes), large whole fish and other seafood (17 percent), and small fish eaten whole with bones (15 percent) were added. Diets continued to diversify as scores increased; however, some food groups were never reported (dairy, organ meat), or were never reported by a substantial proportion of women (red meat of any kind).

6.3. DISTRIBUTIONS OF MICRONUTRIENT INTAKES AND FOOD GROUP DIVERSITY SCORES

Intake distributions for most nutrients, as well as intra-individual SDs of intake, were strongly skewed (**Figures 1-22**); this is typical in most settings. Thus, nutrient intake distributions were 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., only whole number scores are possible, the indicators have a limited range of possible values). Slight skewness of the distribution is observed for FGI-13R, FGI-21 and FGI-21R.

6.4. MICRONUTRIENT INTAKES AND ADEQUACY

For NPNL women, median micronutrient intakes were far below EARs for two micronutrients, about equal for another three, and higher for five micronutrients. For vitamin B12 and iron, median intakes reached only 1 percent and 37 percent of EARs, respectively, underscoring the lack of animal source foods in the diet. Median calcium intakes amounted to only 31 percent of adequate intake (AI). Median intakes roughly equaled EARs for riboflavin, niacin and folate, and exceeded EARs for thiamin, vitamin B6 and zinc. For vitamins A and C, median intakes were about three times the EARs.

Overall, micronutrient intakes were less adequate relative to requirements for lactating women: median intakes were below EARs for 7 of 10 micronutrients, considerably below the AI for calcium, and above EARs for only three micronutrients (R1). Again, intakes of vitamin B12 and iron were lowest relative to EARs, followed by riboflavin, folate, niacin, thiamin and vitamin B6 in ascending order. Median intakes were slightly above the EAR for zinc, and well above requirements only for vitamins C and A.

Micronutrient intakes did not differ by round, except for vitamin B6 (median intake was 1.9 mg in R1 vs. 2.2 mg in R2, $P = 0.028$ for comparison of means of transformed intakes). Consequently, relationships of median micronutrient intakes to EARs were very similar across rounds. With the exception of vitamin B6, micronutrient intakes also did not differ significantly by physiological status. Median intakes of vitamin B6 were slightly lower among lactating women than among NPNL women (1.6 mg vs. 1.9 mg, $P = 0.041$).

The estimated probability of adequacy (PA) incorporates information from both survey rounds. Distributions for PAs (**Figures 31-41**) show a peak at zero for many micronutrients. The proportion of women with zero PA varies from 4 percent for zinc to 68 percent for vitamin B12. In addition, more than half of the women have PAs below 0.30 for thiamin, riboflavin, niacin, folate, calcium and iron; for lactating women, this is also true for vitamin B6 (**Figures L31-41**). Because a probability cannot exceed 100 percent, PAs have an upper limit of 1.0; even very high intakes result in a maximum PA of 1.0. Therefore, distributions of some nutrients also have a spike at 1.0. When averaged across all women, the PA is equivalent to a population-level estimate of prevalence.[50]

When all women in the sample were grouped together, estimates of prevalence of adequate intake ranged from very low (5-17 percent) for iron, calcium and riboflavin; to low (19-30 percent) for folate,

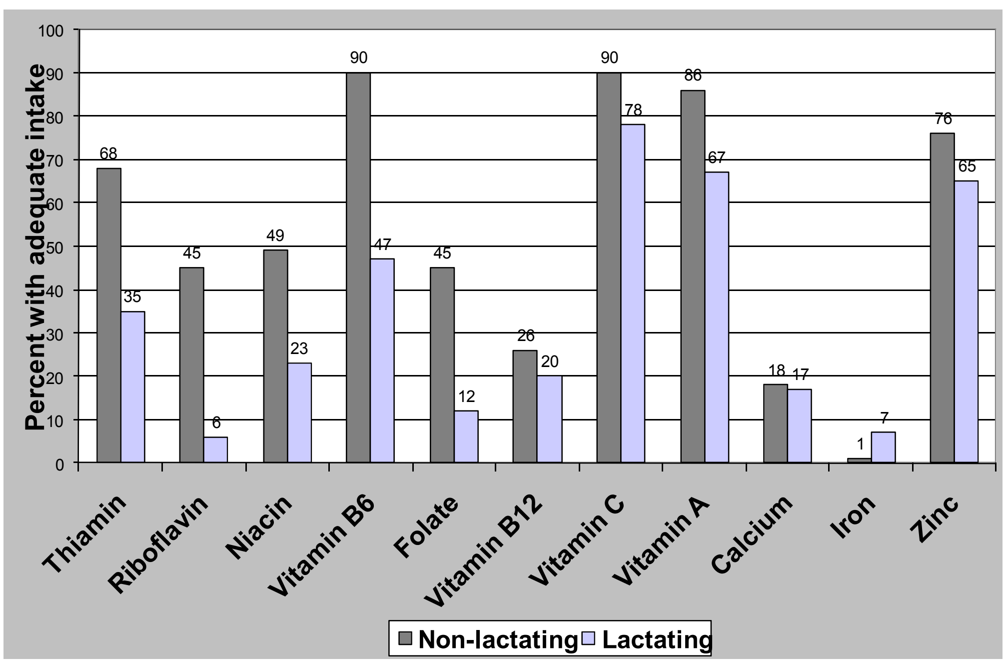
[50] IOM 2000a.

vitamin B12 and niacin; to moderate (43-64 percent) for thiamin, vitamin B6 and zinc; to relatively high (74-83 percent) for vitamins A and C (**Table 8**). **Figure B** shows the prevalence of adequate intake for lactating and NPNL women separately.

Estimated prevalence of adequacy was generally lower for lactating women, due to higher requirements. This applies to all nutrients except for iron, because NPNL women have higher iron requirements due to menstruation. The prevalence of adequacy for iron was very low for both groups: 1 percent for NPNL women and 7 percent for lactating women. Other nutrients with particularly low prevalence of adequacy for lactating women were riboflavin (6 percent) and folate (12 percent). Both physiological groups portrayed in **Figure B** fared poorly on prevalence of adequacy of calcium (17-18 percent), and lactating women reached only 20 percent for vitamin B12 and 23 percent for niacin. For NPNL women the prevalence of adequacy was high for vitamin B6 (90 percent), vitamin C (90 percent) and vitamin A (86 percent). For lactating women, prevalence of adequacy exceeded 75 percent only for vitamin C (78 percent), and exceeded 50 percent only for two other nutrients (zinc at 65 percent and vitamin A at 67 percent). The relatively favorable outcome for vitamins A and C is largely attributable to the seasonally high mango intakes.

Appendix 7 presents alternate tables, assuming intermediate instead of low absorption for iron and zinc. As noted, the choice of low bioavailability is less clear for iron than for zinc, and it is justifiable to present results for both assumptions. **Tables A7-1, A7-2, and A7-3** show the implications of assuming intermediate absorption levels: estimated prevalence of adequacy for iron rises from 5 percent to 34 percent for all women, from 1 percent to 27 percent for NPNL women, and from 7 percent to 44 percent for lactating women. The prevalence of adequacy thus improves from very low to low or moderate with the change in assumption about bioavailability. However, iron intakes remain far from adequate under either assumption.

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. Starchy staples are the most important element of the diet, with maize chima (84 percent), boiled rice (24 percent), maize porridge (15 percent) and cassava chima (13 percent) being the most commonly consumed staples on the recall day.[51]

Starchy staples contribute 68 percent of total energy, 51 percent of the total protein and 38 percent of total fat. Starchy staples also provide more than two-fifths of the thiamin (47 percent), niacin (44 percent), vitamin B6 (42 percent) and iron (48 percent), and 68 percent of the zinc in the diet. After starchy staples, legumes and nuts are the second most important source of fat, protein, zinc and iron intakes, contributing 16-25 percent of these nutrients. Legumes and nuts also supply between 13 percent and 18 percent of the niacin, riboflavin and thiamin in the diet. Vitamin B12 is mainly provided by fish (61 percent) and poultry (11 percent).[52] Vitamin A-rich fruits (largely mango) contribute most of the vitamin C (60 percent) and vitamin A (67 percent), and a considerable share of vitamin B6 (24 percent).

Riboflavin, folate and calcium were provided by several food groups in substantial shares, whereas one single food group was the dominant source of intake for other micronutrients. The following food groups are main sources of riboflavin, folate and calcium, in order of percent contribution for each nutrient (those groups contributing at least 10 percent of total intake are listed, see **Table 9c**):

Riboflavin:	Starchy staples (30 percent); vitamin A-rich fruits (24 percent); legumes and nuts (15 percent)
Folate:	Starchy staples (31 percent); legumes and nuts (28 percent); vitamin A-rich fruits (20 percent)
Calcium:	Legumes and nuts (24 percent); starchy staples (22 percent); vitamin A-rich fruits (15 percent); vitamin A-rich dark green leafy vegetables (15 percent)

Note that dairy products – usually the most important source of calcium – were not consumed at all by the women in this study sample.

Patterns were very similar for lactating and NPNL women, with some minor differences.[53] Eggs and small fish contributed a larger share of vitamin B12 intakes for lactating women (12 percent vs. 4 percent for NPNL women for eggs, and 38 percent vs. 27 percent for NPNL women for small fish).

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

When all women in the sample were grouped together, all eight diversity indicators were positively and significantly associated with estimated micronutrient intakes (**Table 10**). There were few exceptions to this: correlations of some of the more highly disaggregated diversity indicators (FGI-13R, FGI-21 and FGI-21R) with vitamin B12 intakes were insignificant, and so were correlations of FGI-6 with iron intakes, and correlations of FGI-9 and FGI-13 with iron and zinc intakes. Correlation coefficients for significant associations were low to moderate in size, ranging from 0.10 to 0.35. Five out of eight diversity indicators had correlations over 0.30 with vitamin C intakes. Correlations over 0.30 were most prevalent for FGI-9R (3 out of 11 micronutrients) and FGI-21R (4 micronutrients).

Controlling for energy reduced the number of significant correlations notably. For two of the "unrestricted" indicators (FGI-6 and FGI-21), most associations were not significant once energy was controlled for. In contrast, eight of eleven correlations remained significant for FGI-9R and FGI-13R. Overall, significant

[51] Arimond et al. 2008.
[52] A very small proportion of vitamin B12 comes from vegetable sources, i.e. from mushrooms included in the "other fruits and vegetables" category.
[53] This comparison is based on absolute differences in mean percent contribution of the food groups, for lactating and NPNL women. Testing for significant differences was not possible, because tests for differences in median cannot consider the sampling design, and tests for differences in mean would require approximately normally distributed variables. The proportion of macro- and micronutrient intakes from each food group was typically strongly skewed, with values of zero for many nutrients. As a result, it was not possible to obtain satisfactory transformations.

positive correlations ranged from 0.10 to 0.29 when energy was controlled for, with the highest coefficients observed for FGI-9, FGI-9R and FGI-13R.

Not surprisingly, correlations declined most for nutrients for which starchy staples were the largest source (i.e., thiamin, riboflavin, niacin, vitamin B6, folate, iron, zinc). The substantial contribution of the energy-dense legumes and nuts group to folate (28 percent) and iron (25 percent) intakes is also likely to contribute to the decline in correlations for these nutrients. Correlations of all eight diversity indicators with vitamins B12, A and C intakes were least affected when controlling for energy. These three micronutrients were mainly provided by mango or flesh foods.

Results for lactating women showed similar patterns but fewer correlations were significant (**Table L10**). Correlations with energy were weaker, and correlations with most micronutrients (not controlling for energy) were lower than for all women, reaching a maximum of 0.31. FGI-9R was the only indicator with at least two correlations above 0.30. Overall, the associations with thiamin, niacin and zinc intakes were considerably lower than for the entire sample.

For NPNL women, a different pattern emerged. As for lactating women, there are fewer significant associations between the diversity indicators and micronutrient intakes than for the entire sample, especially for the most aggregated indicators (**Table N10).** This is partly attributable to the small sample size (n=103). However, correlations with energy and most micronutrients (not controlling for energy) were higher for NPNL women than for the entire sample and for lactating women, ranging up to a maximum of 0.48. The largest differences between the physiological groups occurred for correlations with thiamin and zinc intakes, and for correlations of the 21-food group indicators with niacin intakes. Results for FGI-21R were strongest: correlations with intakes of eight micronutrients exceeded 0.30. FGI-9R and FGI-13R followed, each having correlations with four micronutrients in this range. Consistent with stronger associations with energy, correlations with micronutrient intakes dropped more for NPNL women than for the entire sample when energy was controlled for.

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

The distribution of MPA (**Figure 42**) for all women shows a wide range across the possible values of 0-1.0, with sufficient variability to explore associations with diversity indicators and each food group. A look at separate histograms for the main physiological groups helps to understand the almost bimodal distribution for the entire sample: for NPNL women, the distribution of MPA is skewed to the right and peaks around 0.7; for lactating women, the distribution is skewed to the left and peaks around 0.3.[54] Mean MPA was 54 percent for NPNL women and only 34 percent for lactating women. For pregnant women, results are not presented in separate tables because of the small sample size, yet it is worth reporting that mean MPA was very similar to that of lactating women, at 35 percent. Differences in MPA between NPNL women and lactating women were highly significant ($P < 0.000$).

For all physiological groups, seasonally high mango intakes clearly made a major contribution to MPA. We examined the role of mango in two ways. First, we examined MPA by number of days mango was consumed for the 95 women with two days of data. There was a strong and clear relationship: MPA averaged 24 percent if mango was not consumed, 38 percent if consumed one day and 47 percent if consumed both days. Given the small sub-sample size it was not possible to analyze by physiological group or to explore if this relationship was confounded by other differences between mango consumers and non-consumers. However, since most households had mango trees (80 percent of households, average of eight trees) and most women consumed mango at least once, mango was clearly not a luxury available only to better-off households.

[54] To reduce skewness, the MPA variable was transformed for use in the correlations and regressions described below.

Second, in order to look at the role of mango in the two main physiological groups, we recalculated MPA for each group, excluding all micronutrients contributed by mango.[55] Mean MPA dropped from 54 percent to 33 percent for NPNL, and from 34 percent to 17 percent for lactating women. The prevalence of adequacy for all women fell from 74-83 percent to 20-28 percent for vitamins A and C. For niacin, thiamin and vitamin B6 – previously in the moderate range of 43-60 percent – prevalence of adequacy fell to 12-30 percent.

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 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 five major food groups consumed (not including dairy, which was not consumed) were positively and significantly associated with MPA. Correlations ranged from 0.12-0.19 (non-dairy animal source foods, and other fruits and vegetables) to 0.51 (vitamin A-rich fruits and vegetables). The more disaggregated food groupings (**Tables 11b-d**) provide a more specific look at which food groups related most strongly to MPA. By far the strongest correlation (0.50) was observed for vitamin A-rich fruits (**Table 11d**), followed in decreasing order by vitamin A-rich dark green leafy vegetables, cooked dry beans and peas, vitamin C-rich vegetables, other vegetables, grains and grain products, and other starchy staples. Correlations with energy from large fish and seafood, nuts and seeds, and fruits not rich in vitamins A or C were also significant.

Tables 11a-d also illustrate how the relationship between food groups and MPA changed when energy was controlled for. In this case, the relationship between starchy staples and MPA (**Tables 11a-c**) and grains/grain products and MPA (**Table 11d**) became negative. This implies that increases in intake from these groups were associated with lower micronutrient density. Correlations of MPA with three other food groups that are not very micronutrient-dense because of their relatively high energy content (other starchy staples, cooked dry beans and peas, and nuts and seeds) became insignificant when controlling for energy. The direction of association remained positive and significant for all other food groups (except for "other fruits"), indicating that increases in intake of these food groups were associated with higher micronutrient density of the diet.

Tables L11a-d and **N11a-d** show that results are less consistent for the two sub-samples. Correlations with MPA and energy from several food groups proved insignificant for NPNL women or lactating women, although they were significant for all women. For lactating women, correlations for nuts and seeds, and "other vegetables" were not significant. For NPNL women, with a smaller sample size, correlations were not significant for energy from grains/grain products, other starchy staples, nuts and seeds, large fish and seafood, and vitamin A-rich dark green leafy vegetables. For a few food groups (other vegetables, cooked dry beans and peas, and other fruits), associations with MPA were much stronger for NPNL than for lactating women. The opposite was true for vitamin A-rich fruits, where the correlation with MPA amounted to 0.60 for lactating women, exceeding the correlation for NPNL women markedly. When controlling for energy, the association of starchy staples with MPA turned negative for both physiological sub-groups.

6.8. RELATIONSHIP BETWEEN DIVERSITY INDICATORS AND TOTAL ENERGY INTAKE

All eight food group diversity indicators were positively and significantly correlated with energy intake. These associations are illustrated in **Figure C**, and in **Tables 12-13**. Correlations tended to rise with increasing disaggregation of food groups, particularly for the 21-group indicators (**Table 13**). Correlations

[55] We acknowledge that it is very likely that mango would be replaced in the diet by some other food. Given the limited range of options, it may be that the other food would not be as rich in micronutrients, and particularly vitamins A and C. Mango may also function as a supplement to diets, and be only partially replaced in other seasons. OFSP is one possible substitute for mango during other seasons.

also increased for a given set of food groups when the 15 g minimum requirement was imposed, especially for the 6- and 9-food group indicators and the sub-sample of NPNL women. Overall, correlations were low to moderate, ranging from 0.15 to 0.26 for lactating women and from 0.23 to 0.41 for NPNL women.

As would be expected, energy values tend to be higher for any given diversity score when the 15 g requirement is imposed (see **Figure C**). For NPNL women, **Figure C** illustrates a consistent increase of energy intakes with rising diversity scores for most indicators, but not for FGI-21 and FGI-21R. For lactating women, most indicators show non-linear tendencies.

6.9. RELATIONSHIP BETWEEN DIVERSITY INDICATORS AND MEAN PROBABILITY OF ADEQUACY

Each of the eight food group diversity indicators was significantly and positively associated with MPA (**Figure D** and **Tables 14-15**). This is not surprising, since **Section 6.6** described positive associations between FGIs and most individual micronutrient intakes, and **Section 6.7** showed positive associations between energy intakes from many individual food groups and the MPA.

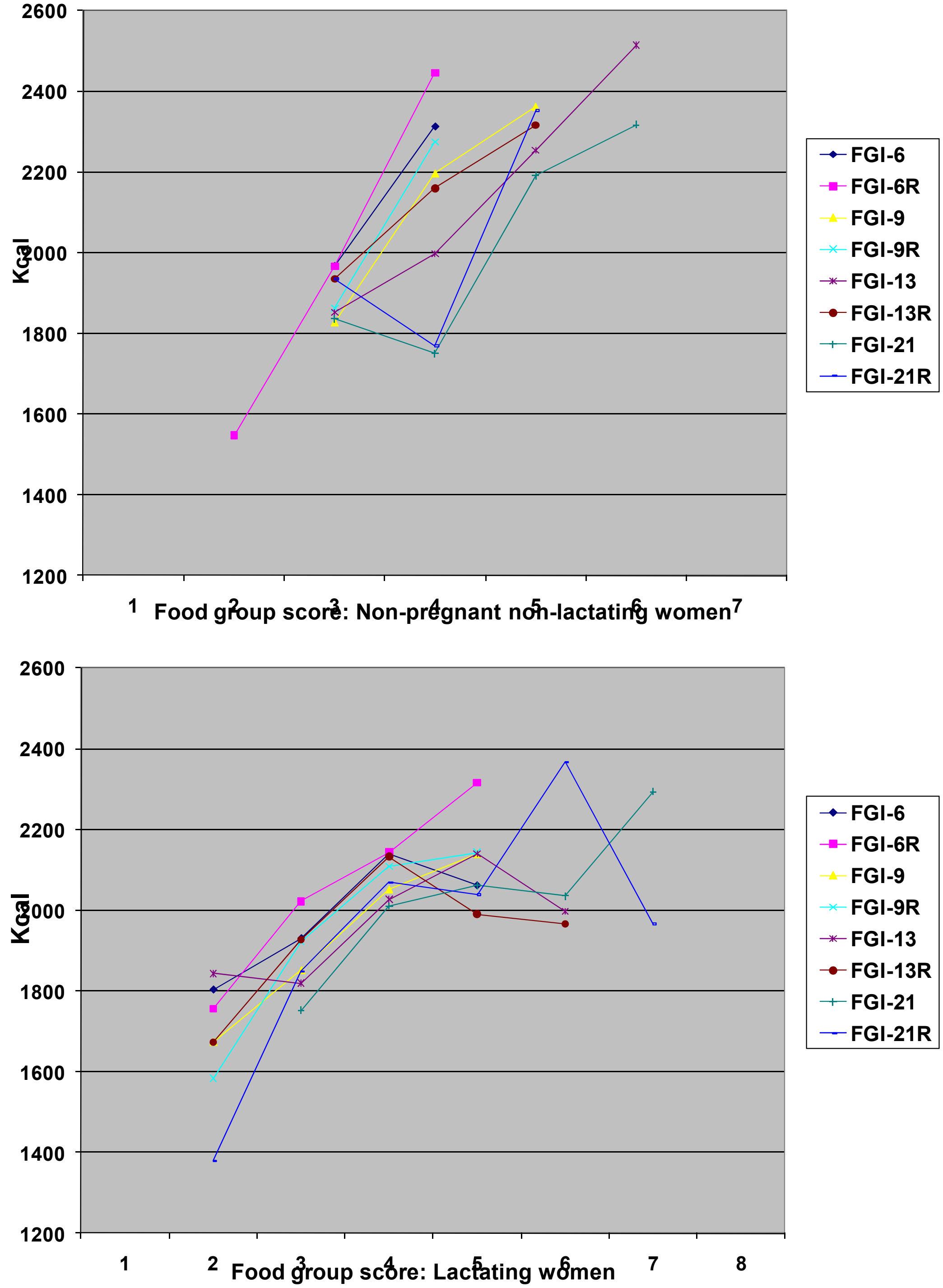
Correlations for the diversity indicators and MPA were moderate, ranging from 0.23 to 0.37 for all women (**Table 15**). Controlling for energy attenuated the correlations considerably, to a range of 0.11-0.26, with the largest drop observed for the 21-group indicators. Associations were stronger for NPNL women, with correlations ranging from 0.30-0.53 (0.20-0.37 controlling for energy) as compared to a range of 0.19-0.38 for lactating women (0.12-0.36 controlling for energy) (**Tables N15, L15**).

In contrast to the relationship between diversity and energy, increasing disaggregation did not consistently raise correlations. For lactating women, the strongest correlations were with FGI-9R (0.38) and FGI-13R (0.36) (**Table L15**). For NPNL women, the strongest correlation was with FGI-21R (0.53, see **Table N15**). For all women grouped together, correlations were strongest (and similar) for FGI-9R, FGI-13R and FGI-21R, ranging from 0.35-0.37 (**Table 15**).

For all four sets of food groups, correlations were substantially higher when the 15 g minimum requirement was imposed. This also held true for the sub-samples by physiological group, and with and without controlling for energy. As for energy intake, MPA tended to be higher for the 15 g indicator than for the corresponding 1 g indicator at any given diversity score, but the differences were small. For example, for NPNL women with a score of 4, the median MPA was 0.45 for FGI-21 and 0.52 for FGI-21R (**Table N14**).

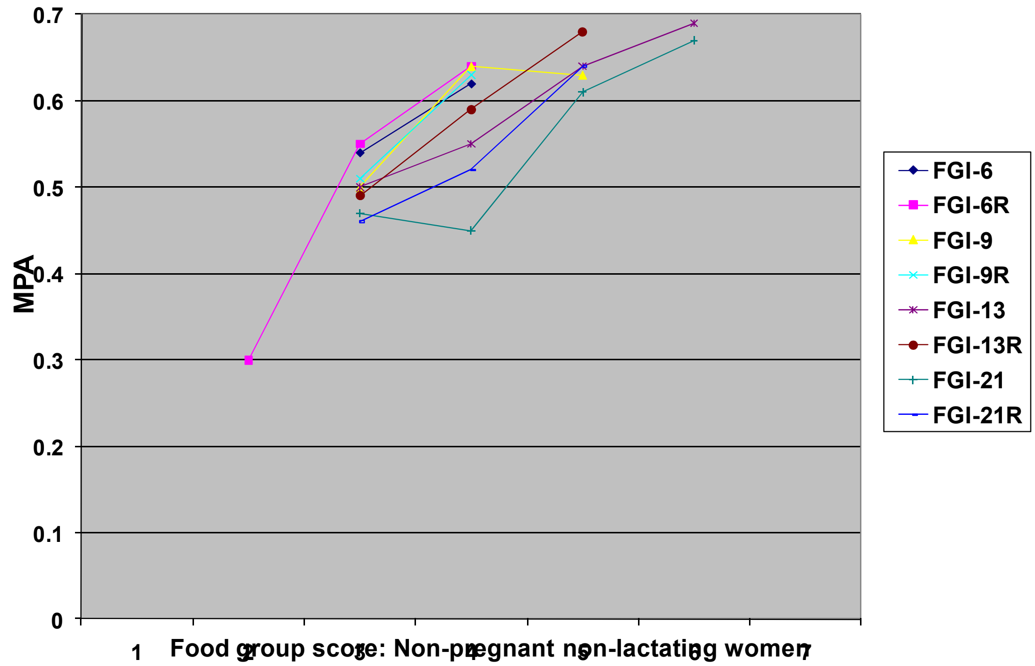
For NPNL women, **Figure D** shows a generally consistent positive slope: as food group diversity scores increase, so does MPA. For lactating women, **Figure D** highlights the lower range of MPA and also shows a different pattern, with MPA appearing to plateau as food group diversity scores increase. This suggests that with the much higher micronutrient requirements during lactation, increases in MPA are more difficult to achieve even at higher food group diversity scores.

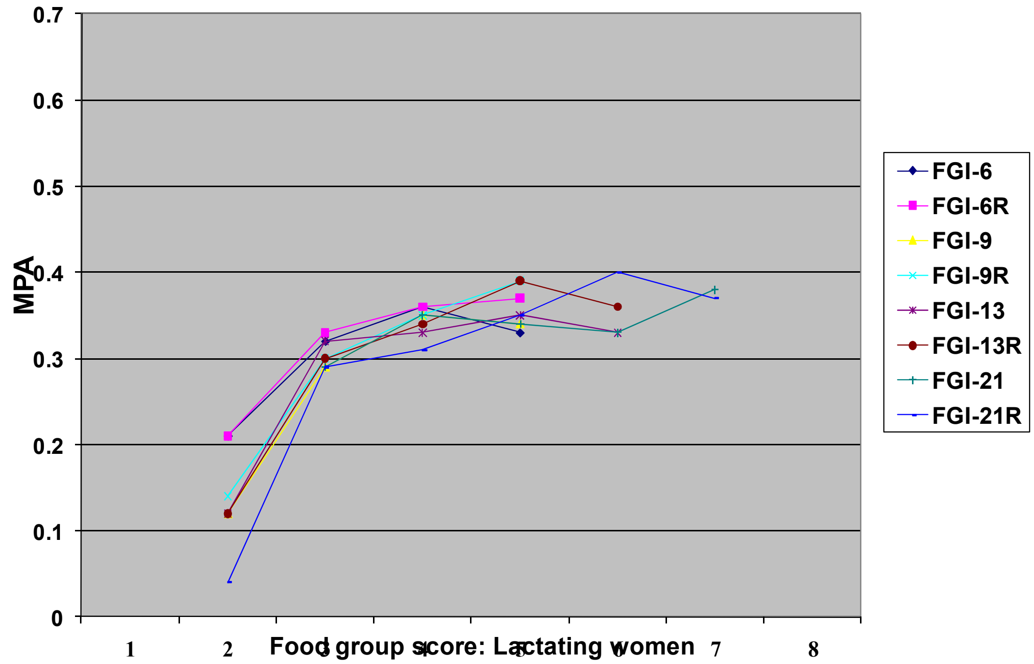
Figure C. Total Energy Intake (kcal) by Food Group Scores for Various Diversity Indicators, by Physiological Group [a, b]



[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.

Table 16 provides another way of looking at the relationship between the diversity indicators and MPA. Simple linear regressions showed that the food group diversity scores were consistently significant in models controlling for the woman's height, age and physiological status.[56] This remained true (and overall explanatory power increased greatly) when total energy intake was included in the model. A negative coefficient for age was small but significant in models for all women and for lactating women. The coefficients for lactation and pregnancy status were much larger, negative and significant, suggesting that when controlling for other factors, MPA is about 20 percentage points lower for these two physiological groups than for NPNL women. The overall explanatory power of the models was indicated by the adjusted R^2 and ranged from 0.20 to 0.29 without the energy variable. When total energy intake was included in the model, the adjusted R^2 increased considerably to 0.55-0.59. For both types of models, the highest adjusted R^2 values were observed for FGI-9R. Results for FGI-13R and FGI-21R were similar.

For the sub-samples by physiological group, results for the diversity indicators were slightly less consistent, and the explanatory power of the models was generally lower than for the entire sample. Without energy in the models, the adjusted R^2 was 0.06-0.30 for NPNL women, and 0.04-0.14 for lactating women **(Tables N16, L16)**. The decrease in explanatory power largely resulted from the absence of the lactation and/or pregnancy variables in the regressions on sub-samples.[57] The diversity indicators were significant in all models that did not include energy intake, and remained significant in most when total energy intake was included. Including energy in the regressions again greatly increased the explanatory power of the models for the physiological sub-groups.

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

The final objective of the WDDP (**Section 3**) is to test and compare indicator qualities, both within and across sites. The results from the Mozambique site reported here are also incorporated in a WDDP summary report, which presents a comparative analysis across sites and allows for firmer conclusions regarding the general usefulness of these indicators.

Because micronutrient adequacy is poor for the women in this sample from Mozambique, the predictive power of the diversity indicators to identify women with high MPA cannot be assessed; only 2 women had an MPA > 80 percent (**Table 17**). We therefore explored indicator characteristics at cutoff points of > 50 percent, > 60 percent and > 70 percent for MPA for all women and NPNL women, but note that these cutoffs – particularly the first two – cannot be considered to define adequate diets. For lactating women, only 3 percent of the women (7 individuals) had an MPA > 70 percent, so indicators were evaluated at cutoff points of MPA > 50 percent and > 60 percent 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.

Table 18 shows the AUC for each indicator at each of the three MPA cutoffs, for all women. The AUC summarizes the predictive power of each indicator, across all possible diversity score cutoffs. An AUC of 0.50 represents a null value (no predictive power). A statistically significant AUC indicates some

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[56] The sample size was reduced from 409 to 298 women for the regressions due to missing values for age. For all regressions performed, residual plots were examined and distributions of residuals were tested for normality. The null hypothesis of normal distribution could not be rejected for any of the models. When testing for heteroskedasticity with the Breusch-Pagan test (using fitted values of the dependent variable), all models passed except for the two with the 21-food group indicators for the sample of all women and not controlling for energy. Yet, these two models passed the test for heteroskedasticity, which is part of Cameron & Trivedi's decomposition of IM test and were considered acceptable on this basis.

[57] For comparison, adjusted R^2 dropped to 0.03-0.11 for all women when indicators of physiological status were not included. For lactating women, the dummy variable for pregnancy remained in the models, because 4 lactating women were also pregnant. The pregnancy variable was not significant in the models for lactating women; this is not surprising considering the small number of women both pregnant and lactating.

predictive power, but AUC can be statistically significant even when predictive power is weak. As a rule of thumb, we considered AUC ≥ 0.70 to indicate some promise for the indicator.

For all women, all eight diversity indicators had AUC significantly different from 0.50 at MPA > 50 percent and MPA > 60 percent. However, at MPA > 70 percent, only two indicators were significantly different from 0.50. No indicator reached an AUC above 0.70 for any of the three MPA cutoffs. AUC varied from 0.54 for the 6-food group indicators at MPA > 70 percent to 0.66 for FGI-21R at the two lower MPA cutoffs. Overall, FGI-21 and FGI-21R produced the best results; yet, for the sample of all women, performance was not satisfactory for any of the eight diversity indicators at any MPA cutoff.

For NPNL women, the diversity indicators performed better than for the entire sample or the sub-group of lactating women (compare **Tables N18** and **L18**). At MPA > 50 percent, the AUC was significant for all indicators, ranging from 0.68 for FGI-6 to 0.77 for FGI-21R. The AUC for six of the eight indicators were significant at MPA > 60 percent, and for two indicators at MPA > 70 percent.

For lactating women, all indicators except for FGI-6 were significant for the lowest MPA cutoff (> 50 percent). Three of eight indicators were significant at the MPA > 60 percent cutoff. However, the AUC for all indicators at MPA > 50 percent and MPA > 60 percent remained well below the threshold of 0.70, varying from 0.57 for FGI-6 at MPA > 60 percent to 0.64 (FGI-13R and FGI-21R at MPA > 50 percent, and FGI-9R at MPA > 60 percent).

In comparing indicators, it is also useful to assess which AUC are significantly different from others. **Table 19** compares all indicators and identifies statistically significant differences. For all women and at MPA > 60 percent, FGI-21 performed better than the other indicators with 1 g minimum requirement (FGI-6, FGI-9 and FGI-13), and also better than FGI-6R. At MPA > 70 percent the AUC for both FGI-21 and FGI-21R was higher than for FGI-6 and FGI-6R. Other differences were insignificant.

For NPNL women, the results were similar: FGI-21R was superior to all other indicators except FGI-13 and FGI-21 at MPA > 50 percent and to all other indicators except FGI-21 at the two higher MPA cutoffs. FGI-21 again consistently performed better than the less disaggregated indicators with 1 g minimum requirement.

For lactating women, the indicators with the 15 g minimum requirement had significantly higher AUC than those with 1 g minimum for the more highly disaggregated food groups (9, 13 and 21 food groups). These differences were observed at MPA > 50 percent but not at MPA > 60 percent.

In summary, consistent with results for correlations and regressions, the 21-food group indicator with 15 g minimum requirement performed best for NPNL women. For lactating women, FGI-9R, FGI-13R and FGI-21R performed better than some other indicators, but the picture was less clear.

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 all three MPA cutoffs (**Tables 20a-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.

In evaluating the results in **Tables 20a-h**, both the balance between sensitivity and specificity and total misclassification were considered. Overall, indicator performance was moderate for NPNL women, and poor for lactating women.

Among NPNL women, a number of indicators performed reasonably, depending on the MPA cutoff and the food group diversity cutoff employed. FGI-9R, FGI-13R and FGI-21R each yielded acceptable balance between sensitivity and specificity, and total misclassification in the range of 29-35 percent for one or more of the MPA cutoffs. For FGI-21R, a diversity score cutoff of ≥ 5 produced the best result at MPA > 50 percent and 60 percent; a diversity score cutoff of ≥6 produced the best result at MPA >70 percent. These results are arguably the "best" among all the indicators, with misclassification of 31 percent for MPA > 50 percent; 29 percent for MPA >60 percent; and 22 percent for MPA >70 percent. However, they are not substantially better than some results for several of the simpler, less disaggregated indicators, especially for the lowest MPA cutoff. For example, for MPA > 50 percent, both FGI-9R and -13R yield total misclassification of 33-34 percent, with a diversity score cutoff ≥ 4.

For lactating women, results were poor and there were few diversity cutoffs with an acceptable balance of sensitivity and specificity. This is no surprise, considering the low AUC across all diversity indicators for lactating women. FGI-21R at a diversity score cutoff of ≥ 5 performed best: sensitivity was 60-63 percent, specificity 59-57 percent, and misclassification 41-43 percent for MPA > 50 percent and MPA > 60 percent.

7. Summary and Discussion

This report supports the potential of simple indicators of dietary diversity to function as proxy indicators of micronutrient adequacy for NPNL women of reproductive age in resource-poor settings. Results for lactating women were less promising. The report also 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 Mozambique. Few studies have employed the newer probability approach to assess micronutrient adequacy for women in resource-poor areas.

7.1. DIETARY PATTERNS

The diets of women in rural Mozambique, like diets of the poor in many locations, are dominated by starchy staples. In this case, starchy staples (mainly maize, rice and cassava) contributed 68 percent of total energy. Starchy staples also provided over half of the protein and zinc, and more than two-fifths of the thiamin, niacin, vitamin B6 and iron in the diets. While starchy staples contributed large shares of micronutrients, women with higher intakes of this food group had diets with poorer micronutrient density (**Tables 11a-d**). Energy intakes and the proportion of energy from macronutrients did not differ significantly by physiological status.

Other food groups that were eaten in substantial quantities (contributing more than 10 percent of energy intake) were vitamin A-rich fruits, and legumes and nuts. Vitamin A-rich fruits (primarily mango, with seasonally high intakes) provided 60 percent of vitamin C, about two-thirds of vitamin A and roughly one quarter of vitamin B6. Legumes and nuts were the second most important source of protein, zinc and iron after starchy staples. Other nutritionally important food groups were dark green leafy vegetables, vitamin C-rich vegetables, other vegetables, and fish (**Tables 11c-d**). Animal source foods were eaten in very small quantities and provided virtually all the vitamin B12 in the diet (**Table 9a**). Dairy products, which are usually the most important source of calcium, were not consumed at all by the women in this study site.

7.2. MICRONUTRIENT INTAKES AND ADEQUACY

For NPNL women, median micronutrient intakes were far below EARs for two micronutrients, about equal for another three, and higher for five of the micronutrients assessed (R1; results for R2 were very similar). For vitamin B12 and iron, median intakes reached only 1 percent and 37 percent of EARs, respectively, underscoring the lack of animal source foods in the diet. Median calcium intakes amounted to only 31 percent of adequate intake (AI). Median intakes roughly equaled EARs for riboflavin, niacin and folate, and exceeded EARs for thiamin, vitamin B6 and zinc. For vitamins A and C, median intakes were about three times the EARs.

Overall, micronutrient intakes were less adequate relative to requirements for lactating women: median intakes were below EARs for 7 out of 10 micronutrients, considerably below the AI for calcium, and above EARs for only three micronutrients (R1). Again, intakes of vitamin B12 and iron were lowest relative to EARs, followed by riboflavin, folate, niacin, thiamin and vitamin B6 in ascending order. Median intakes were slightly above the EAR for zinc, and well above requirements only for vitamins C and A.

Consistent with this, the estimated prevalence of adequate intake was low for most nutrients. When all women in the sample were grouped together,[58] estimates of prevalence of adequate intake ranged from very low (5-17 percent) for iron, calcium and riboflavin; to low (19-30 percent) for folate, vitamin B12 and niacin; to moderate (43-64 percent) for thiamin, vitamin B6 and zinc; to relatively high (74-83 percent) for vitamins A and C (**Table 8**). Moderate to high prevalence of adequacy for the latter five nutrients can be traced back to intakes of three food groups: starchy staples largely accounted for thiamin, zinc and vitamin B6 intakes; beans and peas also contributed to thiamin and zinc intakes; vitamin A-rich fruits

[58] All women included 103 NPNL women, 248 lactating women, 54 pregnant women and 4 women who were both pregnant and lactating.

(predominantly mango and some papaya) were good sources of vitamin B6 and thiamin, and accounted for most of the high vitamin A and C intakes.

The MPA provides a summary of this information and shows the low to moderate quality of the women's diets. About two-fifths of NPNL women had an MPA below 50 percent; the median MPA was 58 percent. Among lactating women, almost 80 percent had an MPA below 50 percent, and the median was 33 percent. Mango, a seasonally available food, made major contributions to intake of many micronutrients and therefore to MPA. Among women (including pregnant women) with two 24-h recalls, median MPA was 18 percent if mango was not consumed, 35 percent if consumed one day and 45 percent if consumed both days.

For both lactating and NPNL women, MPA was well distributed and had sufficient variability to allow assessment of the relationship between food group diversity and micronutrient adequacy. However, we note that variability in the food group indicators was limited.

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

All eight food group diversity indicators were significantly correlated with most micronutrient intakes, with few exceptions for individual nutrients (**Table 10**). This suggests that the observed relationship between the food group diversity indicators and the summary indicator for micronutrient adequacy (MPA) was not driven by a strong relationship with one or a few nutrients, although some nutrients had markedly higher correlations than others (niacin; vitamins B6, C and A).

Overall, there were fewer significant correlations for the sub-groups of NPNL women and lactating women, especially for FGI-6 (**Tables N10** and **L10**). For NPNL women, correlations were generally higher than for all women and ranged up to 0.48; correlations of FGI-21R exceeded 0.30 for eight of 11 micronutrients. The associations between diversity indicators and micronutrient intakes were generally lower for lactating women, with correlations ranging up to 0.31.

Each food group diversity indicator was also significantly associated with MPA, with correlations ranging from 0.30 (FGI-6) to 0.53 (FGI-21R) for NPNL women, and from 0.19 (FGI-6) to 0.38 (FGI-9R) for lactating women (**Figure D** and **Table 15**). Correlations were higher for the indicators that imposed a 15 g minimum in order for the food group to "count." For NPNL women, the magnitude of the correlations, as well as the shape of the relationship illustrated in **Figure D**, suggest that these simple indicators provide meaningful information about micronutrient adequacy. The associations are less meaningful for lactating women because correlations are lower, and **Figure D** shows some non-linearity in the relationship of the diversity indicators with MPA.

For both NPNL and lactating women, regression analyses confirmed that each of the diversity scores remained significant in models controlling for the woman's age and height. The models that did not include total energy intake as a covariate explained 6-30 percent of the variability in MPA for NPNL women, but only 4-14 percent for lactating women (**Tables N16** and **L16**). In models for all women, pregnancy and lactation status were also significant; results suggest that controlling for other factors, MPA was about 20 percentage points lower for these two physiological groups.

As has been shown in other studies,[59] our analysis indicated that each of the eight diversity indicators was also associated with energy intake (**Figure C** and **Tables 12-13**), with correlations ranging from 0.23 to 0.41 for NPNL women, and from 0.15 to 0.26 for lactating women. The relationship with energy intakes was consistently stronger for 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

[59] Ogle, Hung and Tuyet 2001; Foote et al. 2004; Torheim et al. 2004.

correlations, controlling for energy intake. The number of significant associations with individual nutrients was reduced considerably when controlling for energy, and correlations declined most for nutrients for which starchy staples were the main source (all B-vitamins except for vitamin B12, and iron and zinc). Correlations with MPA were also attenuated but remained significant for all women.

For the regression models with all women, each diversity indicator remained significant when total energy intake was included as a covariate (**Table 16**); for the sub-groups of NPNL and lactating women, this was true for most diversity indicators. Adjusted R^2 were substantially higher for models that included total energy as a covariate.

In sum, correlation and regression results were consistent and showed a stronger relationship between FGI and MPA when the 15 g minimum was imposed. They also suggest some advantage of food group disaggregation, with strongest results for FGI-21R.

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.[60]

For this Mozambique site, food group diversity indicators performed poorly for lactating women, who constituted 62 percent of our sample, and for all women. For this reason, we focus our discussion on NPNL women. Food group diversity scores can be presented as ordinal or as dichotomous indicators; the latter may be preferred for communication and advocacy purposes. In order to assess the performance of dichotomous indicators, cutoffs must be selected both for MPA and for the diversity indicator.

Given the distribution of MPA in our sample, we evaluated dichotomous indicators for NPNL women at MPA > 50 percent, MPA > 60 percent and MPA > 70 percent. Note, however, that few women (25 individuals) were above 70 percent MPA, so analysis at the 70 percent level should be interpreted with some 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.

For NPNL women, the results summarized in the previous sections indicate that in our study site, the relationship between simple FGIs and micronutrient adequacy for women is meaningful and moderately strong. This was supported by the ROC analysis, particularly at the lowest (> 50 percent) cutoff for MPA. The AUC statistic from this analysis provides a summary of the overall potential of indicators to predict MPA, across all FGI scores. As a rule of thumb, AUC ≥ 0.70 are considered to indicate reasonable potential for an indicator.

The AUC for NPNL women was significant for all indicators at MPA > 50 percent, with five out of eight indicators (FGI-9R through FGI-21R) at or above 0.70. Six out of eight diversity indicators were significant at MPA > 60 percent, but only FGI-21 and FGI-21R exceeded the 0.70 threshold. At MPA > 70 percent, AUC was significant only for FGI-21 and FGI-21R, and exceeded 0.70 only for FGI-21R.

For many policy and program purposes, continuous indicators (e.g., average diversity score) 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 (in this case, diversity score cutoffs) must be selected. Selection of cutoffs is informed by an examination of indicator characteristics such as sensitivity, specificity and level of misclassification.

Examination of indicator characteristics using the MPA cutoffs of 50 percent, 60 percent and 70 percent showed indicator performance was moderate for NPNL women and poor for lactating women.

[60] Arimond et al 2009.

Among NPNL women, a number of indicators performed reasonably, depending on the MPA cutoff and the diversity score cutoff. FGI-9R, FGI-13R and FGI-21R each yielded acceptable balance between sensitivity and specificity, and overall misclassification in the range of 29-35 percent for one or more of the MPA cutoffs. These levels of misclassification may be acceptable for indicators of this type; that is, population-level indicators for assessment and 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 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 diversity indicator score. If indicators constructed with a 1 g cutoff had performed as well as those with a 15 g cutoff, this would have suggested that enumerators could aim to determine if the respondent woman had consumed any food in the group in any amount. Results from this site indicate that indicators that exclude trivial amounts (less than 15 g) perform better.

In this site, two foods (onion and tomato) were consumed in small quantities by some of the women. For the purposes of surveys, this suggests that it may suffice to try to ensure that these vegetables are excluded from the recall when consumed in condiment quantities; whenever they are consumed in larger quantities, they should be included. We acknowledge that applying quantity cut-offs for certain foods in simple surveys is challenging.

Results from additional sites are needed in order to fully assess this issue and to make recommendations regarding operationalizing diversity indicators for women.

7.6. GENERALIZABILITY

Characteristics of the study sampling frame and survey timing impact generalizability. Most households in the sampling frame participated in some type of community group (usually a church group) and included young children. Therefore, results can only be generalized to households that share these characteristics. Perhaps more importantly, implementation of the survey during mango season strongly influenced results for nutrient intake and adequacy. Our results show that mango consumption is associated with higher intakes of a wide range of micronutrients, and not just of vitamin A.

Because of all these considerations, our results are not representative of women of reproductive age in rural Mozambique generally, or for all seasons. However, based on diet patterns and likely "substitutions" for mango, there is no reason to believe micronutrient intakes and adequacy would be substantially better in other seasons. The general picture that emerges is likely to be typical for areas where families remain impoverished and heavily reliant on starchy staples: low nutrient adequacy prevails, and nutrient-dense foods that are seasonally available (such as mango) can have a large, time-limited effect on micronutrient adequacy.

For the main purpose of this analysis – developing indicators of micronutrient adequacy – neither the sample selection nor the seasonality issue invalidate our findings. For women with similar diets, 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 work at higher levels of overall nutrient adequacy.

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. Non-pregnant women of reproductive age – including lactating women – are also vulnerable.

Our findings from rural Mozambique indicate that intakes of most nutrients were very inadequate. This was particularly true for nutrients for which animal-source foods are the best sources: vitamin B12, calcium and iron. Yet, we note that intakes were also very low for folate and riboflavin, and were inadequate for nearly all micronutrients, with the exception of vitamins A and C due to seasonally high intakes of mango. Diets of lactating women were particularly deficient relative to their micronutrient needs. Gaps between intakes and requirements extended beyond the few micronutrients that are the usual focus of supplementation programs.

We considered the potential of food group diversity indicators as proxies for micronutrient adequacy separately for lactating women and for NPNL women. For lactating women, associations of diversity indicators with MPA were comparatively weak for this study site, and overall indicator performance was poor.

For NPNL women of reproductive age, our results suggest that food group diversity indicators have potential for use in population-level assessment. The best diversity indicators explored in this report were correlated not only with overall micronutrient adequacy, averaged across 11 micronutrients, but with most individual micronutrient intakes. Associations were not driven by one or a few micronutrients; this strengthens the case for use of food group diversity indicators as proxies for overall micronutrient adequacy. The usefulness of these indicators is not limited by their relationship with quantity of intake (that is, energy intake).

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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)	298	28.8	7.6	28.0	15.0-49.0
Height (cm)	409	153.6	5.6	153.5	137.8-172.4
Weight (kg)	409	50.9	8.3	50.2	33.7-80.7
BMI	409	21.5	2.9	21.4	15.8-32.7
% Literate	408	19.1			
% Lactating	409	61.6			
% Pregnant	409	14.2			
	n	**Percent**			
BMI <16	1	0.2			
BMI 16-16.9	4	1.0			
BMI 17-18.49	24	5.9			
BMI 18.5-24.9	350	85.6			
BMI 25-29.9	24	5.9			
BMI ≥ 30	6	1.5			

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

	Mean	SD	Median	Range	Percent of kcal
Energy (kcal)	2,114.4	712.9	2,029.0	737.5-4,208.4	
Protein (g)	61.8	31.4	58.1	9.6-260.4	11
Animal source (g)	10.9	20.1	1.2	0.0-236.0	2
Plant source (g)	50.9	29.2	46.9	4.6-119.7	9
Total carbohydrate (g)	452.8	156.2	434.6	161.6-864.3	82
Total fat (g)	17.0	21.0	11.5	2.1-202.1	7

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	58	56
All dairy	0	0
Other animal source foods	50	46
Vitamin A-rich fruits and vegetables [a]	84	84
Other fruits and vegetables	63	53

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100g raw, taking into account retention factors.

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	58	56
All dairy	0	0
Organ meat	0	0
Eggs	6	6
Flesh foods and other miscellaneous small animal protein	46	41
Vitamin A-rich dark green leafy vegetables [a]	34	34
Other vitamin A-rich vegetables and fruits [a]	77	77
Other fruits and vegetables	63	53

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100g raw, taking into account retention factors.

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	58	56
All dairy	0	0
Organ meat	0	0
Eggs	6	6
Small fish eaten whole with bones	22	18
All other flesh foods and miscellaneous small animal protein	30	26
Vitamin A-rich dark green leafy vegetables [a]	34	34
Vitamin A-rich deep yellow/orange/red vegetables [a]	2	2
Vitamin C-rich vegetables [b]	34	26
Vitamin A-rich fruits [a]	77	77
Vitamin C-rich fruits [b]	7	7
All other fruits and vegetables	50	37

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100g raw, taking into account retention factors.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100g raw, taking into account retention factors.

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

	≥ 1 g	≥ 15 g
Grains and grain products	93	93
All other starchy staples	43	43
Cooked dry beans and peas	50	50
Soybeans and soy products	0	0
Nuts and seeds	14	12
Milk/yogurt	0	0
Cheese	0	0
Beef, pork, veal, lamb, goat, game meat	2	1
Organ meat	0	0
Chicken, duck, turkey, pigeon, guinea hen, game birds	7	7
Large whole fish/dried fish/shellfish and other seafood	17	14
Small fish eaten whole with bones	22	18
Insects, grubs, snakes, rodents and other small animal	5	5
Eggs	6	6
Vitamin A-rich dark green leafy vegetables [a]	34	34
Vitamin A-rich deep yellow/orange/red vegetables [a]	2	2
Vitamin C-rich vegetables [b]	34	26
All other vegetables	46	31
Vitamin A-rich fruits [a]	77	77
Vitamin C-rich fruits [b]	7	7
All other fruits	12	12

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100g raw, taking into account retention factors.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100g raw, taking into account retention factors.

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

Food group	All (n = 409)					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	1,298.9	1,414.7	1,205.0	1,317.6	100	1,298.9	1,414.7	1,205.0	1,317.6
All legumes and nuts	183.6	249.5	88.3	157.7	58	316.8	430.6	278.2	385.9
All dairy	0.0	0.0	0.0	0.0	0	–	–	–	–
Other animal source foods	38.2	79.3	2.9	9.6	50	76.2	158.2	53.9	107.8
Vitamin A-rich fruits and vegetables [a]	469.1	269.3	382.9	193.6	84	559.3	321.2	456.0	253.8
Other fruits and vegetables	119.7	44.4	18.8	7.5	63	191.2	70.9	138.1	33.8

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100g raw, taking into account retention factors.

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

Food group	All (n = 409)					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	1,298.9	1,414.7	1,205.0	1,317.6	100	1,298.9	1,414.7	1,205.0	1,317.6
All legumes and nuts	183.6	249.5	88.3	157.7	58	316.8	430.6	278.2	385.9
All dairy	0.0	0.0	0.0	0.0	0	–	–	–	–
Organ meat	0.0	0.0	0.0	0.0	0	–	–	–	–
Eggs	4.4	7.4	0.0	0.0	6	71.2	121.8	58.3	108.9
Flesh foods and other miscellaneous small animal protein	33.9	71.8	0.0	0.0	46	73.7	156.3	47.2	98.9
Vitamin A-rich dark green leafy vegetables [a]	65.0	11.5	0.0	0.0	34	190.0	33.6	135.3	26.0
Other vitamin A-rich vegetables and fruits [a]	404.0	257.8	292.8	190.3	77	522.9	333.7	439.2	282.1
Other fruits and vegetables	119.7	44.4	18.8	7.5	63	191.2	70.9	138.1	33.8

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100g raw, taking into account retention factors.

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

	All (n = 409)					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	1,298.9	1,414.7	1,205.0	1,317.6	100	1,298.9	1,414.7	1,205.0	1,317.6
All legumes and nuts	183.6	249.5	88.3	157.7	58	316.8	430.6	278.2	385.9
All dairy	0.0	0.0	0.0	0.0	0	–	–	–	–
Organ meat	0.0	0.0	0.0	0.0	0	–	–	–	–
Eggs	4.4	7.4	0.0	0.0	6	71.2	121.8	58.3	108.9
Small fish eaten whole with bones	10.1	21.8	0.0	0.0	22	46.5	100.3	29.3	68.6
All other flesh foods and miscellaneous small animal protein	23.7	50.0	0.0	0.0	30	79.6	167.6	56.9	101.7
Vitamin A-rich dark green leafy vegetables [a]	65.0	11.5	0.0	0.0	34	190.0	33.6	135.3	26.0
Vitamin A-rich deep yellow/orange/red vegetables [a]	5.3	5.3	0.0	0.0	2	270.9	269.7	247.3	242.1
Vitamin C-rich vegetables [b]	26.7	6.3	0.0	0.0	34	79.7	18.9	38.3	10.8
Vitamin A-rich fruits [a]	398.7	252.6	292.8	190.3	77	517.7	327.9	434.0	263.3
Vitamin C-rich fruits [b]	14.9	11.7	0.0	0.0	7	210.7	164.6	173.9	95.2
All other fruits and vegetables	78.0	26.4	0.0	0.0	50	157.2	53.1	99.9	23.4

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100g raw, taking into account retention factors.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100g raw, taking into account retention factors.

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

	All (n = 409)					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	1,101.9	1,161.7	1,091.0	1,162.4	93	1,182.8	1,247.1	1,130.0	1,212.7
All other starchy staples	197.1	253.0	0.0	0.0	43	463.2	594.6	238.5	341.0
Cooked dry beans and peas	174.8	215.9	32.0	70.1	50	347.0	428.6	312.1	385.9
Soybeans and soy products	0.4	0.8	0.0	0.0	0	162.6	323.7	162.6	323.7
Nuts and seeds	8.4	32.9	0.0	0.0	14	59.1	232.0	31.2	114.7
Milk/yogurt	0.0	0.0	0.0	0.0	0	–	–	–	–
Cheese	0.0	0.0	0.0	0.0	0	–	–	–	–
Beef, pork, veal, lamb, goat, game meat	1.3	3.5	0.0	0.0	2	76.3	205.6	85.0	215.1
Organ meat	0.0	0.0	0.0	0.0	0	–	–	–	–
Chicken, duck, turkey, pigeon, guinea hen, game birds	6.8	19.3	0.0	0.0	7	92.1	263.4	91.8	261.6
Large whole fish/dried fish/shellfish and other seafood	12.7	22.7	0.0	0.0	17	73.1	130.7	38.5	77.1
Small fish eaten whole with bones	10.1	21.8	0.0	0.0	22	46.5	100.3	29.3	68.6
Insects, grubs, snakes, rodents and other small animal	3.0	4.5	0.0	0.0	5	58.3	87.1	50.0	85.8
Eggs	4.4	7.4	0.0	0.0	6	71.2	121.8	58.3	108.9
Vitamin A-rich dark green leafy vegetables [a]	65.0	11.5	0.0	0.0	34	190.0	33.6	135.3	26.0
Vitamin A-rich deep yellow/orange/red vegetables [a]	5.3	5.3	0.0	0.0	2	270.9	269.7	247.3	242.1
Vitamin C-rich vegetables [b]	26.7	6.3	0.0	0.0	34	79.7	18.9	38.3	10.8
All other vegetables	61.6	11.9	0.0	0.0	46	133.9	25.9	40.2	14.3
Vitamin A-rich fruits [a]	398.7	252.6	292.8	190.3	77	517.7	327.9	434.0	263.3
Vitamin C-rich fruits [b]	14.9	11.7	0.0	0.0	7	210.7	164.6	173.9	95.2
All other fruits	16.5	14.5	0.0	0.0	12	140.5	123.3	137.6	122.5

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100g raw, taking into account retention factors.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100g raw, taking into account retention factors.

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	3.5	0.9	4.0	2-5
FGI-6R [a]	6 major food groups	3.4	0.8	3.0	1-5
FGI-9	9 food subgroups	3.8	0.9	4.0	2-7
FGI-9R [a]	9 food subgroups	3.7	0.8	4.0	1-7
FGI-13	13 food subgroups	4.2	1.2	4.0	2-8
FGI-13R [a]	13 food subgroups	3.9	1.0	4.0	1-7
FGI-21	21 food subgroups	4.7	1.6	5.0	2-9
FGI-21R [a]	21 food subgroups	4.4	1.3	4.0	2-9

[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	0	0	0	0	0	0	0
2	10	13	6	8	5	8	3	5
3	36	43	28	32	23	28	18	22
4	43	37	44	46	34	39	23	28
5	11	7	22	14	27	19	29	30
6	0	0	1	1	11	5	17	10
7			0	0	1	1	9	5
8			0	0	0	0	1	0
9			0	0	0	0	1	0
10					0	0	0	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 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)	10 (40)	36 (149)	43 (177)	11 (43)	0 (0)
Food groups	**Percent of observation days on which each food group was consumed**					
All starchy staples	–	100	100	100	100	–
All legumes and nuts	–	23	46	66	100	–
All dairy	–	0	0	0	0	–
Other animal source foods	–	18	36	57	100	–
Vitamin A-rich fruits and vegetables [a]	–	48	79	92	100	–
Other fruits and vegetables	–	13	38	85	100	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100g raw, taking into account retention factors.

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	0 (1)	13 (52)	43 (175)	37 (151)	7 (30)	0 (0)
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	19	47	71	100	–
All dairy	0	0	0	0	0	–
Other animal source foods	0	19	37	54	100	–
Vitamin A-rich fruits and vegetables [a]	0	50	83	93	100	–
Other fruits and vegetables	0	12	32	82	100	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100g raw, taking into account retention factors.

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)	6 (24)	28 (114)	44 (179)	22 (88)	1 (3)	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	–	–
All legumes and nuts	–	38	42	59	81	100	100	–	–
All dairy	–	0	0	0	0	0	0	–	–
Organ meat	–	0	0	0	0	0	0	–	–
Eggs	–	4	2	7	10	0	100	–	–
Flesh foods and other miscellaneous small animal protein	–	25	33	46	67	100	100	–	–
Vitamin A-rich dark green leafy vegetables [a]	–	13	22	34	55	100	100	–	–
Other vitamin A-rich vegetables and fruits [a]	–	0	66	86	94	100	100	–	–
Other fruits and vegetables	–	21	36	69	93	100	100	–	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100g raw, taking into account retention factors.

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	0 (1)	8 (31)	32 (131)	46 (187)	14 (56)	1 (2)	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	32	44	60	86	100	100	–	–
All dairy	0	0	0	0	0	0	0	–	–
Organ meat	0	0	0	0	0	0	0	–	–
Eggs	0	7	2	6	11	0	100	–	–
Flesh foods and other miscellaneous small animal protein	0	26	31	44	61	100	100	–	–
Vitamin A-rich dark green leafy vegetables [a]	0	10	24	40	52	100	100	–	–
Other vitamin A-rich vegetables and fruits [a]	0	7	70	89	93	100	100	–	–
Other fruits and vegetables	0	19	29	60	98	100	100	–	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100g raw, taking into account retention factors.

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)	5 (22)	23 (92)	34 (137)	27 (109)	11 (43)	1 (5)	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	–	–	–	–	–
All legumes and nuts	–	41	44	56	67	79	80	100	–	–	–	–	–
All dairy	–	0	0	0	0	0	0	0	–	–	–	–	–
Organ meat	–	0	0	0	0	0	0	0	–	–	–	–	–
Eggs	–	5	1	7	9	5	40	0	–	–	–	–	–
Small fish eaten whole with bones	–	9	10	19	29	42	40	0	–	–	–	–	–
All other flesh foods and miscellaneous small animal protein	–	18	23	29	28	51	80	100	–	–	–	–	–
Vitamin A-rich dark green leafy vegetables [a]	–	14	25	36	39	42	60	100	–	–	–	–	–
Vitamin A-rich deep yellow/orange/red vegetables [a]	–	0	0	1	3	7	0	100	–	–	–	–	–
Vitamin C-rich vegetables [b]	–	5	8	23	54	81	60	0	–	–	–	–	–
Vitamin A-rich fruits [a]	–	0	71	81	87	88	100	100	–	–	–	–	–
Vitamin C-rich fruits [b]	–	0	1	5	11	12	60	100	–	–	–	–	–
All other fruits and vegetables	–	9	19	45	72	93	80	100	–	–	–	–	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100g raw, taking into account retention factors.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100g raw, taking into account retention factors.

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	0 (1)	8 (31)	28 (113)	39 (161)	19 (79)	5 (20)	1 (4)	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	39	47	55	73	80	75	–	–	–	–	–	–
All dairy	0	0	0	0	0	0	0	–	–	–	–	–	–
Organ meat	0	0	0	0	0	0	0	–	–	–	–	–	–
Eggs	0	7	3	5	10	5	50	–	–	–	–	–	–
Small fish eaten whole with bones	0	10	9	19	27	30	50	–	–	–	–	–	–
All other flesh foods and miscellaneous small animal protein	0	13	24	30	20	45	100	–	–	–	–	–	–
Vitamin A-rich dark green leafy vegetables [a]	0	10	25	42	39	40	50	–	–	–	–	–	–
Vitamin A-rich deep yellow/orange/red vegetables [a]	0	0	0	1	4	10	25	–	–	–	–	–	–
Vitamin C-rich vegetables [b]	0	7	6	19	60	85	50	–	–	–	–	–	–
Vitamin A-rich fruits [a]	0	7	71	89	85	95	100	–	–	–	–	–	–
Vitamin C-rich fruits [b]	0	0	1	8	9	25	50	–	–	–	–	–	–
All other fruits and vegetables	0	10	15	34	73	85	50	–	–	–	–	–	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100g raw, taking into account retention factors.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100g raw, taking into account retention factors.

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)	3 (13)	18 (75)	23 (93)	29 (117)	17 (68)	9 (35)	1 (5)	1 (3)	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	–	92	92	86	94	99	100	100	100	–	–	–	–	–	–	–	–	–	–	–	–
All other starchy staples	–	8	19	34	53	50	71	80	67	–	–	–	–	–	–	–	–	–	–	–	–
Cooked dry beans and peas	–	39	41	50	46	59	69	80	67	–	–	–	–	–	–	–	–	–	–	–	–
Soybeans and soy products	–	0	0	0	0	2	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Nuts and seeds	–	0	1	4	19	25	29	60	33	–	–	–	–	–	–	–	–	–	–	–	–
Milk/yogurt	–	0	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Cheese	–	0	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Beef, pork, veal, lamb, goat, game meat	–	8	3	1	1	0	6	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Organ meat	–	0	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Chicken, duck, turkey, pigeon, guinea hen, game birds	–	15	5	10	7	3	11	0	33	–	–	–	–	–	–	–	–	–	–	–	–
Large whole fish/dried fish/shellfish and other seafood	–	0	7	15	18	24	34	20	67	–	–	–	–	–	–	–	–	–	–	–	–
Small fish eaten whole with bones	–	8	12	15	27	27	37	20	33	–	–	–	–	–	–	–	–	–	–	–	–
Insects, grubs, snakes, rodents and other small animal	–	0	3	8	5	3	11	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Eggs	–	8	1	7	7	9	9	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin A-rich dark green leafy vegetables [a]	–	8	24	29	39	43	37	80	67	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin A-rich deep yellow/orange/red vegetables [a]	–	0	0	1	3	2	6	0	33	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin C-rich vegetables [b]	–	0	11	22	33	59	69	80	67	–	–	–	–	–	–	–	–	–	–	–	–
All other vegetables	–	15	15	33	49	75	80	100	100	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin A-rich fruits [a]	–	0	67	77	85	81	89	100	100	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin C-rich fruits [b]	–	0	0	7	6	12	14	20	67	–	–	–	–	–	–	–	–	–	–	–	–
All other fruits	–	0	0	2	9	31	29	60	67	–	–	–	–	–	–	–	–	–	–	–	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100g raw, taking into account retention factors.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100g raw, taking into account retention factors.

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	0 (0)	5 (19)	22 (90)	28 (113)	30 (122)	10 (42)	5 (21)	0 (1)	0 (1)	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	–	90	89	89	98	98	100	100	100	–	–	–	–	–	–	–	–	–	–	–	–
All other starchy staples	–	16	23	35	56	60	76	100	100	–	–	–	–	–	–	–	–	–	–	–	–
Cooked dry beans and peas	–	26	46	50	48	69	67	100	100	–	–	–	–	–	–	–	–	–	–	–	–
Soybeans and soy products	–	0	1	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Nuts and seeds	–	0	1	4	21	19	38	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Milk/yogurt	–	0	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Cheese	–	0	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Beef, pork, veal, lamb, goat, game meat	–	5	2	1	0	0	5	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Organ meat	–	0	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Chicken, duck, turkey, pigeon, guinea hen, game birds	–	11	4	11	6	2	19	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Large whole fish/dried fish/shellfish and other seafood	–	0	9	17	17	14	19	0	100	–	–	–	–	–	–	–	–	–	–	–	–
Small fish eaten whole with bones	–	11	10	15	23	24	29	0	100	–	–	–	–	–	–	–	–	–	–	–	–
Insects, grubs, snakes, rodents and other small animal	–	0	2	6	6	5	10	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Eggs	–	11	2	5	6	10	14	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin A-rich dark green leafy vegetables [a]	–	5	23	32	47	33	48	100	0	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin A-rich deep yellow/orange/red vegetables [a]	–	0	0	1	3	2	10	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin C-rich vegetables [b]	–	5	8	20	26	62	67	100	100	–	–	–	–	–	–	–	–	–	–	–	–
All other vegetables	–	16	11	23	39	60	57	100	100	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin A-rich fruits [a]	–	5	68	81	84	93	86	100	100	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin C-rich fruits [b]	–	0	0	7	7	7	33	0	0	–	–	–	–	–	–	–	–	–	–	–	–
All other fruits	–	0	0	4	15	43	24	100	100	–	–	–	–	–	–	–	–	–	–	–	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100g raw, taking into account retention factors.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100g raw, taking into account retention factors.

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	2,114	713	2,029					
Protein (All Sources) (% of kcal)	11	4	11					
Protein from animal sources (% of kcal)	2	4	0					
Total carbohydrate (% of kcal)	82	10	79					
Total fat (% of kcal)	7	7	5					
Thiamin (mg/d)	1.09	0.51	1.03	1.2	0.12	0.43	0.26	0.196
Riboflavin (mg/d)	0.86	0.48	0.77	1.3	0.13	0.17	0.00	-0.019
Niacin (mg/d)	11.50	6.70	10.42	13	2.0	0.30	0.13	-0.297
Vitamin B6 (mg/d)	1.99	1.19	1.65	1.7	0.17	0.60	0.88	-0.007
Folate (μg/d)	314.81	213.00	288.51	450	45.0	0.19	0.00	0.156
Vitamin B12 (μg/d)	1.78	3.90	0.06	2.4	0.24	0.22	0.00	–
Vitamin C (mg/d)	154.84	159.65	119.00	58	5.8	0.83	1.00	0.398
Vitamin A (RE/d)	905.05	1,112.11	694.68	450	90	0.74	1.00	0.360
Calcium (mg/d)	324.26	205.64	284.64	1,000 [d]	[d]	0.17	0.25	0.193
Iron (mg/d)	11.82	6.56	10.75	23.40	7.02	0.05	0.02	0.137
Zinc (mg/d)	9.48	4.34	8.97	8	1.00	0.64	0.85	0.193
MPA across 11 micronutrients	0.39	0.23	0.37					

[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 are presented here; see Tables A6-1 and N8 for requirements for NPNL women. There were few pregnant women in the study sample, and over 50 percent of the women were lactating.
[c] This documents the transformation parameters selected for each nutrient. The power transformations result in approximately normal distributions. For vitamin B12, more than half of the women had zero vitamin B12 intake in R1. As a result, it was not possible to obtain a satisfactory transformation.
[d] There is no EAR and no SD for calcium; 1000 mg is the Adequate Intake (AI) value for lactating 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	67.7	51.0	73.1	38.1	46.8	30.1	43.7	42.4	30.7	0.0	13.5	5.3	21.9	47.9	68.0
All legumes and nuts	11.2	21.9	8.9	16.1	18.0	14.8	13.2	8.9	28.3	0.0	2.0	2.4	24.3	24.5	17.9
All dairy	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
Other animal source foods	3.9	15.7	0.0	18.0	4.8	10.9	11.8	5.8	3.1	92.8	0.7	6.4	13.6	5.8	7.4
Vitamin A-rich fruits/vegetables [b]	12.6	6.6	14.7	10.5	22.3	31.0	22.0	32.3	28.1	0.0	68.2	77.1	30.6	13.5	3.9
Other fruits and vegetables	2.1	3.9	2.3	2.8	6.9	10.7	7.1	9.4	9.0	1.9	14.0	8.4	8.6	7.0	2.4

[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). Mushrooms consumed by women in our study site were categorized as other fruits and vegetables and contained some vitamin B12. Fish broth was assigned to "other foods" and contributed about 3 percent of vitamin B12 intakes.
[b] Vitamin A-rich fruits and vegetables are defined as those with >120 RE/100g raw, taking into account retention factors.

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	67.7	51.0	73.1	38.1	46.8	30.1	43.7	42.4	30.7	0.0	13.5	5.3	21.9	47.9	68.0
All legumes and nuts	11.2	21.9	8.9	16.1	18.0	14.8	13.2	8.9	28.3	0.0	2.0	2.4	24.3	24.5	17.9
All dairy	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
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	0.4	1.1	0.0	2.4	0.4	2.3	0.0	0.5	1.0	9.4	0.0	1.9	1.4	0.8	0.6
Flesh foods and other miscellaneous small animal protein	3.5	14.6	0.0	15.5	4.4	8.6	11.8	5.3	2.1	83.3	0.7	4.5	12.2	5.0	6.7
Vitamin A-rich dark green leafy vegetables	0.6	2.2	0.5	0.8	2.3	6.9	2.7	8.0	7.7	0.0	7.8	9.4	14.9	7.9	1.5
Other vitamin A-rich vegetables and fruits [b]	12.0	4.3	14.2	9.7	20.0	24.1	19.3	24.3	20.4	0.0	60.5	67.8	15.7	5.5	2.4
Other fruits and vegetables	2.1	3.9	2.3	2.8	6.9	10.7	7.1	9.4	9.0	1.9	14.0	8.4	8.6	7.0	2.4

[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). Mushrooms consumed by women in our study site were categorized as other fruits and vegetables and contained some vitamin B12. Fish broth was assigned to "other foods" and contributed about 3 percent of vitamin B12 intakes.
[b] Vitamin A-rich fruits and vegetables are defined as those with >120 RE/100g raw, taking into account retention factors.

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	67.7	51.0	73.1	38.1	46.8	30.1	43.7	42.4	30.7	0.0	13.5	5.3	21.9	47.9	68.0
All legumes and nuts	11.2	21.9	8.9	16.1	18.0	14.8	13.2	8.9	28.3	0.0	2.0	2.4	24.3	24.5	17.9
All dairy	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
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	0.4	1.1	0.0	2.4	0.4	2.3	0.0	0.5	1.0	9.4	0.0	1.9	1.4	0.8	0.6
Small fish eaten whole w/bones	1.1	5.4	0.0	5.5	1.3	3.3	4.6	1.9	0.9	36.8	0.2	1.2	8.7	1.8	2.4
All other flesh foods misc. small animal protein	2.3	9.1	0.0	10.0	3.1	5.3	7.2	3.4	1.2	46.5	0.5	3.3	3.5	3.2	4.4
Vitamin A-rich dark green leafy vegetables [b]	0.6	2.2	0.5	0.8	2.3	6.9	2.7	8.0	7.7	0.0	7.8	9.4	14.9	7.9	1.5
Vitamin A-rich deep yellow/orange/red vegetables [b]	0.2	0.1	0.3	0.0	0.3	0.4	0.3	0.5	0.2	0.0	0.2	1.2	0.5	0.3	0.2
Vitamin C-rich vegetables [c]	0.3	0.8	0.3	0.6	2.0	1.5	1.8	1.7	2.1	0.0	5.1	3.7	2.2	1.5	0.7
Vitamin A-rich fruits [b]	11.8	4.2	13.9	9.6	19.7	23.6	19.0	23.8	20.2	0.0	60.3	66.6	15.2	5.3	2.2
Vitamin C-rich fruits [c]	0.6	0.3	0.7	0.4	0.9	1.1	0.8	1.2	1.1	0.0	2.6	0.5	0.6	0.4	0.2
All other fruits and vegetables	1.2	2.8	1.3	1.9	4.0	8.1	4.4	6.5	5.9	1.9	6.3	4.2	5.8	5.1	1.5

[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). Mushrooms consumed by women in our study site were categorized as other fruits and vegetables and contained some vitamin B12. Fish broth was assigned to "other foods" and contributed about 3 percent of vitamin B12 intakes.
[b] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100g raw, taking into account retention factors.
[c] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100g raw, taking into account retention factors.

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	56.2	46.4	60.3	34.1	37.1	22.6	35.1	27.0	21.9	0.0	1.0	1.1	10.4	37.1	59.3
All other starchy staples	11.5	4.7	12.8	4.0	9.7	7.5	8.6	15.4	8.8	0.0	12.5	4.2	11.6	10.8	8.8
Cooked dry beans and peas	9.8	19.8	8.5	8.2	15.5	13.4	10.4	7.7	26.5	0.0	1.8	1.9	23.0	22.3	15.7
Soybeans and soy products	0.0	0.1	0.0	0.1	0.1	0.2	0.1	0.1	0.1	0.0	0.0	0.2	0.1	0.1	0.1
Nuts and seeds	1.3	2.0	0.4	7.8	2.4	1.2	2.6	1.1	1.6	0.0	0.2	0.3	1.1	2.1	2.1
Milk/yogurt	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
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	0.2	0.7	0.0	0.9	0.3	0.5	0.6	0.2	0.0	2.9	0.2	0.2	0.2	0.4	0.6
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	0.9	2.3	0.0	3.9	0.6	1.6	2.3	1.1	0.2	11.0	0.0	1.5	0.6	1.0	1.2
Large whole fish/dried fish/shellfish, other seafood	1.1	4.8	0.0	4.6	1.9	2.5	3.4	1.6	0.9	24.4	0.3	1.6	2.1	1.3	1.5
Small fish eaten whole w/bones	1.1	5.4	0.0	5.5	1.3	3.3	4.6	1.9	0.9	36.8	0.2	1.2	8.7	1.8	2.4
Insects, grubs, snakes, rodents and other small animal	0.2	1.3	0.0	0.6	0.2	0.6	1.0	0.5	0.1	8.2	0.0	0.0	0.5	0.5	1.1
Eggs	0.4	1.1	0.0	2.4	0.4	2.3	0.0	0.5	1.0	9.4	0.0	1.9	1.4	0.8	0.6
Vitamin A-rich dark green leafy vegetables [b]	0.6	2.2	0.5	0.8	2.3	6.9	2.7	8.0	7.7	0.0	7.8	9.4	14.9	7.9	1.5
Vitamin A-rich deep yellow/orange/red vegetables [b]	0.2	0.1	0.3	0.0	0.3	0.4	0.3	0.5	0.2	0.0	0.2	1.2	0.5	0.3	0.2
Vitamin C-rich vegetables [c]	0.3	0.8	0.3	0.6	2.0	1.5	1.8	1.7	2.1	0.0	5.1	3.7	2.2	1.5	0.7
All other vegetables	0.6	2.5	0.5	1.4	3.5	6.9	3.5	3.9	4.9	1.9	4.8	3.6	5.5	4.7	1.2
Vitamin A-rich fruits [b]	11.8	4.2	13.9	9.6	19.7	23.6	19.0	23.8	20.2	0.0	60.3	66.6	15.2	5.3	2.2
Vitamin C-rich fruits [c]	0.6	0.3	0.7	0.4	0.9	1.1	0.8	1.2	1.1	0.0	2.6	0.5	0.6	0.4	0.2
All other fruits	0.6	0.3	0.8	0.4	0.4	1.2	0.9	2.5	0.9	0.0	1.5	0.6	0.3	0.4	0.3

[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). Mushrooms consumed by women in our study site were categorized as other fruits and vegetables and contained some vitamin B12. Fish broth was assigned to "other foods" and contributed about 3 percent of vitamin B12 intakes.
[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100g raw, taking into account retention factors.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100g raw, taking into account retention factors.

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	0.203 ***		0.243 ***		0.205 ***		0.244 ***		0.227 ***		0.228 ***		0.299 ***		0.304 ***	
Thiamin	0.159 **	-0.003	0.246 ***	0.091	0.160 **	-0.005	0.249 ***	0.094	0.185 ***	0.008	0.250 ***	0.116 *	0.254 ***	0.027	0.308 ***	0.115 *
Riboflavin	0.144 **	0.021	0.226 ***	0.096	0.194 ***	0.086	0.276 ***	0.162 **	0.212 ***	0.091	0.284 ***	0.185 ***	0.203 ***	0.019	0.262 ***	0.095
Niacin	0.218 ***	0.103 *	0.280 ***	0.154 **	0.234 ***	0.124 *	0.299 ***	0.181 ***	0.234 ***	0.100 *	0.280 ***	0.170 ***	0.271 ***	0.076	0.310 ***	0.131 **
Vitamin B6	0.127 *	0.008	0.158 **	0.018	0.267 ***	0.185 ***	0.306 ***	0.207 ***	0.248 ***	0.145 **	0.294 ***	0.203 ***	0.280 ***	0.133 **	0.323 ***	0.186 ***
Folate	0.163 ***	0.046	0.261 ***	0.144 **	0.162 ***	0.044	0.263 ***	0.146 **	0.157 **	0.019	0.241 ***	0.128 **	0.213 ***	0.034	0.276 ***	0.115 *
Vitamin B12	0.160 **	0.165 ***	0.141 **	0.146 **	0.118 *	0.121 *	0.100 *	0.104 *	0.113 *	0.117 *	0.084	0.087	0.080	0.085	0.052	0.056
Vitamin C	0.198 ***	0.137 **	0.202 ***	0.127 *	0.336 ***	0.288 ***	0.352 ***	0.292 ***	0.313 ***	0.255 ***	0.337 ***	0.281 ***	0.295 ***	0.210 ***	0.315 ***	0.231 ***
Vitamin A	0.114 *	0.057	0.135 **	0.068	0.307 ***	0.264 ***	0.337 ***	0.286 ***	0.274 ***	0.222 ***	0.332 ***	0.284 ***	0.184 ***	0.105 *	0.223 ***	0.146 **
Calcium	0.110 *	0.024	0.142 **	0.041	0.252 ***	0.185 ***	0.290 ***	0.210 ***	0.204 ***	0.120 *	0.243 ***	0.164 ***	0.203 ***	0.085	0.240 ***	0.125 *
Iron	0.086	-0.082	0.168 ***	-0.005	0.095	-0.071	0.176 ***	0.005	0.091	-0.099 *	0.146 **	-0.021	0.166 ***	-0.067	0.215 ***	0.001
Zinc	0.142 **	-0.002	0.228 ***	0.082	0.061	-0.122 *	0.142 **	-0.046	0.089	-0.104 *	0.142 **	-0.029	0.157 **	-0.082	0.199 ***	-0.025

[a] Usual intake of energy and individual nutrients are estimated by the BLUP following the method described in Arimond et al., 2007**.** 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	**0.319** ***	**-0.341** ***
All legumes and nuts	0.233 ***	-0.003
All dairy	–	–
Other animal source foods	0.117 *	0.050
Vitamin A-rich fruits and vegetables [c]	0.511 ***	0.417 ***
Other fruits and vegetables	0.187 ***	0.170 ***

[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 > 120 RE/100g raw, taking into account retention factors.

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	**0.319** ***	**-0.341** ***
All legumes and nuts	0.233 ***	-0.003
All dairy	–	–
Organ meat	–	–
Eggs	-0.096	-0.085
Flesh foods and other miscellaneous small animal protein	0.145 **	0.074
Vitamin A-rich dark green leafy vegetables [c]	0.200 ***	0.207 ***
Other vitamin A-rich vegetables and fruits [c]	0.501 ***	0.404 ***
Other fruits and vegetables	0.187 ***	0.170 ***

[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 > 120 RE/100g raw, taking into account retention factors.

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	**0.319** ***	**-0.341** ***
All legumes and nuts	0.233 ***	-0.003
All dairy	–	–
Organ meat	–	–
Eggs	-0.096	-0.085
Small fish eaten whole with bones	0.063	0.069
All other flesh foods and miscellaneous small animal protein	0.126 *	0.047
Vitamin A-rich dark green leafy vegetables [c]	0.200 ***	0.207 ***
Vitamin A-rich deep yellow/orange/red vegetables [c]	0.078	0.050
Vitamin C-rich vegetables [d]	0.168 ***	0.146 **
Vitamin A-rich fruits [c]	0.495 ***	0.400 ***
Vitamin C-rich fruits [d]	0.056	0.079
All other fruits and vegetables	0.187 ***	0.135 **

[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 > 120 RE/100g raw, taking into account retention factors.

[d] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100g raw, taking into account retention factors.

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	**0.156** **	**-0.237** ***
All other starchy staples	0.154 **	0.008
Cooked dry beans and peas	0.178 ***	-0.011
Soybeans and soy products	0.073	0.104 *
Nuts and seeds	0.135 **	0.002
Milk/yogurt	–	–
Cheese	–	–
Beef, pork, veal, lamb, goat, game meat	-0.025	-0.012
Organ meat	–	–
Chicken, duck, turkey, pigeon, guinea hen, game birds	0.050	-0.040
Large whole fish/dried fish/shellfish and other seafood	0.137 **	0.104 *
Small fish eaten whole with bones	0.063	0.069
Insects, grubs, snakes, rodents and other small animal	0.009	0.019
Eggs	-0.096	-0.085
Vitamin A-rich dark green leafy vegetables [c]	0.200 ***	0.207 ***
Vitamin A-rich deep yellow/orange/red vegetables [c]	0.078	0.050
Vitamin C-rich vegetables [d]	0.168 ***	0.146 **
All other vegetables	0.167 ***	0.192 ***
Vitamin A-rich fruits [c]	0.495 ***	0.400 ***
Vitamin C-rich fruits [d]	0.056	0.079
All other fruits	0.125 *	0.051

[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 > 120 RE/100g raw, taking into account retention factors.

[d] Vitamin C-rich fruits and vegetables are defined as those with >9 mg/100g raw, taking into account retention factors.

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	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2	1683	(1056-3332)	1637	(889-3332)	1559	(1056-3332)	1535	(889-3332)	1613	(1056-3332)	1583	(889-3332)	1333	(1088-2843)	1333	(1049-2843)
3	1929	(738-3747)	2014	(738-3790)	1843	(738-3515)	1851	(738-3790)	1805	(738-3515)	1862	(738-3790)	1756	(738-3332)	1805	(738-3434)
4	2155	(852-3790)	2275	(935-4208)	2070	(852-3790)	2173	(935-4208)	2029	(852-3790)	2148	(935-3753)	1875	(852-3515)	2014	(1006-3790)
5	2338	(1373-4208)	2356	(1469-3716)	2156	(1148-4208)	2356	(1227-3716)	2148	(1097-3635)	2147	(1203-4208)	2061	(889-3790)	2145	(935-3753)
6	–	–	–	–	–	–	–	–	2338	(1484-4208)	2243	(1561-3716)	2211	(1097-3635)	2406	(1445-4208)
7					–	–	–	–	2993	(1561-3498)	–	–	2367	(1575-4208)	2445	(1561-3716)
8					–	–	–	–	–	–	–	–	2929	(1561-3056)	–	–
9					–	–	–	–	–	–	–	–	–	–	–	–
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 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	3.5	4.0	2,114	2,029	0.224***
FGI-6R [c]	3.4	3.0	2,114	2,029	0.264***
FGI-9	3.8	4.0	2,114	2,029	0.220***
FGI-9R [c]	3.7	4.0	2,114	2,029	0.260***
FGI-13	4.2	4.0	2,114	2,029	0.236***
FGI-13R [c]	3.9	4.0	2,114	2,029	0.249***
FGI-21	4.7	5.0	2,114	2,029	0.316***
FGI-21R [c]	4.4	4.0	2,114	2,029	0.329***

[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 / Median MPA (range)															
	FGI-6		FGI-6R		FGI-9		FGI-9R		FGI-13		FGI-13R		FGI-21		FGI-21R	
1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2	0.22	(0.00-0.78)	0.23	(0.00-0.78)	0.12	(0.00-0.46)	0.14	(0.00-0.46)	0.12	(0.00-0.46)	0.15	(0.00-0.69)	0.10	(0.00-0.31)	0.10	(0.00-0.31)
3	0.36	(0.00-0.75)	0.37	(0.00-0.77)	0.34	(0.00-0.78)	0.34	(0.00-0.78)	0.34	(0.00-0.78)	0.32	(0.00-0.78)	0.31	(0.00-0.78)	0.32	(0.00-0.78)
4	0.40	(0.01-0.87)	0.40	(0.01-0.87)	0.40	(0.01-0.87)	0.40	(0.01-0.87)	0.38	(0.01-0.87)	0.41	(0.01-0.87)	0.38	(0.01-0.77)	0.37	(0.04-0.75)
5	0.40	(0.01-0.77)	0.47	(0.03-0.77)	0.40	(0.01-0.80)	0.43	(0.03-0.80)	0.39	(0.01-0.80)	0.40	(0.03-0.80)	0.35	(0.01-0.87)	0.44	(0.01-0.87)
6	–	–	–	–	–	–	–	–	0.42	(0.15-0.75)	0.45	(0.25-0.75)	0.41	(0.01-0.77)	0.42	(0.03-0.75)
7					–	–	–	–	0.57	(0.37-0.72)	–	–	0.50	(0.19-0.78)	0.48	(0.19-0.78)
8					–	–	–	–	–	–	–	–	0.48	(0.37-0.75)	–	–
9					–	–	–	–	–	–	–	–	–	–	–	–
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 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)		
FGI-6	3.5	4.0	0.39	0.37	0.225 ***	0.109 *
FGI-6R [c]	3.4	3.0	0.39	0.37	0.280 ***	0.150 **
FGI-9	3.8	4.0	0.39	0.37	0.298 ***	0.210 ***
FGI-9R [c]	3.7	4.0	0.39	0.37	0.361 ***	0.262 ***
FGI-13	4.2	4.0	0.39	0.37	0.300 ***	0.200 ***
FGI-13R [c]	3.9	4.0	0.39	0.37	0.352 ***	0.259 ***
FGI-21	4.7	5.0	0.39	0.37	0.323 ***	0.166 ***
FGI-21R [c]	4.4	4.0	0.39	0.37	0.365 ***	0.214 ***

[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	-0.694 *	0.325	-0.773 *	0.318	-0.736 *	0.317	-0.822 **	0.307	-0.681 *	0.317	-0.823 **	0.310	-0.706 *	0.314	-0.817 **	0.308
Woman's height	0.000	0.002	0.000	0.002	0.000	0.002	0.000	0.002	0.000	0.002	0.001	0.002	0.000	0.002	0.001	0.002
Age	-0.003	0.002	-0.003	0.002	-0.002	0.002	-0.002	0.002	-0.003	0.002	-0.002	0.002	-0.003	0.002	-0.002	0.002
Lactating (0/1)	-0.200 ***	0.026	-0.205 ***	0.026	-0.198 ***	0.026	-0.202 ***	0.025	-0.194 ***	0.026	-0.199 ***	0.025	-0.199 ***	0.025	-0.204 ***	0.025
Pregnant (0/1)	-0.195 ***	0.036	-0.205 ***	0.036	-0.191 ***	0.035	-0.201 ***	0.034	-0.190 ***	0.036	-0.202 ***	0.035	-0.186 ***	0.035	-0.196 ***	0.034
Dietary diversity score	0.061 ***	0.014	0.081 ***	0.014	0.075 ***	0.013	0.097 ***	0.013	0.055 ***	0.010	0.073 ***	0.010	0.049 ***	0.008	0.063 ***	0.009
Adjusted R^2	0.201 ***		0.237 ***		0.239 ***		0.288 ***		0.231 ***		0.273 ***		0.247 ***		0.281 ***	
	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	-1.136 ***	0.245	-1.176 ***	0.242	-1.172 ***	0.240	-1.216 ***	0.235	-1.140 ***	0.241	-1.221 ***	0.236	-1.126 ***	0.242	-1.178 ***	0.240
Woman's height	0.001	0.002	0.001	0.002	0.001	0.002	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.002	0.001	0.002
Age	-0.003 *	0.001	-0.003 *	0.001	-0.003 *	0.001	-0.003 *	0.001	-0.003 *	0.001	-0.003 *	0.001	-0.003 *	0.001	-0.003 *	0.001
Lactating (0/1)	-0.203 ***	0.020	-0.205 ***	0.019	-0.202 ***	0.019	-0.204 ***	0.019	-0.200 ***	0.019	-0.202 ***	0.019	-0.202 ***	0.019	-0.204 ***	0.019
Pregnant (0/1)	-0.206 ***	0.027	-0.211 ***	0.027	-0.205 ***	0.027	-0.210 ***	0.026	-0.204 ***	0.027	-0.211 ***	0.026	-0.202 ***	0.027	-0.206 ***	0.027
Dietary diversity score	0.023 *	0.011	0.038 ***	0.011	0.040 ***	0.010	0.057 ***	0.010	0.028 ***	0.008	0.043 ***	0.008	0.019 **	0.007	0.029 ***	0.007
Total energy intake [c]	0.208 ***	0.014	0.202 ***	0.014	0.202 ***	0.013	0.195 ***	0.013	0.203 ***	0.014	0.197 ***	0.013	0.201 ***	0.014	0.195 ***	0.014
Adjusted R^2	0.551 ***		0.563 ***		0.569 ***		0.589 ***		0.564 ***		0.584 ***		0.558 ***		0.571 ***	

[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 asterisks 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 1000 before running the regressions to take into account the large scale of the energy variable and the small scale of MPA.

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

	Percent	(number)
Women with MPA >50%	31	(126)
Women with MPA >60%	19	(79)
Women with MPA >70%	8	(32)
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	2.0-5.0	0.607	0.001	0.027	0.555-0.660
FGI-6R [e]	1.0-5.0	0.615	0.000	0.026	0.563-0.667
FGI-9	2.0-7.0	0.614	0.000	0.026	0.563-0.666
FGI-9R [e]	1.0-7.0	0.630	0.000	0.026	0.579-0.681
FGI-13	2.0-8.0	0.625	0.000	0.028	0.571-0.679
FGI-13R [e]	1.0-7.0	0.636	0.000	0.027	0.584-0.688
FGI-21	2.0-9.0	0.644	0.000	0.028	0.589-0.699
FGI-21R [e]	2.0-9.0	0.656	0.000	0.027	0.602-0.709
			MPA > 60% (second cutoff)		
FGI-6	2.0-5.0	0.571	0.049	0.032	0.509-0.634
FGI-6R [e]	1.0-5.0	0.580	0.027	0.031	0.519-0.641
FGI-9	2.0-7.0	0.597	0.007	0.030	0.539-0.655
FGI-9R [e]	1.0-7.0	0.613	0.002	0.030	0.554-0.671
FGI-13	2.0-8.0	0.601	0.005	0.032	0.539-0.664
FGI-13R [e]	1.0-7.0	0.614	0.002	0.031	0.554-0.675
FGI-21	2.0-9.0	0.644	0.000	0.033	0.579-0.708
FGI-21R [e]	2.0-9.0	0.655	0.000	0.031	0.593-0.716
			MPA > 70% (third cutoff)		
FGI-6	2.0-5.0	0.543	0.417	0.047	0.451-0.635
FGI-6R [e]	1.0-5.0	0.537	0.492	0.048	0.443-0.630
FGI-9	2.0-7.0	0.576	0.155	0.045	0.487-0.664
FGI-9R [e]	1.0-7.0	0.577	0.150	0.047	0.484-0.669
FGI-13	2.0-8.0	0.588	0.100	0.050	0.490-0.685
FGI-13R [e]	1.0-7.0	0.599	0.063	0.047	0.508-0.690
FGI-21	2.0-9.0	0.624	0.020	0.052	0.521-0.727
FGI-21R [e]	2.0-9.0	0.633	0.013	0.050	0.534-0.731

[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]	0.607	0.615	0.614	0.630	0.625	0.636	0.644	0.656
		P-values							
FGI-6	0.607								
FGI-6R [d]	0.615	0.592							
FGI-9	0.614	0.678	0.981						
FGI-9R [d]	0.630	0.265	0.371	0.220					
FGI-13	0.625	0.349	0.667	0.478	0.769				
FGI-13R [d]	0.636	0.201	0.264	0.253	0.660	0.472			
FGI-21	0.644	0.090	0.241	0.101	0.502	0.130	0.689		
FGI-21R [d]	0.656	0.052	0.072	0.054	0.155	0.116	0.171	0.395	
MPA > 60% (second cutoff)									
		FGI-6	**FGI-6R**	**FGI-9**	**FGI-9R**	**FGI-13**	**FGI-13R**	**FGI-21**	**FGI-21R**
	AUC [c]	0.571	0.580	0.597	0.613	0.601	0.614	0.644	0.655
		P-values							
FGI-6	0.571								
FGI-6R [d]	0.580	0.585							
FGI-9	0.597	0.205	0.501						
FGI-9R [d]	0.613	0.106	0.115	0.291					
FGI-13	0.601	0.176	0.428	0.793	0.620				
FGI-13R [d]	0.614	0.117	0.139	0.420	0.935	0.509			
FGI-21	0.644	**0.003**	**0.027**	**0.027**	0.227	**0.005**	0.215		
FGI-21R [d]	0.655	**0.004**	**0.004**	**0.016**	**0.048**	**0.021**	**0.020**	0.502	
MPA > 70% (third cutoff)									
		FGI-6	**FGI-6R**	**FGI-9**	**FGI-9R**	**FGI-13**	**FGI-13R**	**FGI-21**	**FGI-21R**
	AUC [c]	0.543	0.537	0.576	0.577	0.588	0.599	0.624	0.633
		P-values							
FGI-6	0.543								
FGI-6R [d]	0.537	0.803							
FGI-9	0.576	0.285	0.320						
FGI-9R [d]	0.577	0.403	0.201	0.965					
FGI-13	0.588	0.174	0.243	0.645	0.775				
FGI-13R [d]	0.599	0.138	0.055	0.438	0.368	0.669			
FGI-21	0.624	**0.016**	**0.035**	0.131	0.235	0.056	0.387		
FGI-21R [d]	0.633	**0.024**	**0.006**	0.130	0.100	0.175	0.123	0.698	

[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%		
409	≥ 1	100.0	0.0	69.2	0.0	69.2
409	≥ 2	100.0	0.0	69.2	0.0	69.2
369	≥ 3	97.6	13.1	60.1	0.7	60.9
220	≥ 4	66.7	51.9	33.3	10.3	43.5
43	≥ 5	12.7	90.5	6.6	26.9	33.5
0	6	–	–	–	–	–
				MPA > 60%		
409	≥ 1	100.0	0.0	80.7	0.0	80.7
409	≥ 2	100.0	0.0	80.7	0.0	80.7
369	≥ 3	96.2	11.2	71.6	0.7	72.4
220	≥ 4	63.3	48.5	41.6	7.1	48.7
43	≥ 5	12.7	90.0	8.1	16.9	24.9
0	6	–	–	–	–	–
				MPA > 70%		
409	≥ 1	100.0	0.0	92.2	0.0	92.2
409	≥ 2	100.0	0.0	92.2	0.0	92.2
369	≥ 3	93.8	10.1	82.9	0.5	83.4
220	≥ 4	62.5	46.9	48.9	2.9	51.8
43	≥ 5	9.4	89.4	9.8	7.1	16.9
0	6	–	–	–	–	–

[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%		
409	≥ 1	100.0	0.0	69.2	0.0	69.2
408	≥ 2	100.0	0.4	68.9	0.0	68.9
356	≥ 3	97.6	17.7	57.0	0.7	57.7
181	≥ 4	55.6	60.8	27.1	13.7	40.8
30	≥ 5	9.5	93.6	4.4	27.9	32.3
0	6	–	–	–	–	–
				MPA > 60%		
409	≥ 1	100.0	0.0	80.7	0.0	80.7
408	≥ 2	100.0	0.3	80.4	0.0	80.4
356	≥ 3	96.2	15.2	68.5	0.7	69.2
181	≥ 4	53.2	57.9	34.0	9.0	43.0
30	≥ 5	8.9	93.0	5.6	17.6	23.2
0	6	–	–	–	–	–
				MPA > 70%		
409	≥ 1	100.0	0.0	92.2	0.0	92.2
408	≥ 2	100.0	0.3	91.9	0.0	91.9
356	≥ 3	93.8	13.5	79.7	0.5	80.2
181	≥ 4	46.9	56.0	40.6	4.2	44.7
30	≥ 5	9.4	92.8	6.6	7.1	13.7
0	6	–	–	–	–	–

[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%		
409	≥ 1	100.0	0.0	69.2	0.0	69.2
409	≥ 2	100.0	0.0	69.2	0.0	69.2
385	≥ 3	100.0	8.5	63.3	0.0	63.3
271	≥ 4	81.7	40.6	41.1	5.6	46.7
92	≥ 5	26.2	79.2	14.4	22.7	37.2
4	≥ 6	2.4	99.6	0.2	30.1	30.3
1	≥ 7	0.8	100.0	0.0	30.6	30.6
0	≥ 8	–	–	–	–	–
0	9	–	–	–	–	–
				MPA > 60%		
409	≥ 1	100.0	0.0	80.7	0.0	80.7
409	≥ 2	100.0	0.0	80.7	0.0	80.7
385	≥ 3	100.0	7.3	74.8	0.0	74.8
271	≥ 4	82.3	37.6	50.4	3.4	53.8
92	≥ 5	25.3	78.2	17.6	14.4	32.0
4	≥ 6	2.5	99.4	0.5	18.8	19.3
1	≥ 7	1.3	100.0	0.0	19.1	19.1
0	≥ 8	–	–	–	–	–
0	9	–	–	–	–	–
				MPA > 70%		
409	≥ 1	100.0	0.0	92.2	0.0	92.2
409	≥ 2	100.0	0.0	92.2	0.0	92.2
385	≥ 3	100.0	6.4	86.3	0.0	86.3
271	≥ 4	78.1	34.7	60.1	1.7	61.9
92	≥ 5	28.1	78.0	20.3	5.6	25.9
4	≥ 6	0.0	98.9	1.0	7.8	8.8
1	≥ 7	0.0	99.7	0.2	7.8	8.1
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%		
409	≥ 1	100.0	0.0	69.2	0.0	69.2
408	≥ 2	100.0	0.4	68.9	0.0	68.9
377	≥ 3	100.0	11.3	61.4	0.0	61.4
246	≥ 4	76.2	47.0	36.7	7.3	44.0
59	≥ 5	18.3	87.3	8.8	25.2	34.0
3	≥ 6	1.6	99.6	0.2	30.3	30.6
1	≥ 7	0.8	100.0	0.0	30.6	30.6
0	≥ 8	–	–	–	–	–
0	9	–	–	–	–	–
				MPA > 60%		
409	≥ 1	100.0	0.0	80.7	0.0	80.7
408	≥ 2	100.0	0.3	80.4	0.0	80.4
377	≥ 3	100.0	9.7	72.9	0.0	72.9
246	≥ 4	75.9	43.6	45.5	4.6	50.1
59	≥ 5	19.0	86.7	10.8	15.6	26.4
3	≥ 6	1.3	99.4	0.5	19.1	19.6
1	≥ 7	1.3	100.0	0.0	19.1	19.1
0	≥ 8	–	–	–	–	–
0	9	–	–	–	–	–
				MPA > 70%		
409	≥ 1	100.0	0.0	92.2	0.0	92.2
408	≥ 2	100.0	0.3	91.9	0.0	91.9
377	≥ 3	100.0	8.5	84.4	0.0	84.4
246	≥ 4	68.8	40.6	54.8	2.4	57.2
59	≥ 5	21.9	86.2	12.7	6.1	18.8
3	≥ 6	0.0	99.2	0.7	7.8	8.6
1	≥ 7	0.0	99.7	0.2	7.8	8.1
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%		
409	≥ 1	100.0	0.0	69.2	0.0	69.2
409	≥ 2	100.0	0.0	69.2	0.0	69.2
387	≥ 3	100.0	7.8	63.8	0.0	63.8
295	≥ 4	85.7	33.9	45.7	4.4	50.1
158	≥ 5	48.4	65.7	23.7	15.9	39.6
49	≥ 6	17.5	90.5	6.6	25.4	32.0
6	≥ 7	3.2	99.3	0.5	29.8	30.3
1	≥ 8	0.8	100.0	0.0	30.6	30.6
0	≥ 9	–	–	–	–	–
0	≥10	–	–	–	–	–
0	≥ 11	–	–	–	–	–
0	≥ 12	–	–	–	–	–
0	13	–	–	–	–	–
				MPA > 60%		
409	≥ 1	100.0	0.0	80.7	0.0	80.7
409	≥ 2	100.0	0.0	80.7	0.0	80.7
387	≥ 3	100.0	6.7	75.3	0.0	75.3
295	≥ 4	84.8	30.9	55.7	2.9	58.7
158	≥ 5	49.4	63.9	29.1	9.8	38.9
49	≥ 6	15.2	88.8	9.0	16.4	25.4
6	≥ 7	2.5	98.8	1.0	18.8	19.8
1	≥ 8	0.0	99.7	0.2	19.3	19.6
0	≥ 9	–	–	–	–	–
0	≥10	–	–	–	–	–
0	≥ 11	–	–	–	–	–
0	≥ 12	–	–	–	–	–
0	13	–	–	–	–	–
				MPA > 70%		
409	≥ 1	100.0	0.0	92.2	0.0	92.2
409	≥ 2	100.0	0.0	92.2	0.0	92.2
387	≥ 3	100.0	5.8	86.8	0.0	86.8
295	≥ 4	81.3	28.6	65.8	1.5	67.2
158	≥ 5	50.0	62.3	34.7	3.9	38.6
49	≥ 6	18.8	88.6	10.5	6.4	16.9
6	≥ 7	3.1	98.7	1.2	7.6	8.8
1	≥ 8	0.0	99.7	0.2	7.8	8.1
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 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%		
409	≥ 1	100.0	0.0	69.2	0.0	69.2
408	≥ 2	100.0	0.4	68.9	0.0	68.9
377	≥ 3	99.2	11.0	61.6	0.2	61.9
264	≥ 4	81.7	43.1	39.4	5.6	45.0
103	≥ 5	31.7	77.7	15.4	21.0	36.4
24	≥ 6	9.5	95.8	2.9	27.9	30.8
4	≥ 7	2.4	99.6	0.2	30.1	30.3
0	≥ 8	–	–	–	–	–
0	≥ 9	–	–	–	–	–
0	≥ 10	–	–	–	–	–
0	≥ 11	–	–	–	–	–
0	≥ 12	–	–	–	–	–
0	13	–	–	–	–	–
				MPA > 60%		
409	≥ 1	100.0	0.0	80.7	0.0	80.7
408	≥ 2	100.0	0.3	80.4	0.0	80.4
377	≥ 3	98.7	9.4	73.1	0.2	73.3
264	≥ 4	81.0	39.4	48.9	3.7	52.6
103	≥ 5	32.9	76.7	18.8	13.0	31.8
24	≥ 6	7.6	94.5	4.4	17.8	22.2
4	≥ 7	2.5	99.4	0.5	18.8	19.3
0	≥ 8	–	–	–	–	–
0	≥ 9	–	–	–	–	–
0	≥ 10	–	–	–	–	–
0	≥ 11	–	–	–	–	–
0	≥ 12	–	–	–	–	–
0	13	–	–	–	–	–
				MPA > 70%		
409	≥ 1	100.0	0.0	92.2	0.0	92.2
408	≥ 2	100.0	0.3	91.9	0.0	91.9
377	≥ 3	100.0	8.5	84.4	0.0	84.4
264	≥ 4	78.1	36.6	58.4	1.7	60.1
103	≥ 5	34.4	75.6	22.5	5.1	27.6
24	≥ 6	9.4	94.4	5.1	7.1	12.2
4	≥ 7	3.1	99.2	0.7	7.6	8.3
0	≥ 8	–	–	–	–	–
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%		
409	≥ 1	100.0	0.0	69.2	0.0	69.2
409	≥ 2	100.0	0.0	69.2	0.0	69.2
396	≥ 3	100.0	4.6	66.0	0.0	66.0
321	≥ 4	90.5	26.9	50.6	2.9	53.5
228	≥ 5	69.0	50.2	34.5	9.5	44.0
111	≥ 6	38.9	78.1	15.2	18.8	34.0
43	≥ 7	18.3	92.9	4.9	25.2	30.1
8	≥ 8	4.0	98.9	0.7	29.6	30.3
3	≥ 9	2.4	100.0	0.0	30.1	30.1
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%		
409	≥ 1	100.0	0.0	80.7	0.0	80.7
409	≥ 2	100.0	0.0	80.7	0.0	80.7
396	≥ 3	100.0	3.9	77.5	0.0	77.5
321	≥ 4	91.1	24.5	60.9	1.7	62.6
228	≥ 5	70.9	47.9	42.1	5.6	47.7
111	≥ 6	43.0	76.7	18.8	11.0	29.8
43	≥ 7	19.0	91.5	6.8	15.6	22.5
8	≥ 8	3.8	98.5	1.2	18.6	19.8
3	≥ 9	1.3	99.4	0.5	19.1	19.6
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 20g (continued). 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 > 70%		
409	≥ 1	100.0	0.0	92.2	0.0	92.2
409	≥ 2	100.0	0.0	92.2	0.0	92.2
396	≥ 3	100.0	3.4	89.0	0.0	89.0
321	≥ 4	87.5	22.3	71.6	1.0	72.6
228	≥ 5	68.8	45.4	50.4	2.4	52.8
111	≥ 6	46.9	74.5	23.5	4.2	27.6
43	≥ 7	18.8	90.2	9.0	6.4	15.4
8	≥ 8	9.4	98.7	1.2	7.1	8.3
3	≥ 9	3.1	99.5	0.5	7.6	8.1
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.

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%		
409	≥ 1	100.0	0.0	69.2	0.0	69.2
409	≥ 2	100.0	0.0	69.2	0.0	69.2
390	≥ 3	100.0	6.7	64.5	0.0	64.5
300	≥ 4	88.1	33.2	46.2	3.7	49.9
187	≥ 5	61.1	61.1	26.9	12.0	38.9
65	≥ 6	24.6	88.0	8.3	23.2	31.5
23	≥ 7	9.5	96.1	2.7	27.9	30.6
2	≥ 8	1.6	100.0	0.0	30.3	30.3
1	≥ 9	0.8	100.0	0.0	30.6	30.6
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 20h (continued). 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 > 60%		
409	≥ 1	100.0	0.0	80.7	0.0	80.7
409	≥ 2	100.0	0.0	80.7	0.0	80.7
390	≥ 3	100.0	5.8	76.0	0.0	76.0
300	≥ 4	88.6	30.3	56.2	2.2	58.4
187	≥ 5	65.8	59.1	33.0	6.6	39.6
65	≥ 6	25.3	86.4	11.0	14.4	25.4
23	≥ 7	10.1	95.5	3.7	17.4	21.0
2	≥ 8	2.5	100.0	0.0	18.8	18.8
1	≥ 9	1.3	100.0	0.0	19.1	19.1
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%		
409	≥ 1	100.0	0.0	92.2	0.0	92.2
409	≥ 2	100.0	0.0	92.2	0.0	92.2
390	≥ 3	100.0	5.0	87.5	0.0	87.5
300	≥ 4	84.4	27.6	66.7	1.2	68.0
187	≥ 5	65.6	56.0	40.6	2.7	43.3
65	≥ 6	28.1	85.1	13.7	5.6	19.3
23	≥ 7	12.5	95.0	4.6	6.8	11.5
2	≥ 8	6.3	100.0	0.0	7.3	7.3
1	≥ 9	3.1	100.0	0.0	7.6	7.6
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

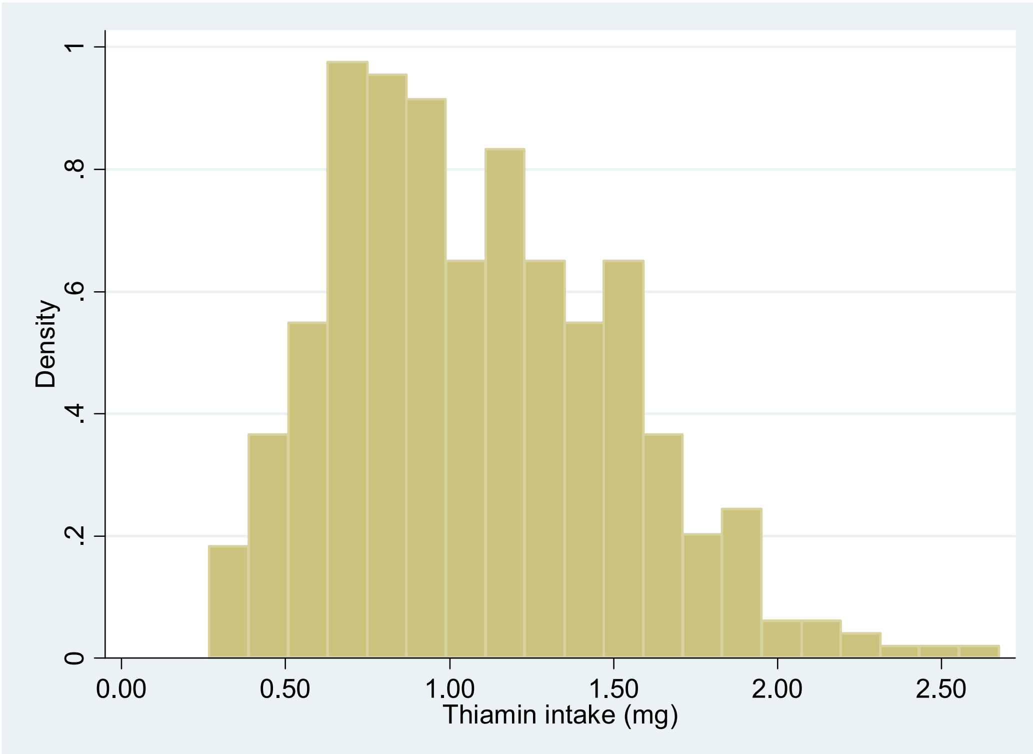


Figure 2. Distribution of Riboflavin Intakes, All Women

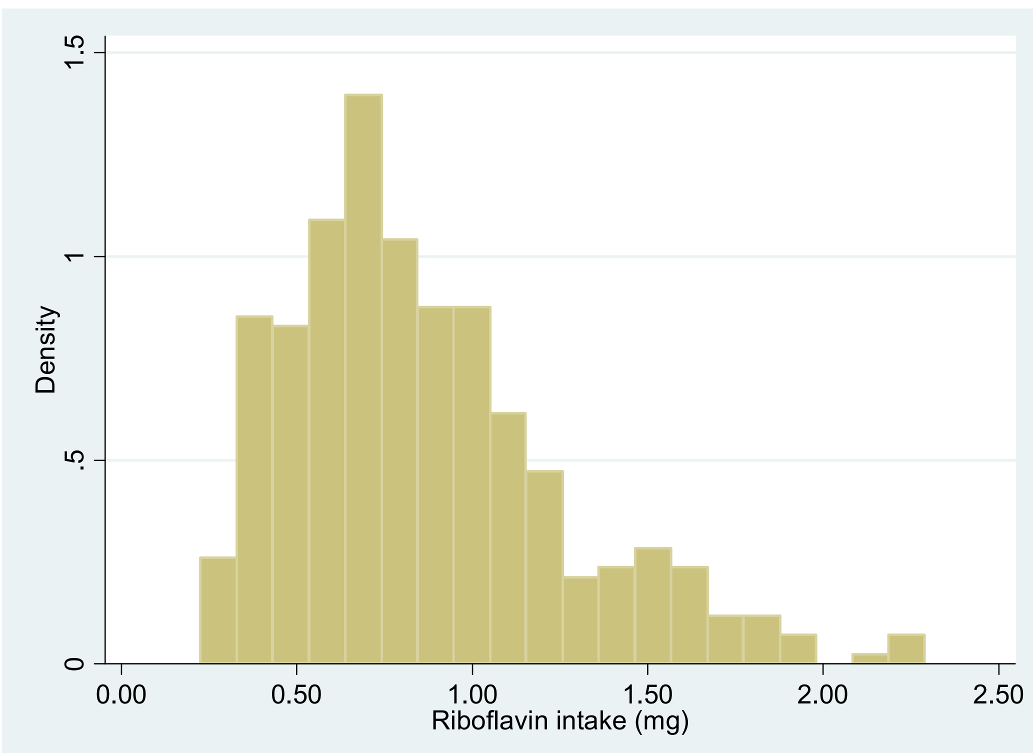


Figure 3. Distribution of Niacin Intakes, All Women

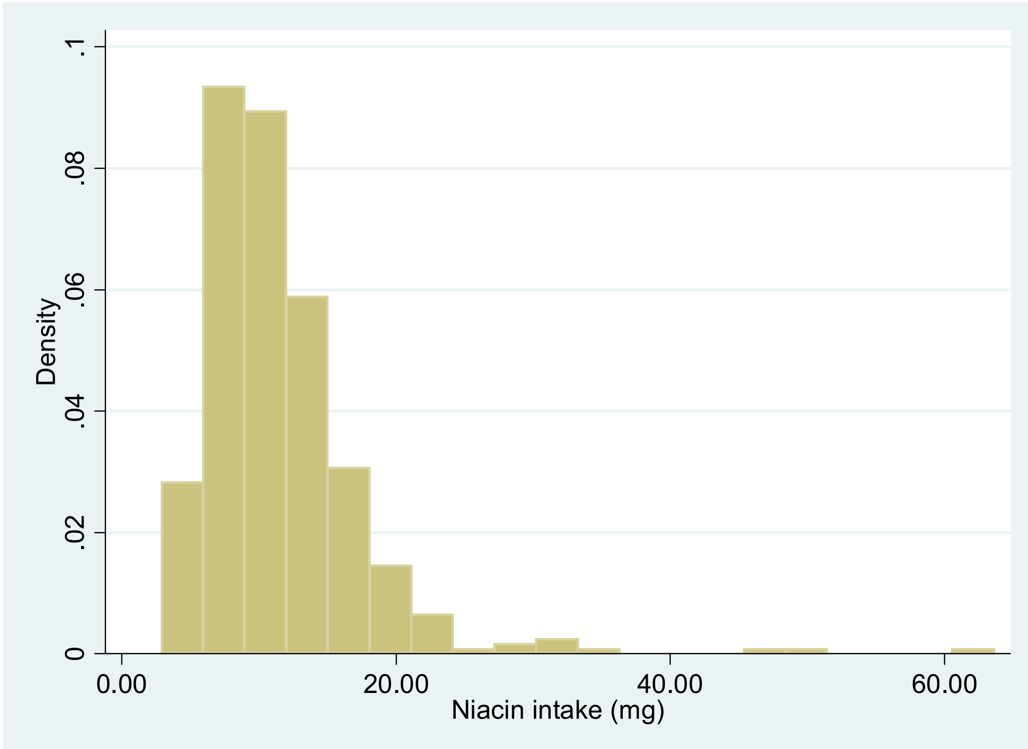


Figure 4. Distribution of Vitamin B6 Intakes, All Women

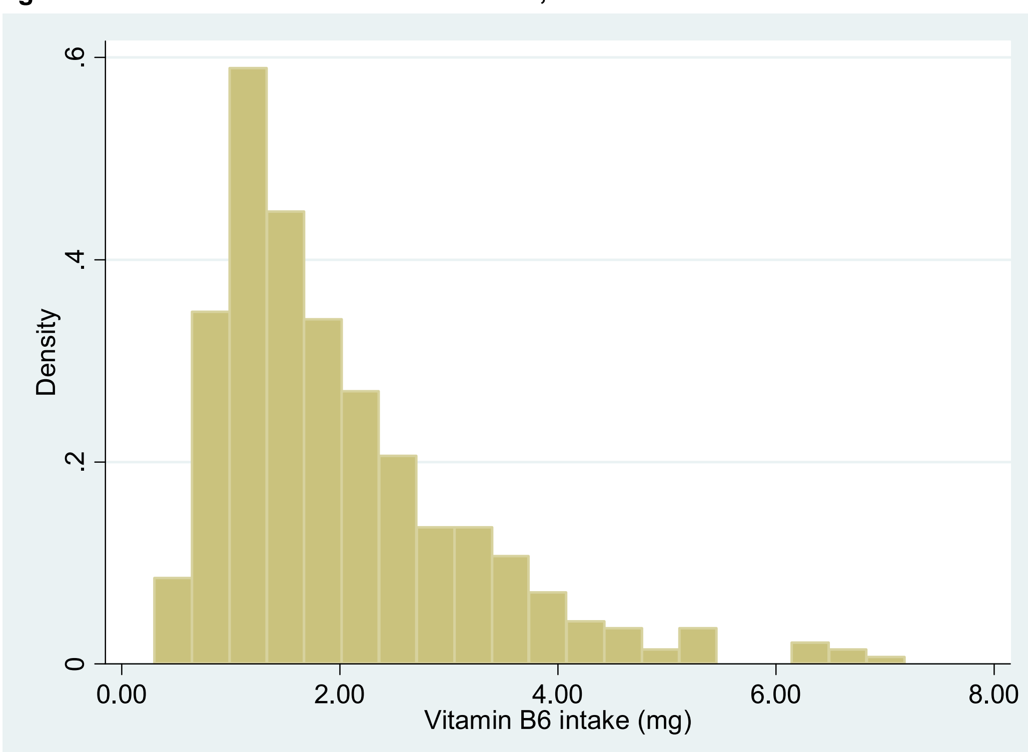


Figure 5. Distribution of Folate Intakes, All Women

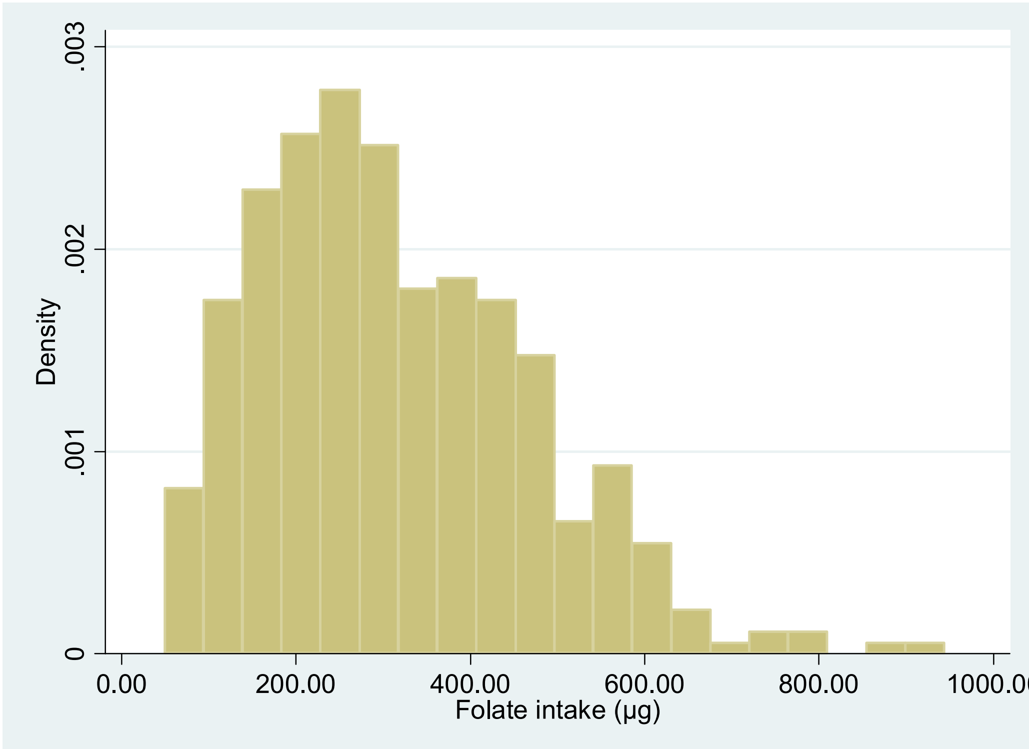


Figure 6. Distribution of Vitamin B12 Intakes, All Women

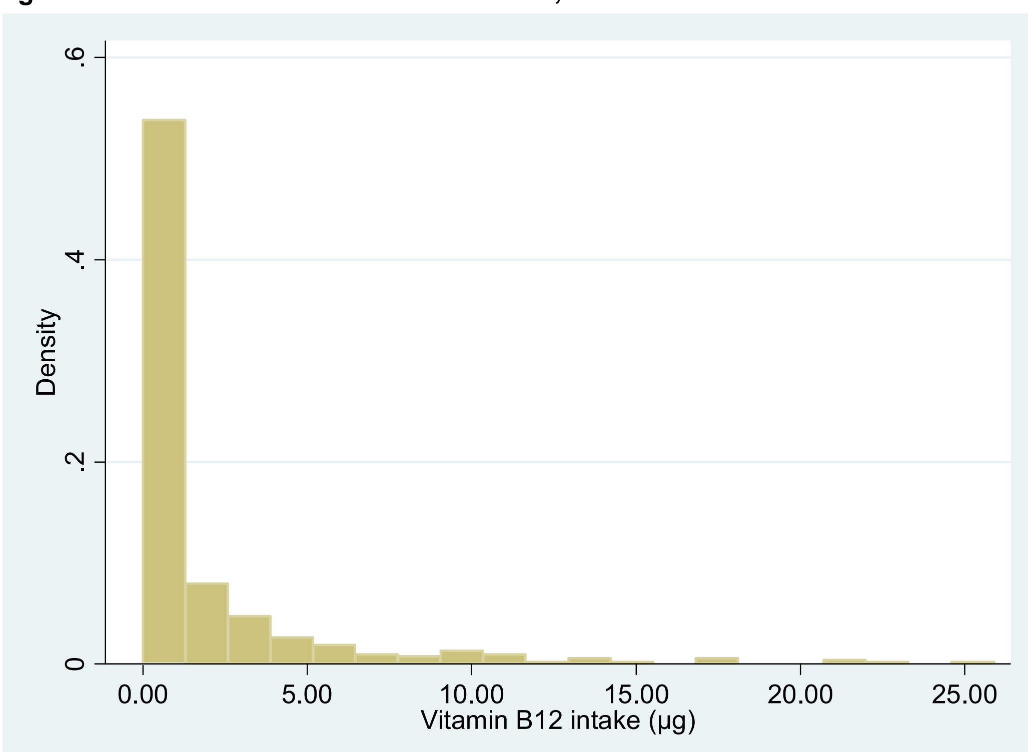


Figure 7. Distribution of Vitamin C Intakes, All Women

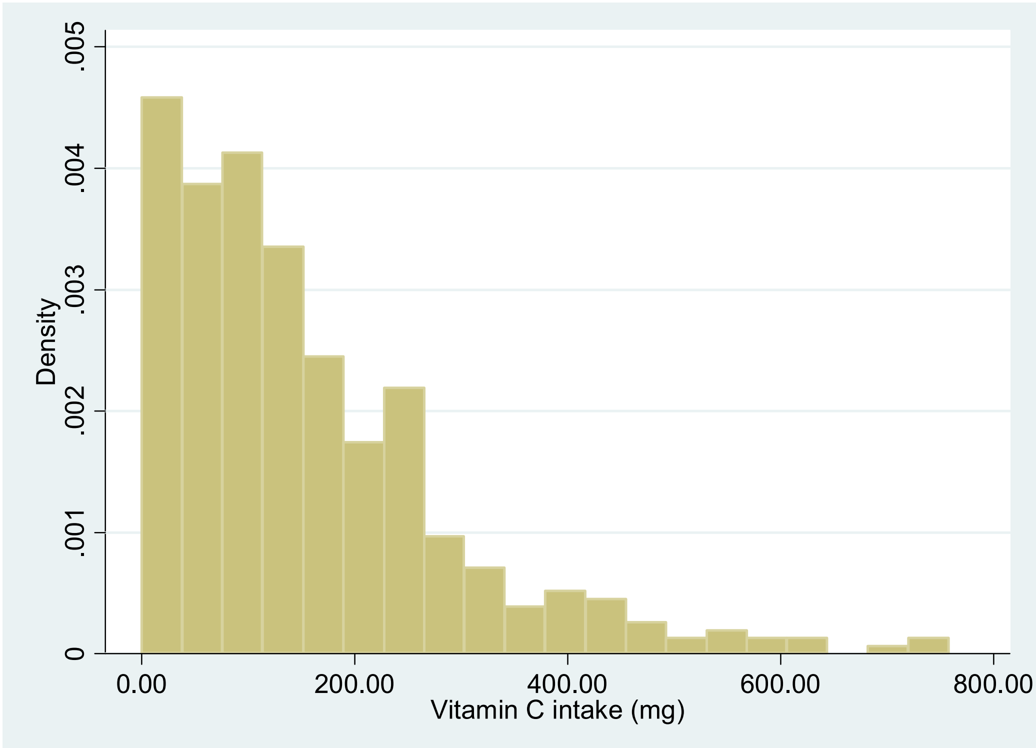


Figure 8. Distribution of Vitamin A Intakes, All Women

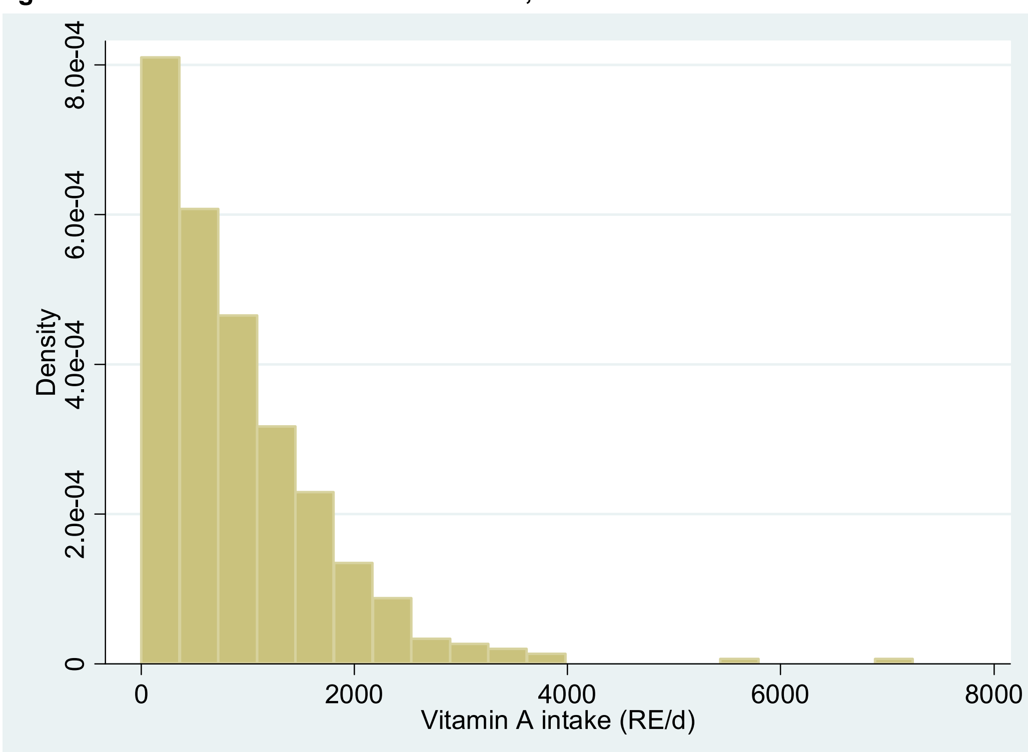


Figure 9. Distribution of Calcium Intakes, All Women

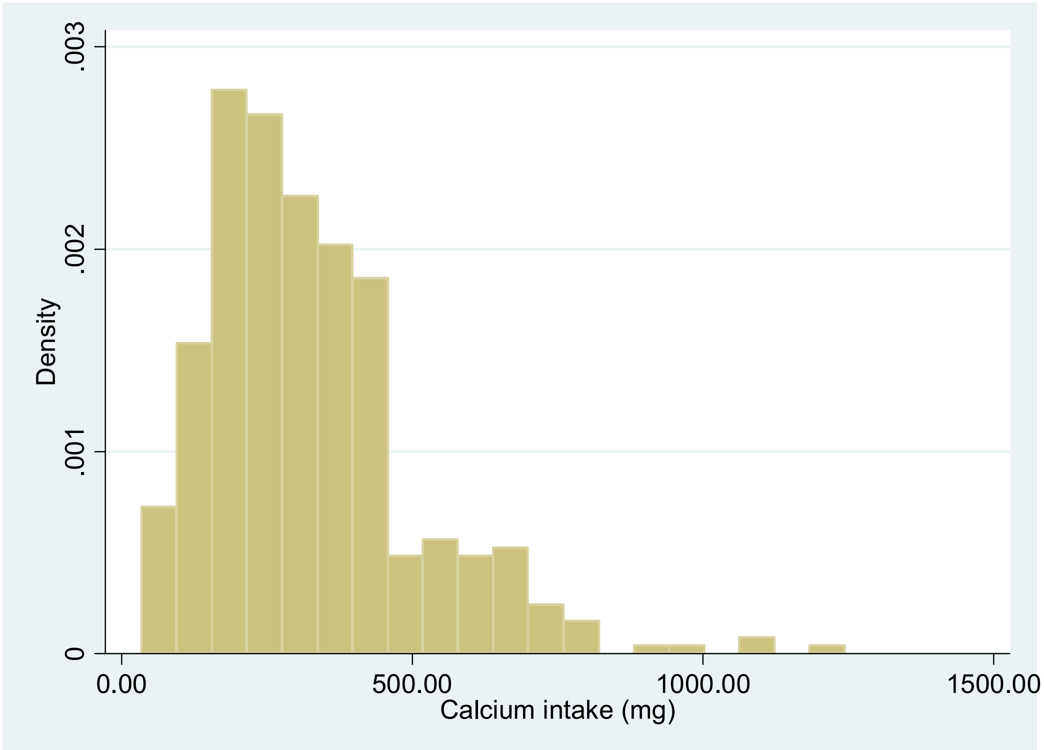


Figure 10. Distribution of Iron Intakes, All Women

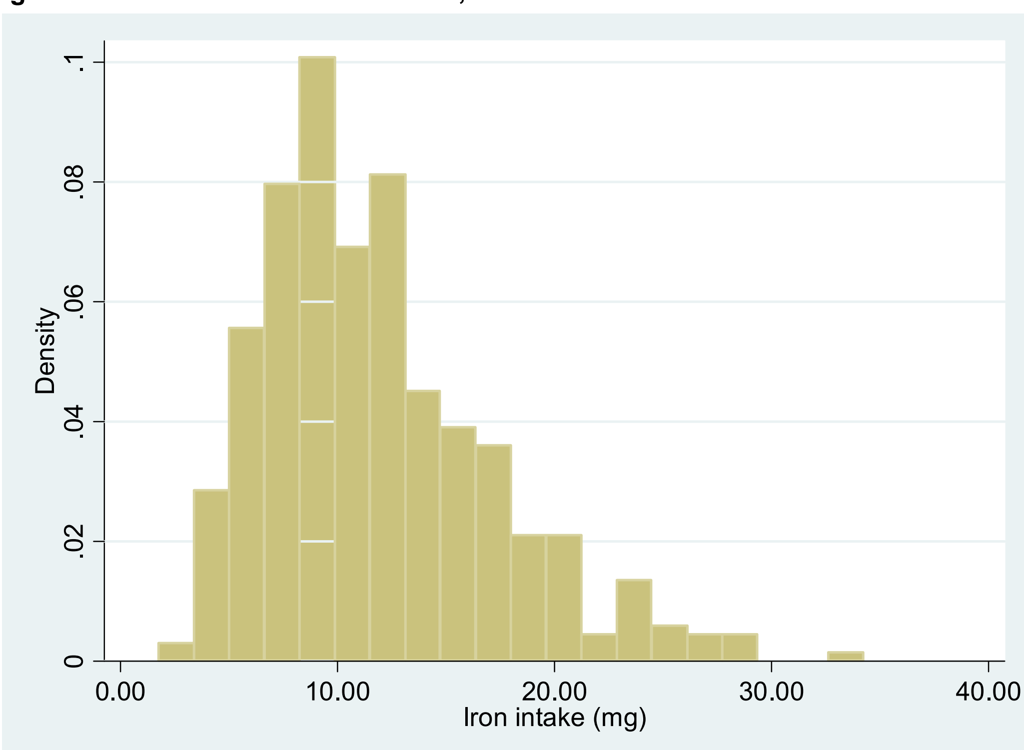


Figure 11. Distribution of Zinc Intakes, All Women

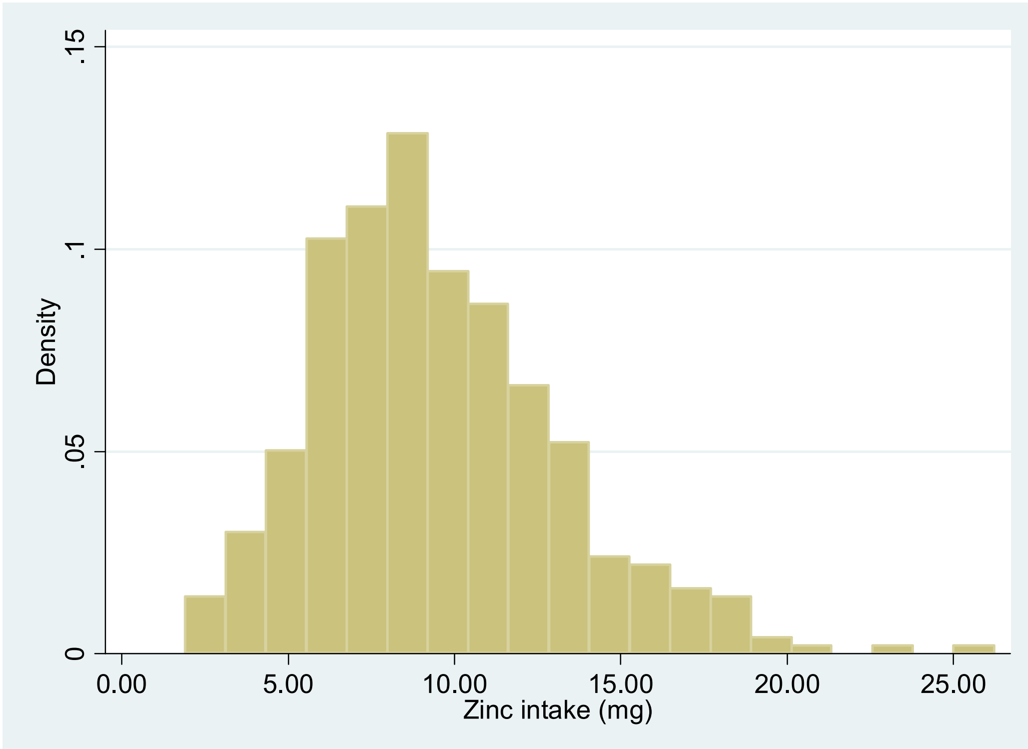


Figure 12. Intra-Individual SD of Thiamin Intakes, All Women

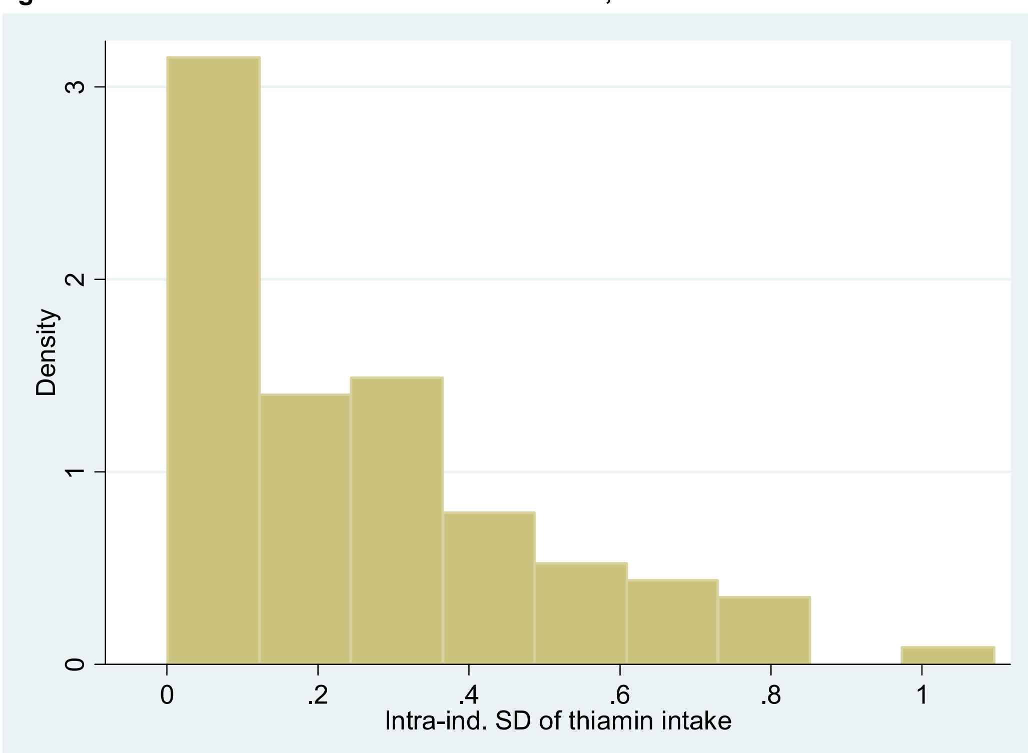


Figure 13. Intra-Individual SD of Riboflavin Intakes, All Women

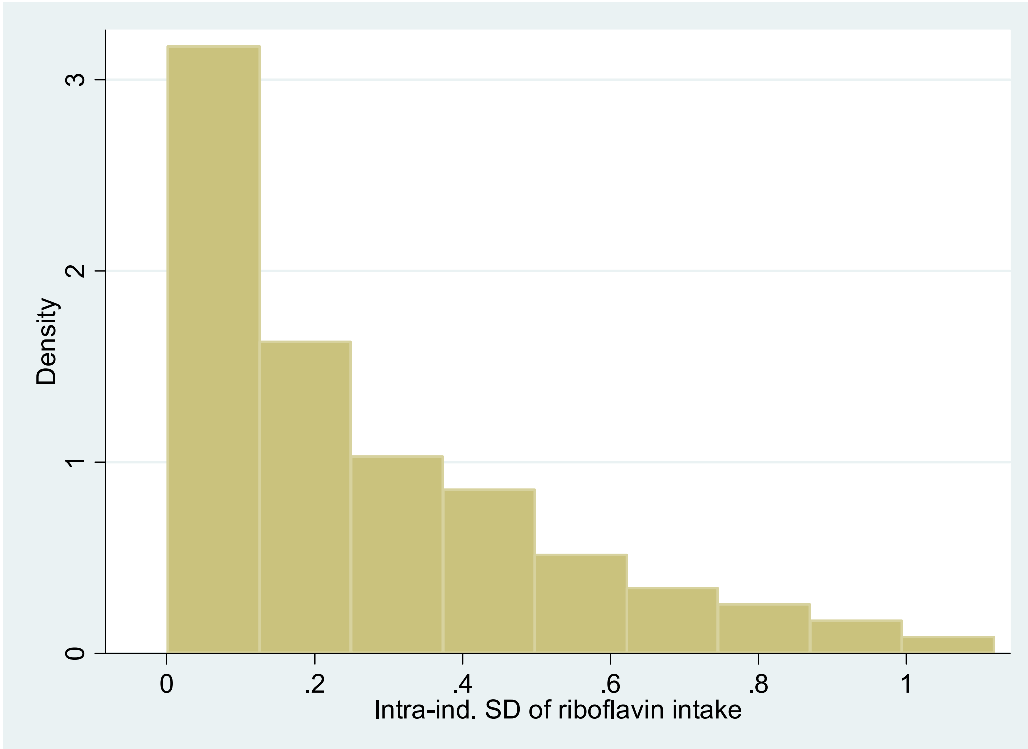


Figure 14. Intra-Individual SD of Niacin Intakes, All Women

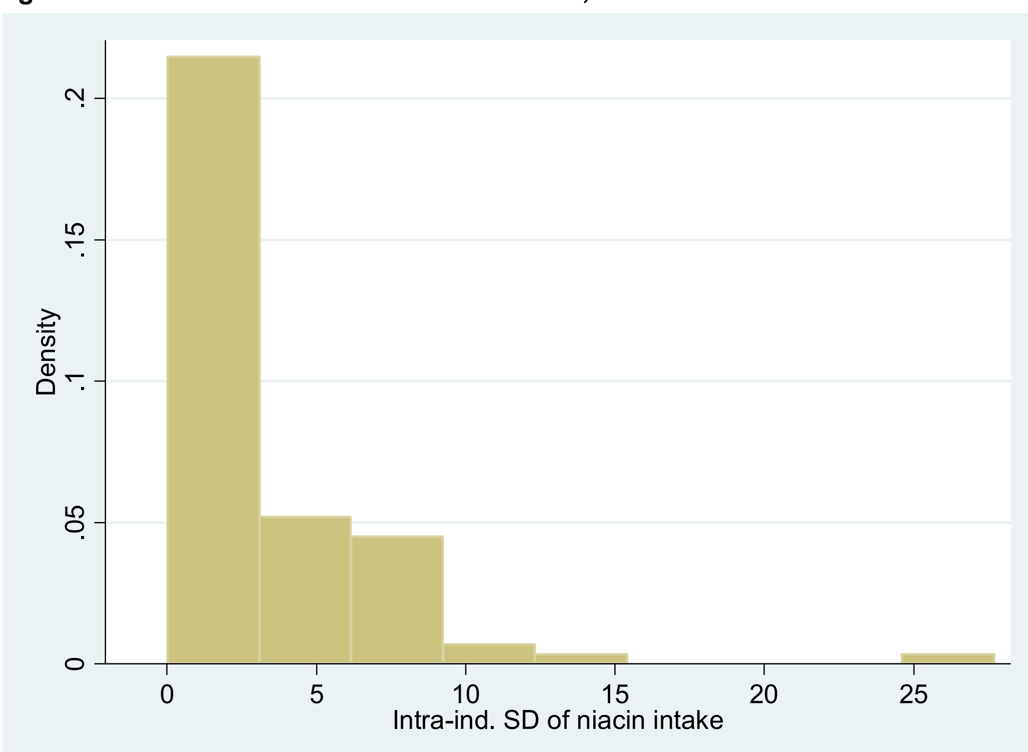


Figure 15. Intra-Individual SD of Vitamin B6 Intakes, All Women

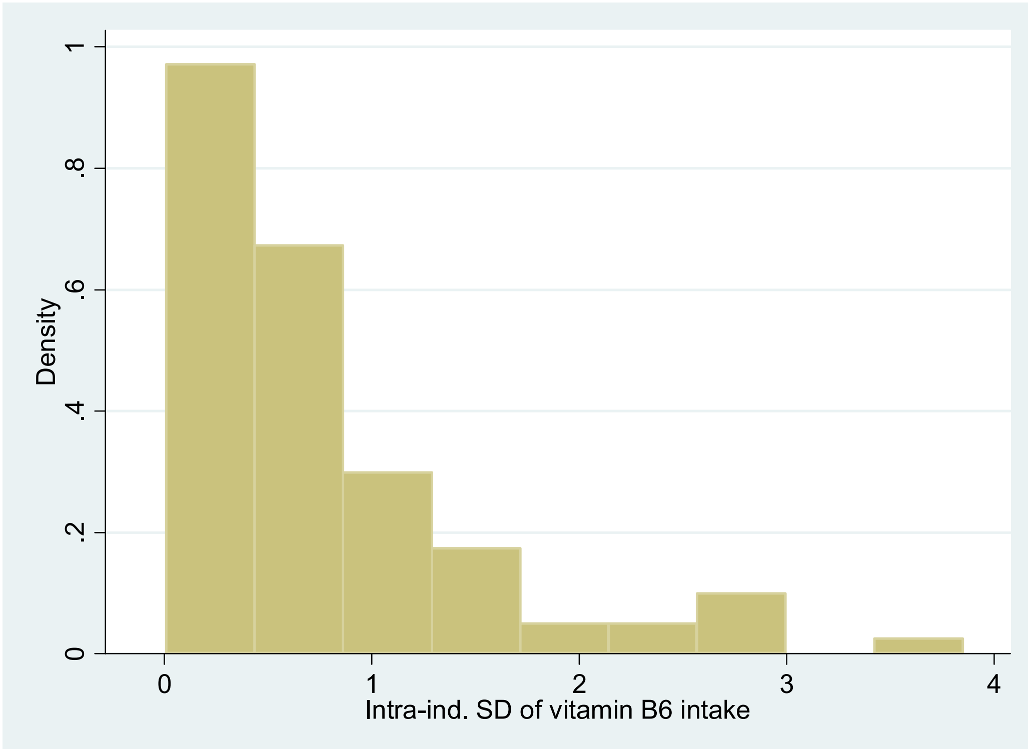


Figure 16. Intra-Individual SD of Folate Intakes, All Women

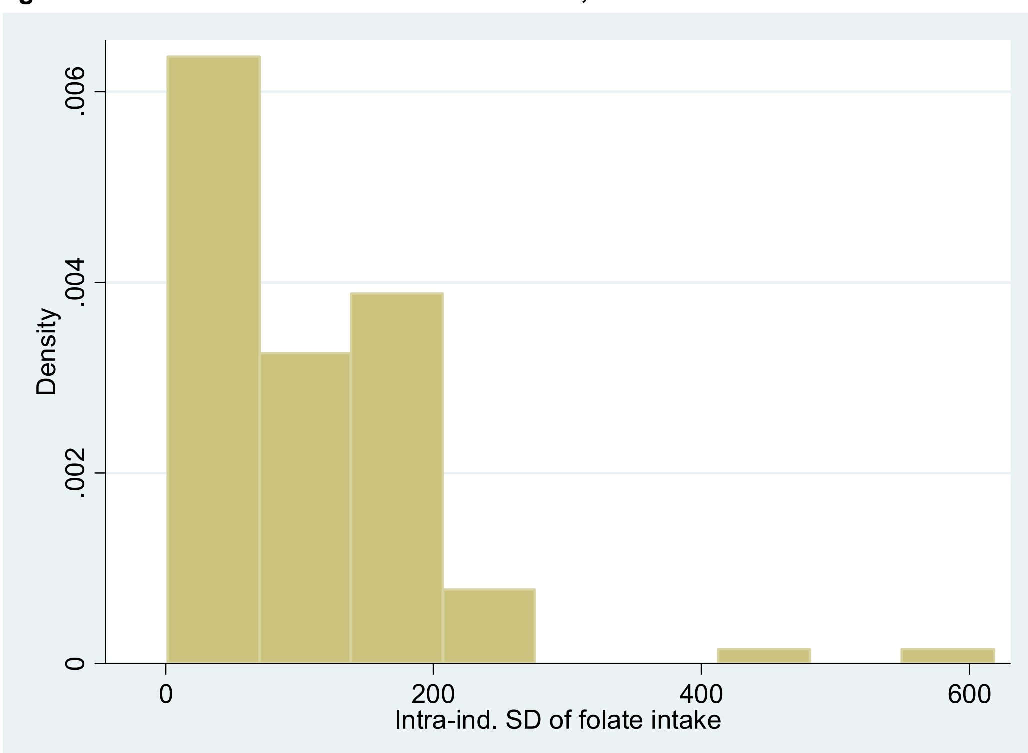


Figure 17. Intra-Individual SD of Vitamin B12 Intakes, All Women

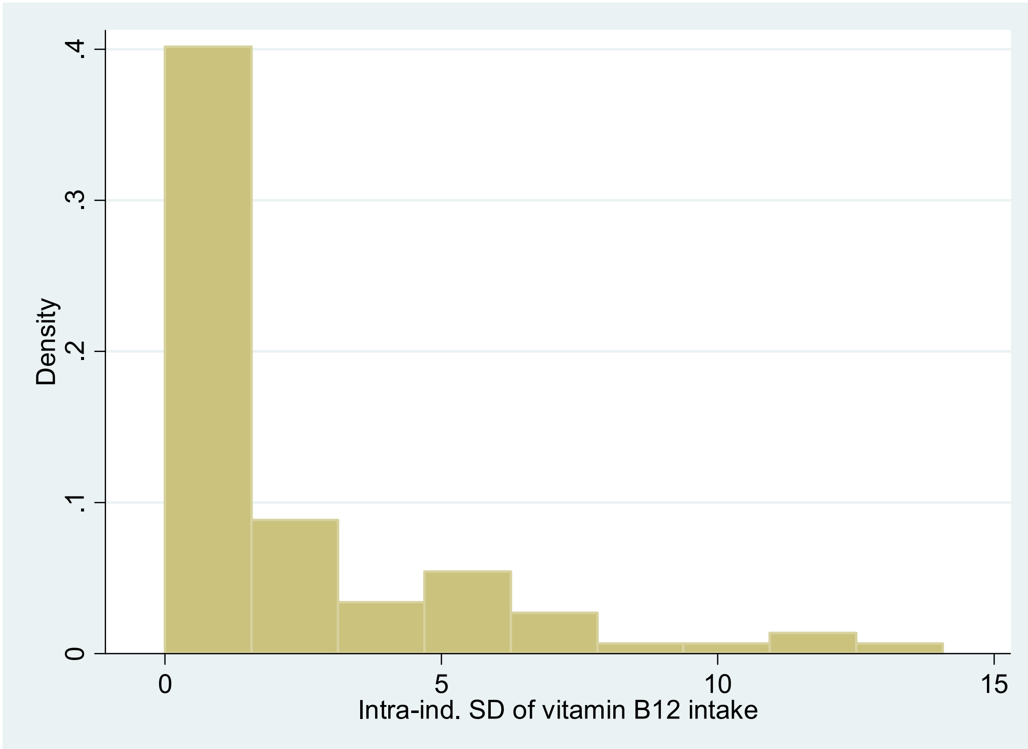


Figure 18. Intra-Individual SD of Vitamin C Intakes, All Women

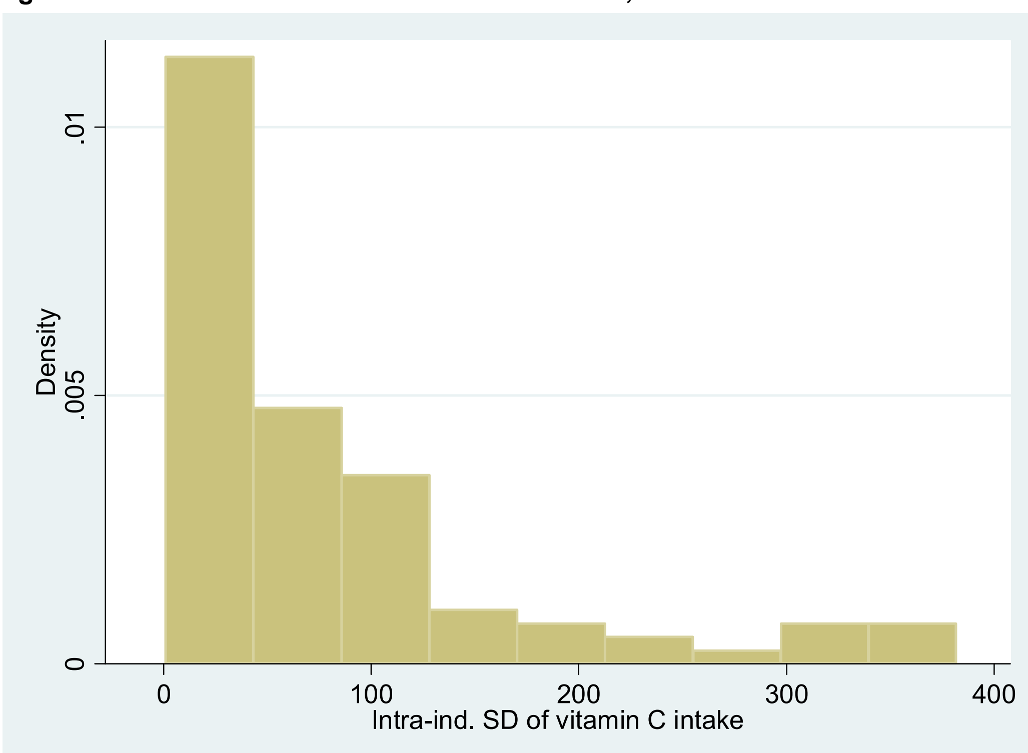


Figure 19. Intra-Individual SD of Vitamin A Intakes, All Women

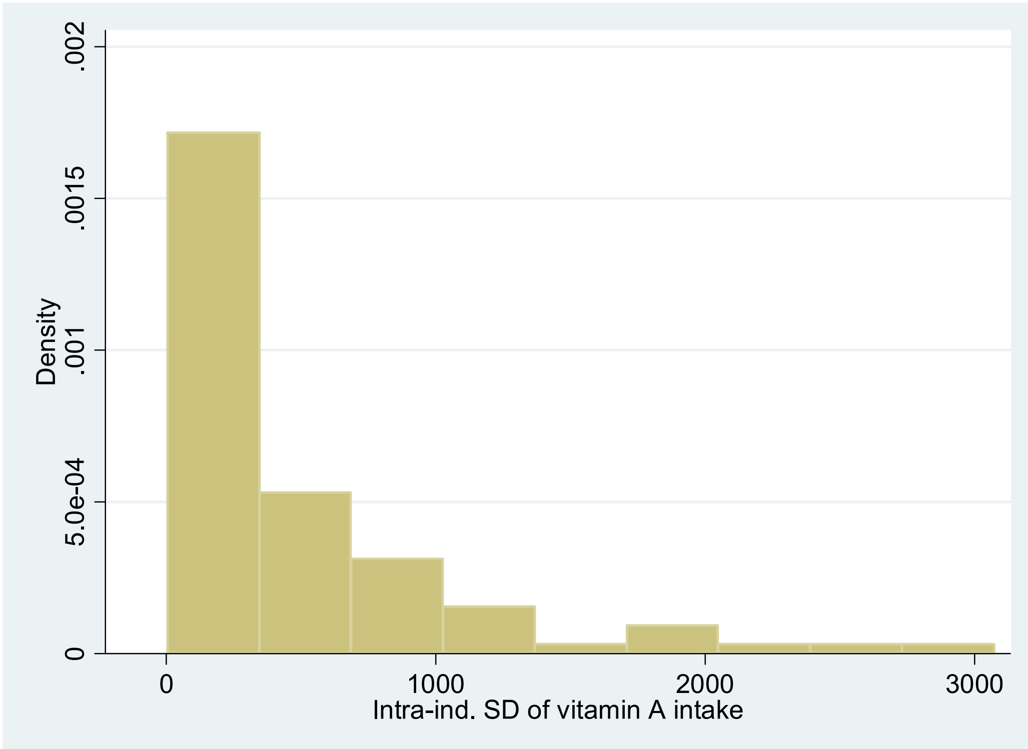


Figure 20. Intra-Individual SD of Calcium Intakes, All Women

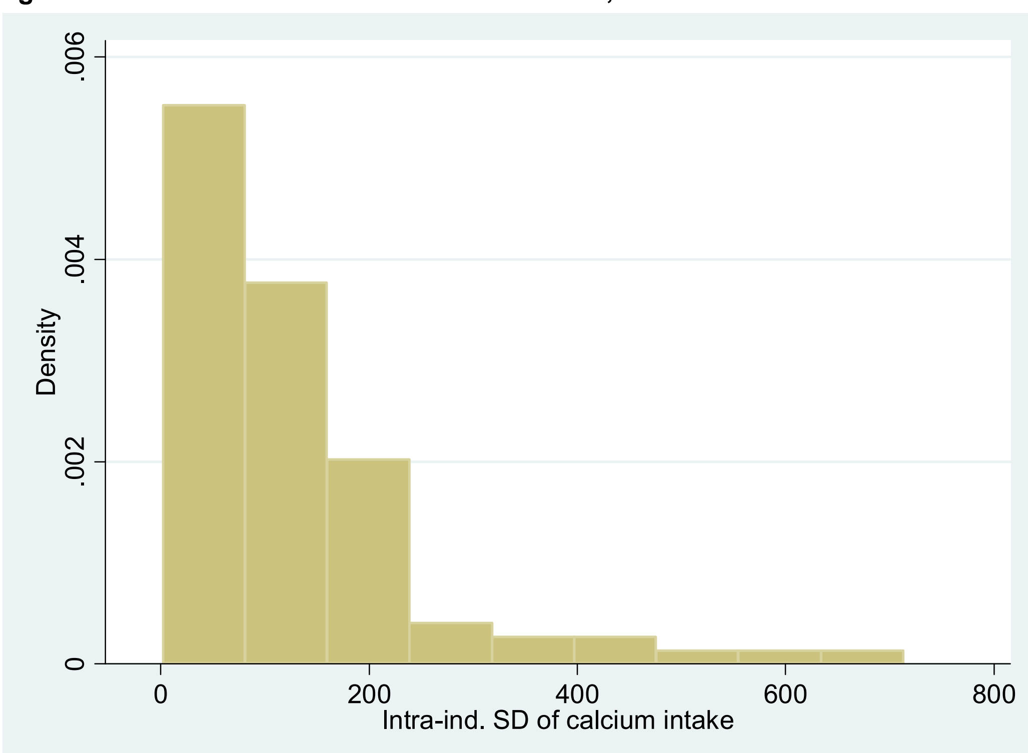


Figure 21. Intra-Individual SD of Iron Intakes, All Women

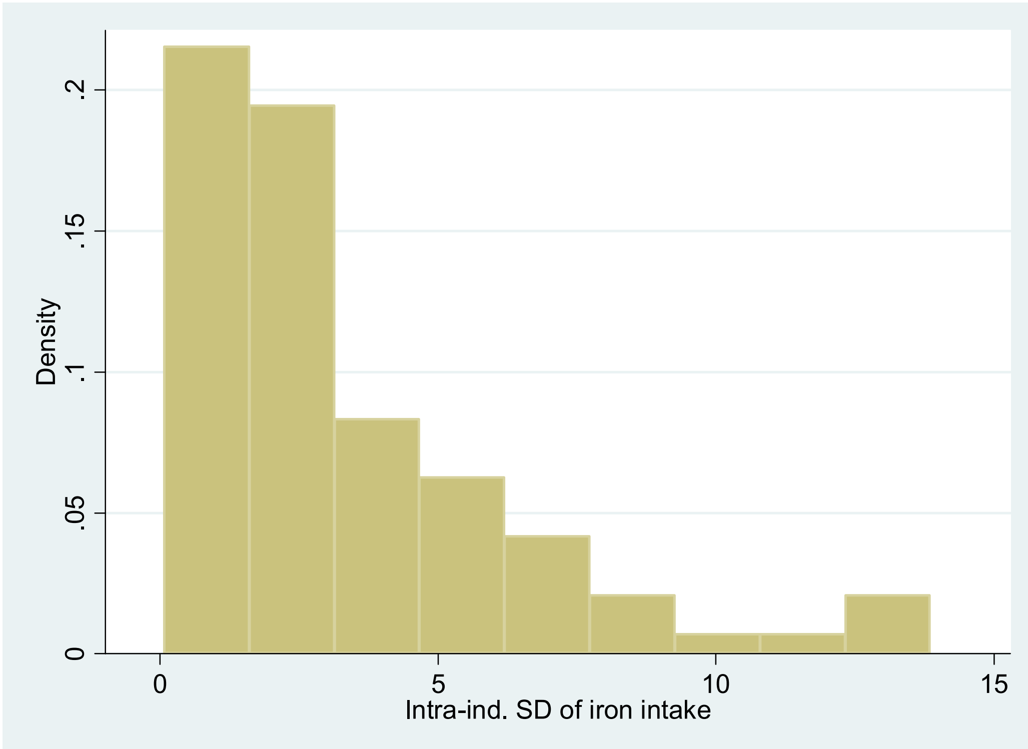


Figure 22. Intra-Individual SD of Zinc Intakes, All Women

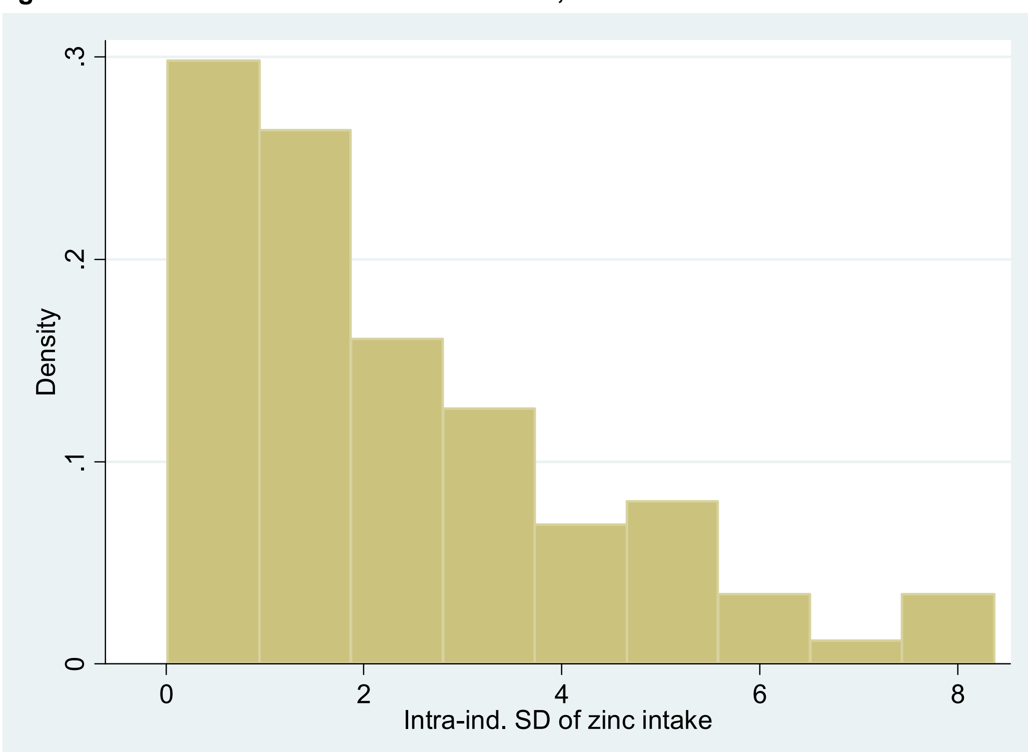


Figure 23. Distribution of Scores for FGI-6, All Women

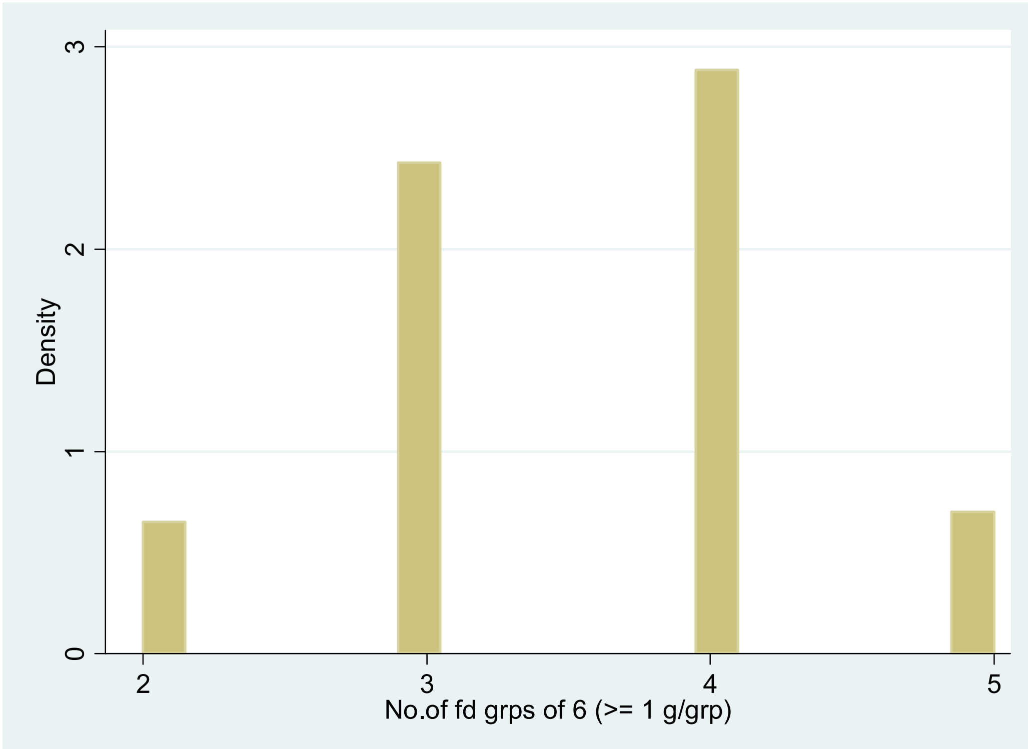


Figure 24. Distribution of Scores for FGI-6R, All Women

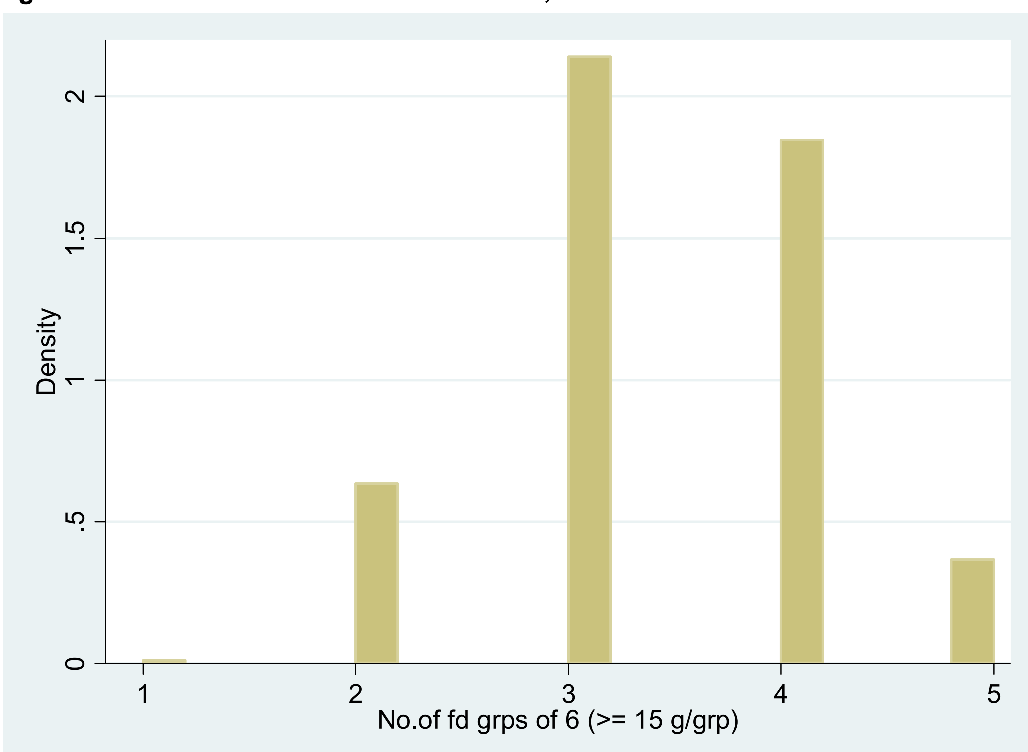


Figure 25. Distribution of Scores for FGI-9, All Women

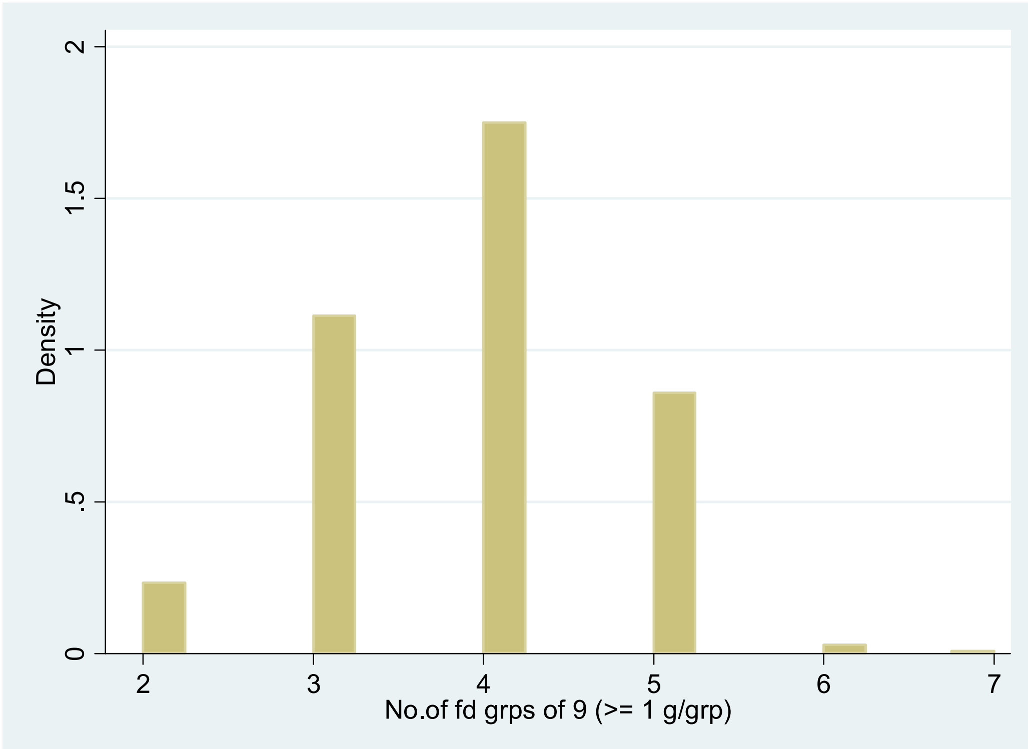


Figure 26. Distribution of Scores for FGI-9R, All Women

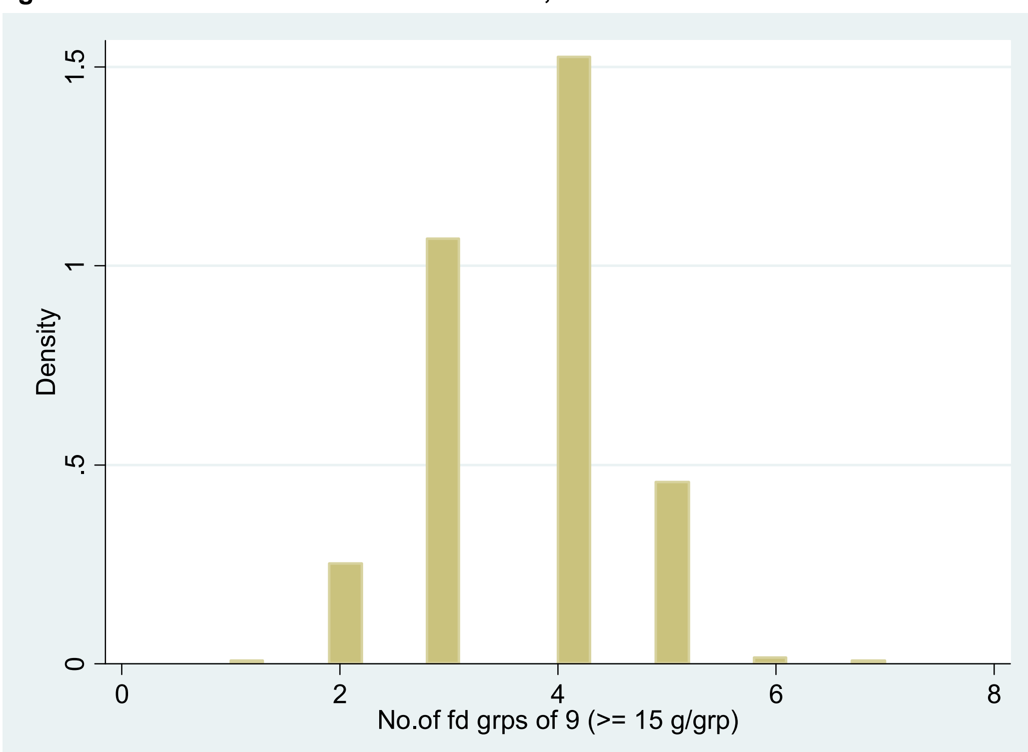


Figure 27. Distribution of Scores for FGI-13, All Women

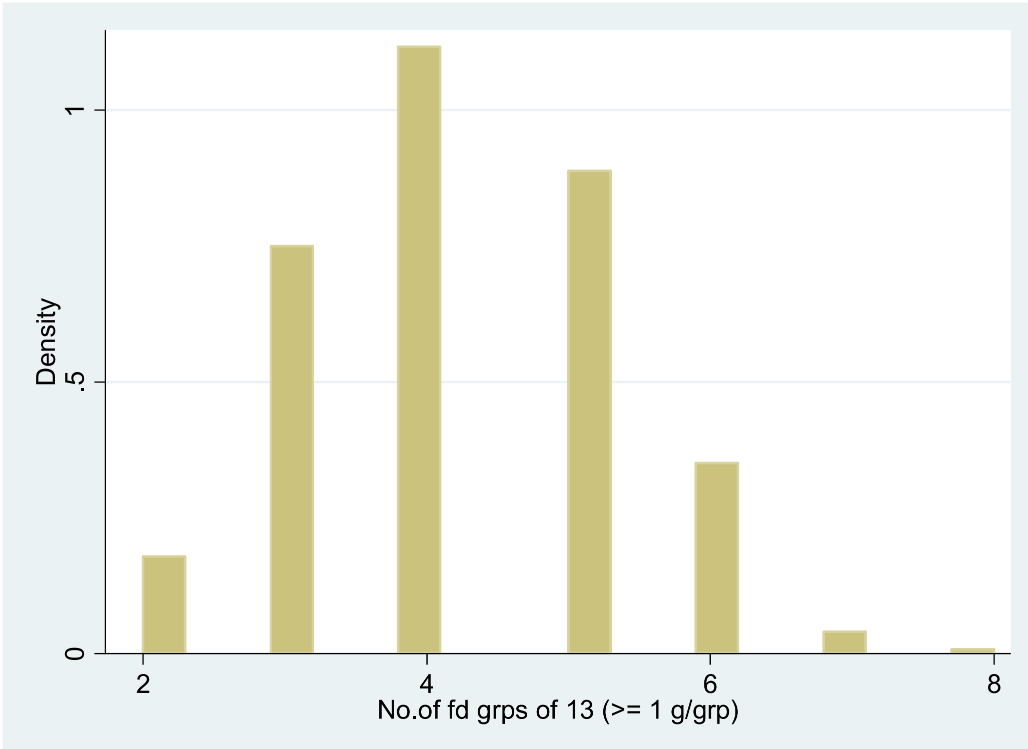


Figure 28. Distribution of Scores for FGI-13R, All Women

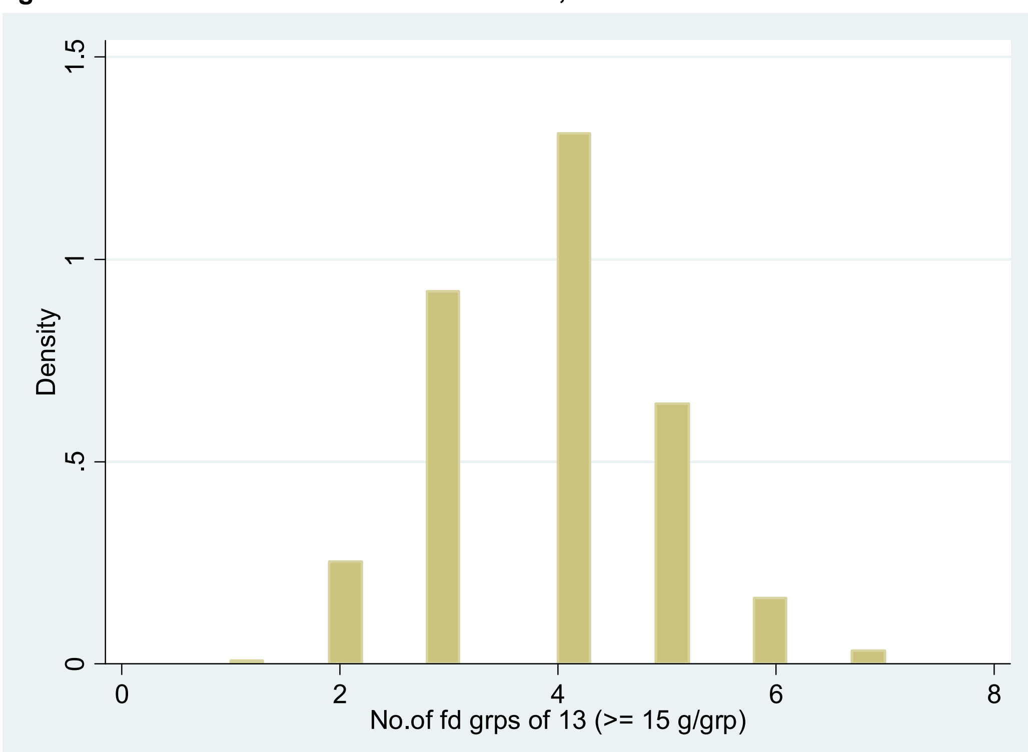


Figure 29. Distribution of Scores for FGI-21, All Women

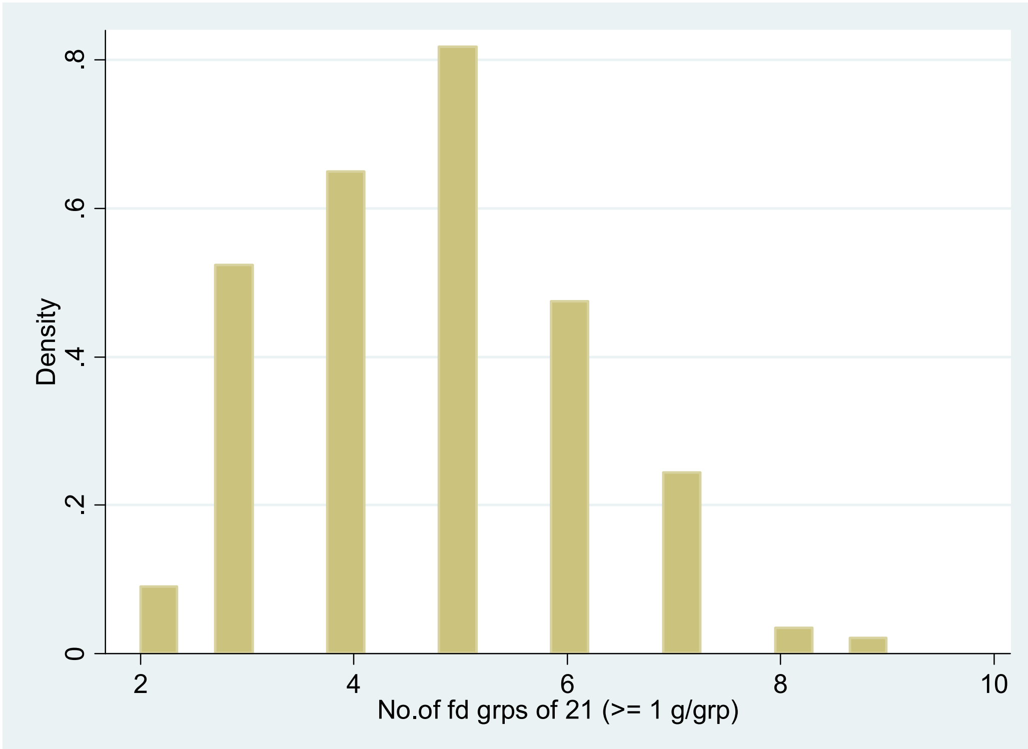


Figure 30. Distribution of Scores for FGI-21R, All Women

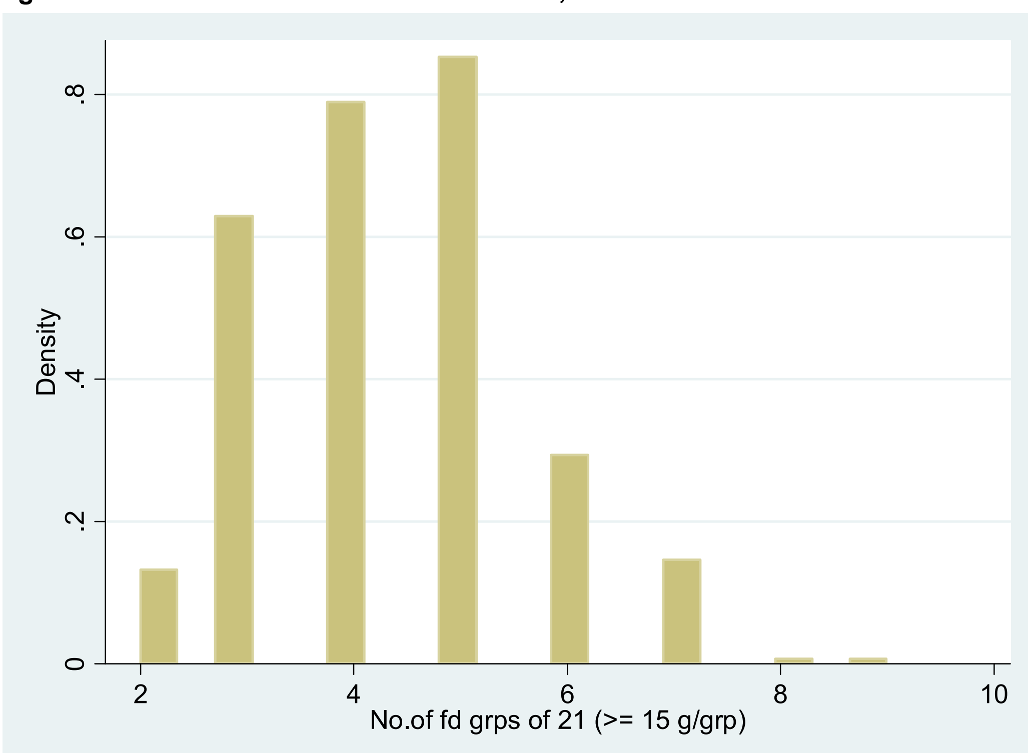


Table 6. Percent of Observation Days at Each Food Group Diversity Score, All Women, R1

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	0	0	0	0	0	0	0
2	10	13	6	8	5	8	3	5
3	36	43	28	32	23	28	18	22
4	43	37	44	46	34	39	23	28
5	11	7	22	14	27	19	29	30
6	0	0	1	1	11	5	17	10
7			0	0	1	1	9	5
8			0	0	0	0	1	0
9			0	0	0	0	1	0
10					0	0	0	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 31. Distribution of PA for Thiamin, All Women

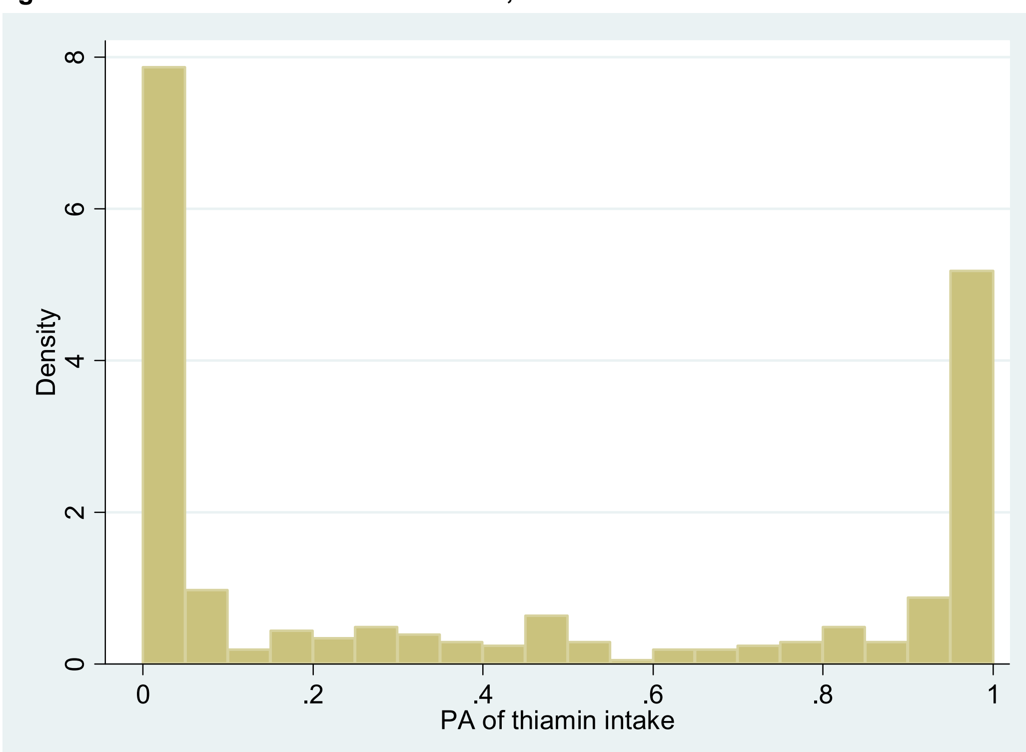


Figure 32. Distribution of PA for Riboflavin, All Women

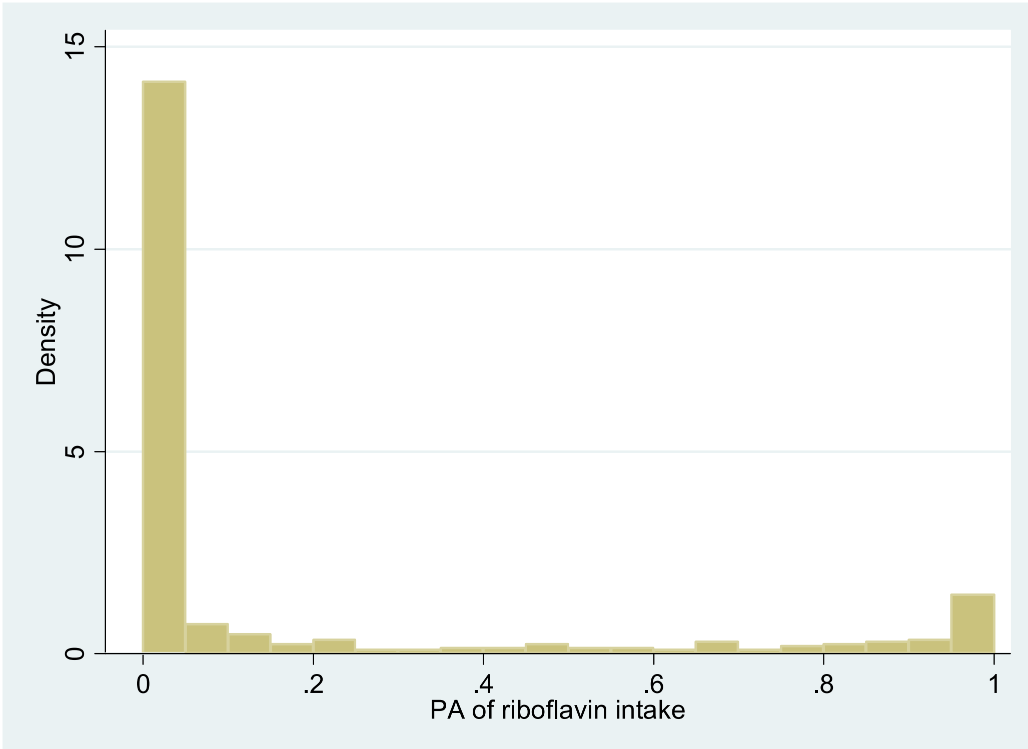


Figure 33. Distribution of PA for Niacin, All Women

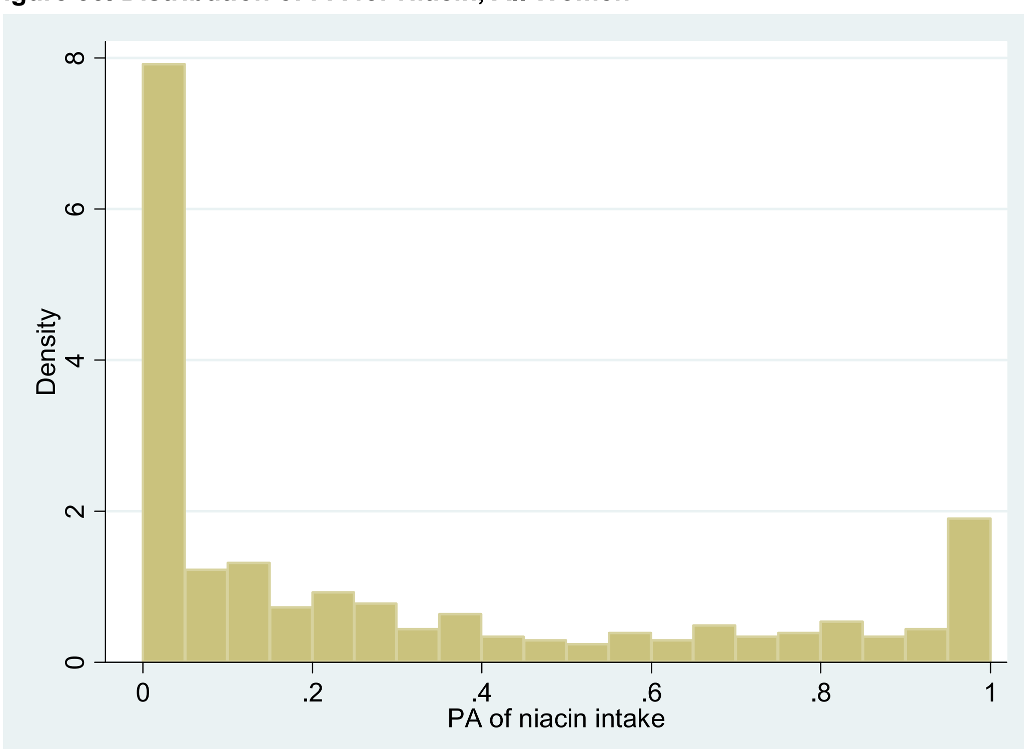


Figure 34. Distribution of PA for Vitamin B6, All Women

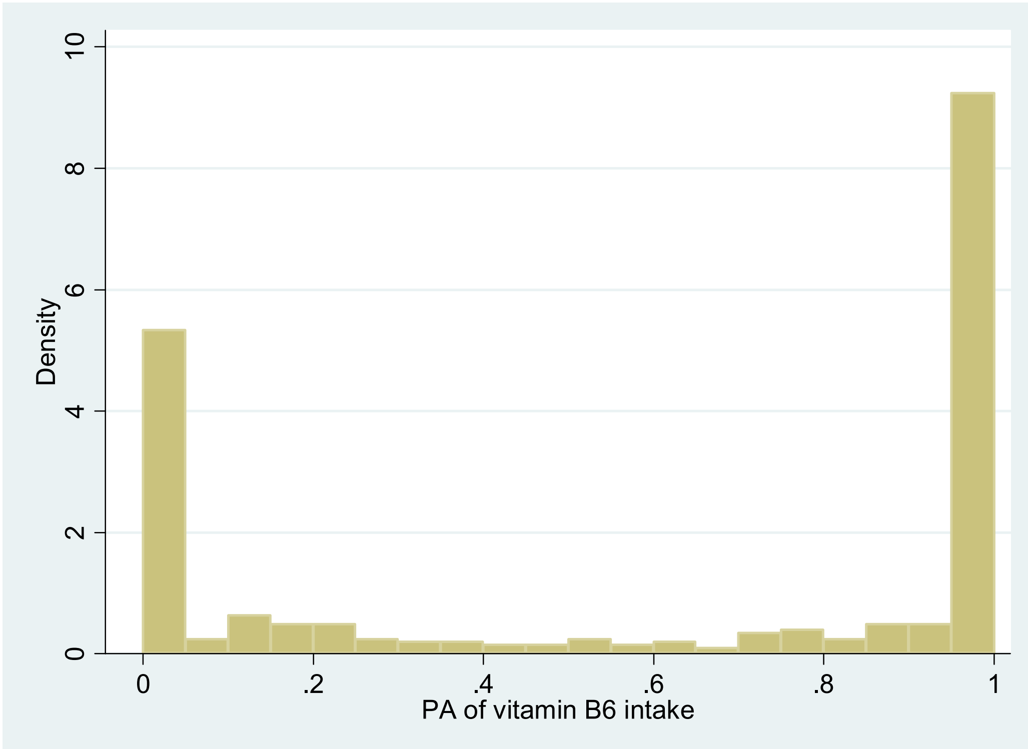


Figure 35. Distribution of PA for Folate, All Women

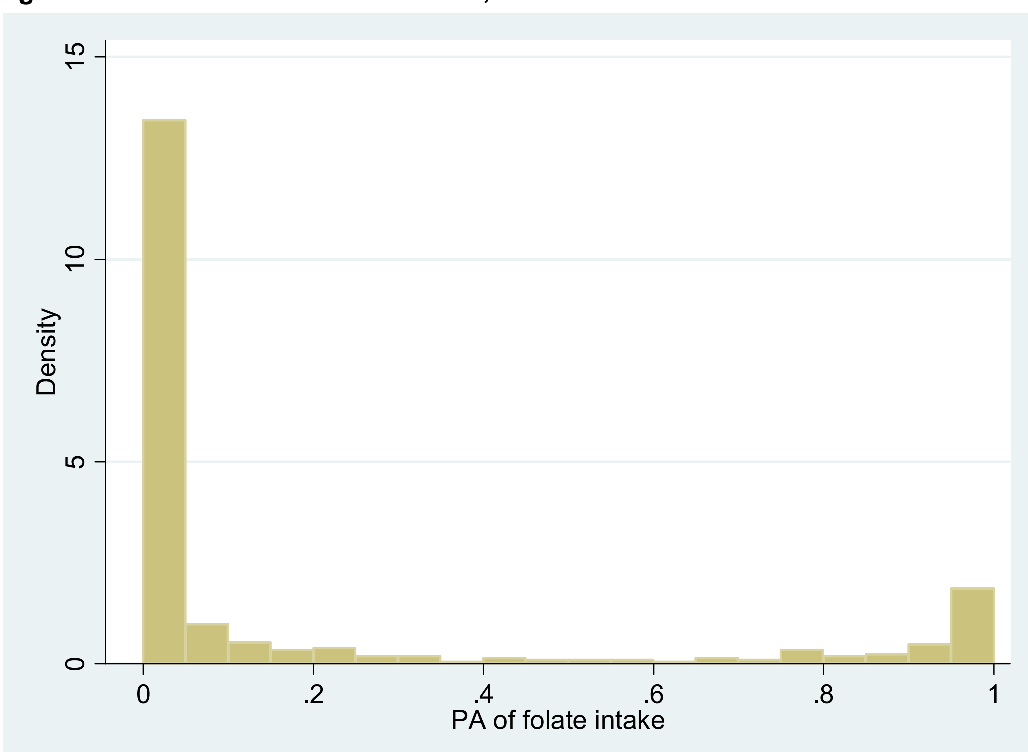


Figure 36. Distribution of PA for Vitamin B12, All Women

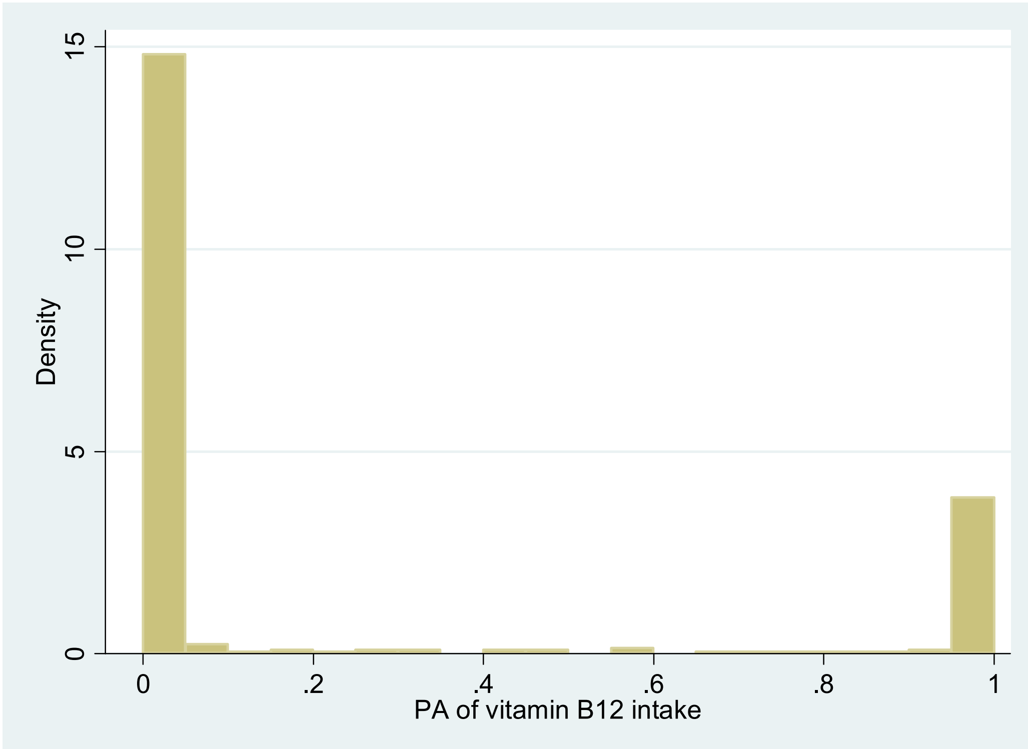


Figure 37. Distribution of PA for Vitamin C, All Women

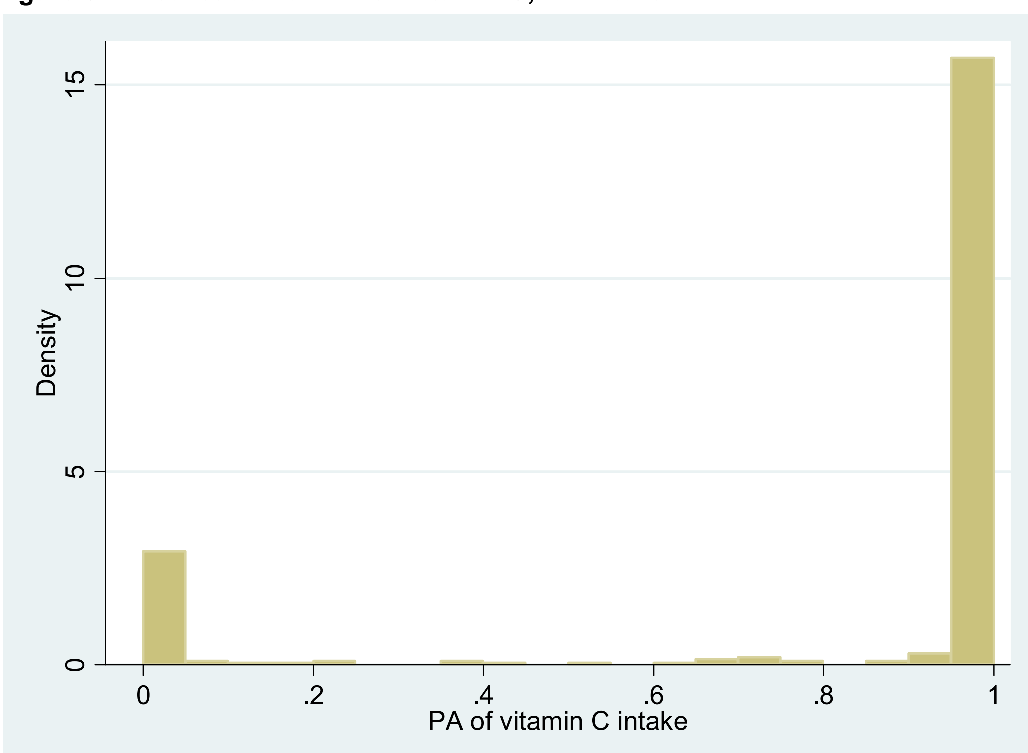


Figure 38. Distribution of PA for Vitamin A, All Women

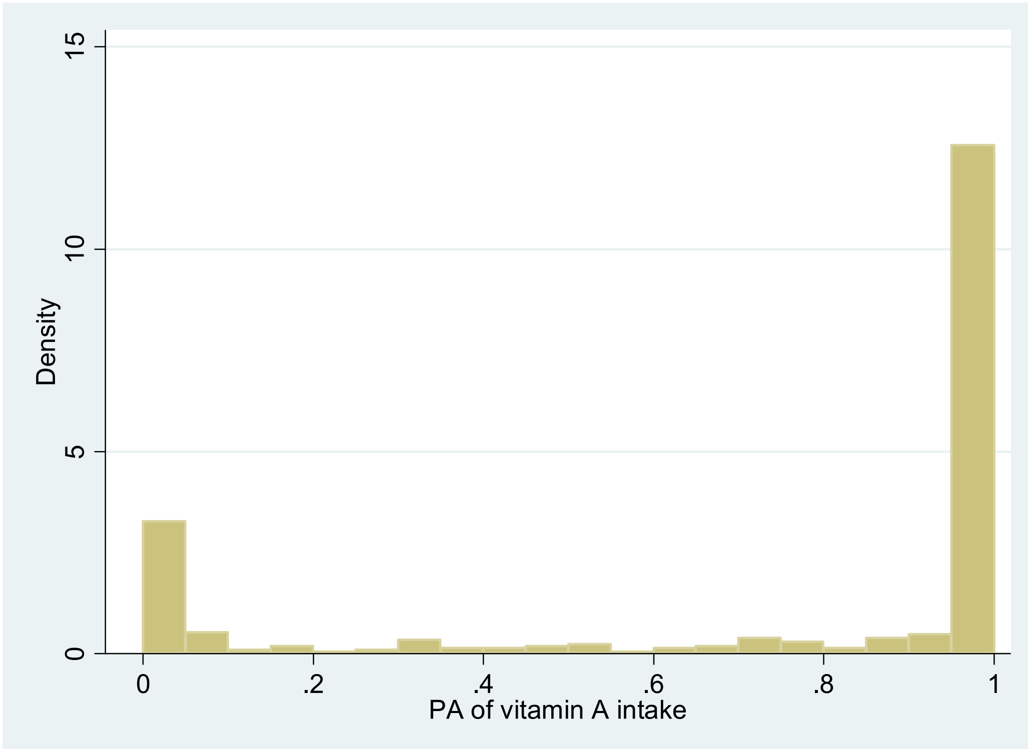


Figure 39. Distribution of PA for Calcium, All Women

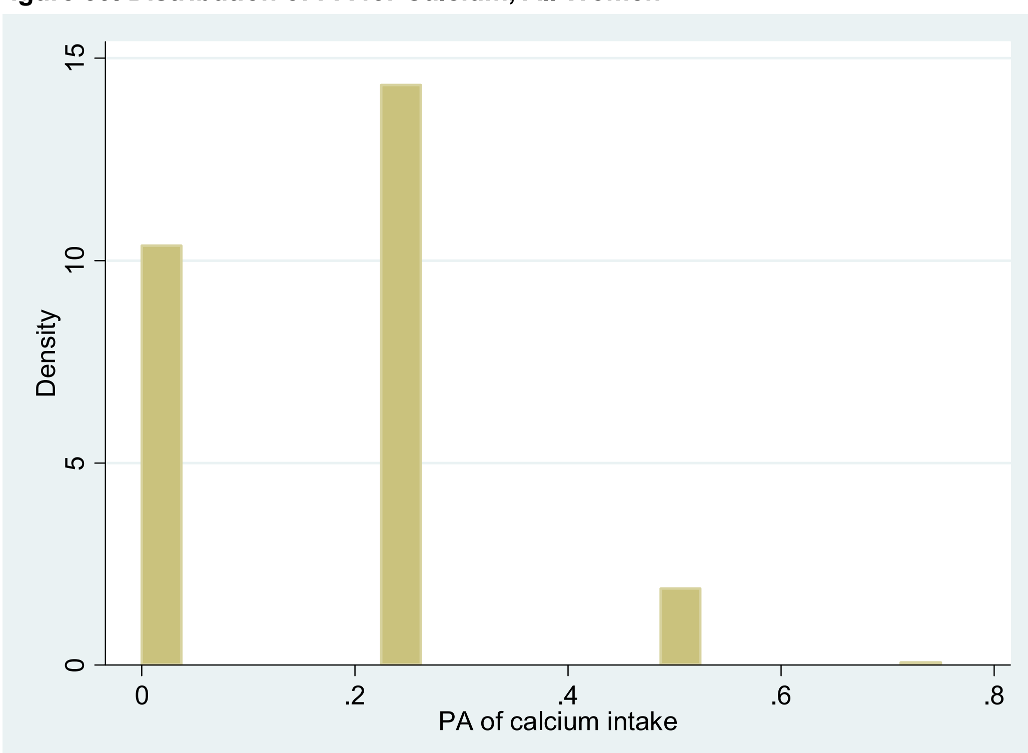


Figure 40. Distribution of PA for Iron, All Women

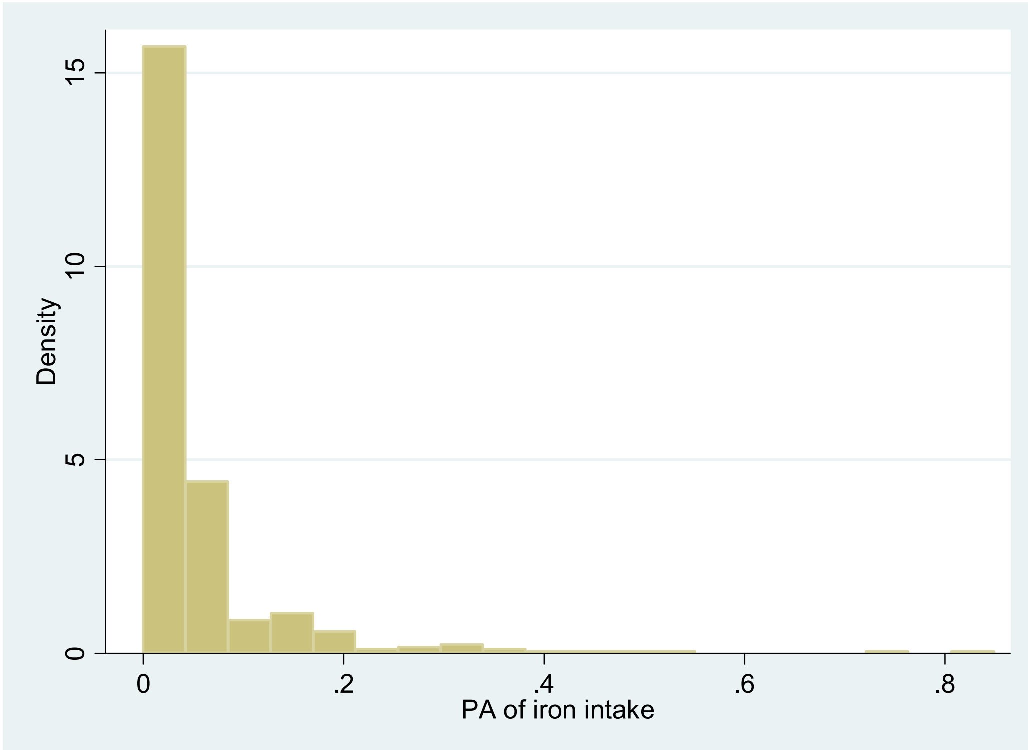


Figure 41. Distribution of PA for Zinc, All Women

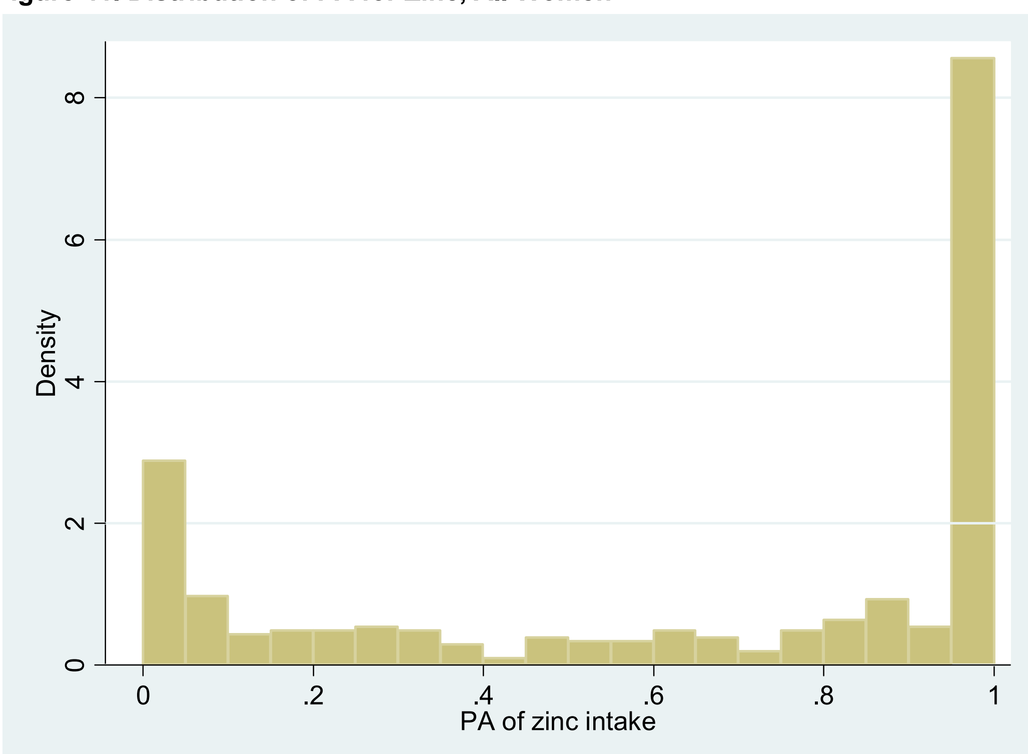
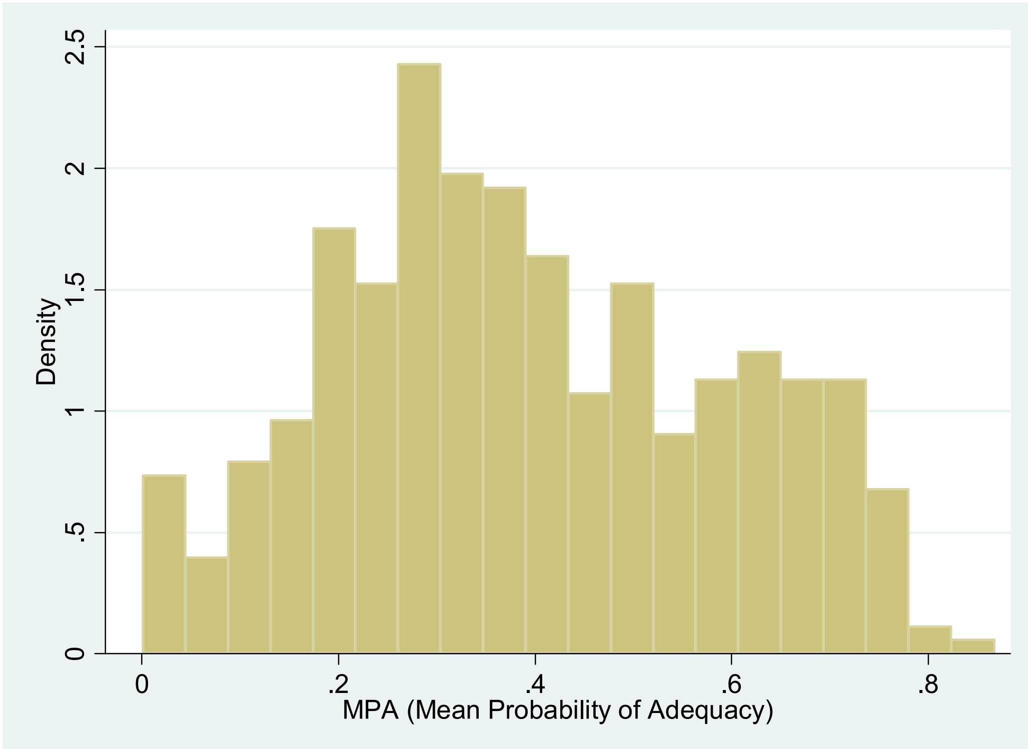


Figure 42. Distribution of MPA across 11 Micronutrients, All Women



Appendix 2. Tables and Figures, Lactating Women

Table L1. Description of Sample, Lactating Women, R1

	n	Mean	SD	Median	Range
Age (year)	180	28.3	7.7	28.0	16.0-47.0
Height (cm)	252	153.6	6.4	153.4	140.2-172.4
Weight (kg)	252	50.5	7.5	50.1	38.6-80.7
BMI	252	21.4	2.4	21.2	15.8-32.7
% Literate	251	19.1			
% Lactating	252	100.0			
% Pregnant	252	1.6			
	n	**Percent**			
BMI <16	1	0.4			
BMI 16-16.9	1	0.4			
BMI 17-18.49	14	5.6			
BMI 18.5-24.9	220	87.3			
BMI 25-29.9	13	5.2			
BMI ≥ 30	3	1.2			

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

	Mean	SD	Median	Range	Percent of kcal
Energy (kcal)	2,104.8	768.4	2,012.2	737.5-3,790.5	
Protein (g)	61.7	34.2	56.3	12.1-260.4	11
Animal source (g)	10.3	18.8	1.4	0.0-236.0	2
Plant source (g)	51.4	27.5	47.5	4.6-119.7	9
Total carbohydrate (g)	452.3	165.4	436.4	161.6-864.3	82
Total fat (g)	16.1	19.5	11.3	2.1-148.3	7

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	60	59
All dairy	0	0
Other animal source foods	50	46
Vitamin A-rich fruits and vegetables [a]	83	83
Other fruits and vegetables	61	53

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100g raw, taking into account retention factors.

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	60	59
All dairy	0	0
Organ meat	0	0
Eggs	8	8
Flesh foods and other miscellaneous small animal protein	46	41
Vitamin A-rich dark green leafy vegetables [a]	31	31
Other vitamin A-rich vegetables and fruits [a]	77	77
Other fruits and vegetables	61	53

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100g raw, taking into account retention factors.

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	60	59
All dairy	0	0
Organ meat	0	0
Eggs	8	8
Small fish eaten whole with bones	22	18
All other flesh foods and miscellaneous small animal protein	29	26
Vitamin A-rich dark green leafy vegetables [a]	31	31
Vitamin A-rich deep yellow/orange/red vegetables [a]	2	2
Vitamin C-rich vegetables [b]	33	25
Vitamin A-rich fruits [a]	77	77
Vitamin C-rich fruits [b]	7	6
All other fruits and vegetables	48	36

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100g raw, taking into account retention factors.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100g raw, taking into account retention factors.

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

	≥ 1 g	≥ 15 g
Grains and grain products	95	95
All other starchy staples	43	43
Cooked dry beans and peas	54	54
Soybeans and soy products	0	0
Nuts and seeds	14	11
Milk/yogurt	0	0
Cheese	0	0
Beef, pork, veal, lamb, goat, game meat	2	2
Organ meat	0	0
Chicken, duck, turkey, pigeon, guinea hen, game birds	7	7
Large whole fish/dried fish/shellfish and other seafood	18	15
Small fish eaten whole with bones	22	18
Insects, grubs, snakes, rodents and other small animal	5	4
Eggs	8	8
Vitamin A-rich dark green leafy vegetables [a]	31	31
Vitamin A-rich deep yellow/orange/red vegetables [a]	2	2
Vitamin C-rich vegetables [b]	33	25
All other vegetables	44	29
Vitamin A-rich fruits [a]	77	77
Vitamin C-rich fruits [b]	7	6
All other fruits	12	12

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100g raw, taking into account retention factors.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100g raw, taking into account retention factors.

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

	All (n = 252)					Among those who consume			
Food group	**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)**
All starchy staples	1,325.2	1,435.7	1,228.7	1,340.7	100	1,325.2	1,435.7	1,228.7	1,340.7
All legumes and nuts	185.9	245.6	109.3	179.2	60	308.1	407.2	262.9	374.6
All dairy	0.0	0.0	0.0	0.0	0	–	–	–	–
Other animal source foods	35.1	75.2	3.5	10.2	50	69.7	149.2	47.9	97.4
Vitamin A-rich fruits and vegetables [a]	452.0	258.4	341.6	178.3	83	545.0	311.6	434.0	253.5
Other fruits and vegetables	108.7	37.6	21.5	7.5	61	177.8	61.6	138.3	28.9

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100g raw, taking into account retention factors.

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

	All (n = 252)					Among those who consume			
Food group	**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)**
All starchy staples	1,325.2	1,435.7	1,228.7	1,340.7	100	1,325.2	1,435.7	1,228.7	1,340.7
All legumes and nuts	185.9	245.6	109.3	179.2	60	308.1	407.2	262.9	374.6
All dairy	0.0	0.0	0.0	0.0	0	–	–	–	–
Organ meat	0.0	0.0	0.0	0.0	0	–	–	–	–
Eggs	5.6	9.5	0.0	0.0	8	69.9	119.7	58.0	102.5
Flesh foods and other miscellaneous small animal protein	29.6	65.7	0.0	0.0	46	64.9	143.9	41.5	88.6
Vitamin A-rich dark green leafy vegetables [a]	62.5	11.0	0.0	0.0	31	204.6	35.9	138.8	27.0
Other vitamin A-rich vegetables and fruits [a]	389.5	247.5	284.1	160.2	77	503.4	319.8	403.0	253.8
Other fruits and vegetables	108.7	37.6	21.5	7.5	61	177.8	61.6	138.3	28.9

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100g raw, taking into account retention factors.

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

	All (n = 252)					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	1,325.2	1,435.7	1,228.7	1,340.7	100	1,325.2	1,435.7	1,228.7	1,340.7
All legumes and nuts	185.9	245.6	109.3	179.2	60	308.1	407.2	262.9	374.6
All dairy	0.0	0.0	0.0	0.0	0	–	–	–	–
Organ meat	0.0	0.0	0.0	0.0	0	–	–	–	–
Eggs	5.6	9.5	0.0	0.0	8	69.9	119.7	58.0	102.5
Small fish eaten whole with bones	8.1	18.7	0.0	0.0	22	37.0	85.6	22.7	56.5
All other flesh foods and miscellaneous small animal protein	21.5	47.0	0.0	0.0	29	74.3	162.2	45.9	100.2
Vitamin A-rich dark green leafy vegetables [a]	62.5	11.0	0.0	0.0	31	204.6	35.9	138.8	27.0
Vitamin A-rich deep yellow/orange/red vegetables [a]	6.2	5.8	0.0	0.0	2	314.1	291.8	397.6	308.3
Vitamin C-rich vegetables [b]	27.4	6.6	0.0	0.0	33	82.3	19.8	35.0	10.5
Vitamin A-rich fruits [a]	383.3	241.7	272.7	160.2	77	497.9	313.9	390.4	253.8
Vitamin C-rich fruits [b]	10.6	6.5	0.0	0.0	7	148.3	91.5	168.6	89.3
All other fruits and vegetables	70.6	24.5	0.0	0.0	48	148.3	51.5	113.1	19.5

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100g raw, taking into account retention factors.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100g raw, taking into account retention factors.

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

	All (n = 252)					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	1,142.0	1,196.7	1,123.5	1,209.7	95	1,204.1	1,261.8	1,165.0	1,238.4
All other starchy staples	183.2	238.9	0.0	0.0	43	427.5	557.5	238.5	340.9
Cooked dry beans and peas	179.1	219.7	99.8	151.2	54	334.3	410.2	299.6	379.3
Soybeans and soy products	0.0	0.0	0.0	0.0	0	–	–	–	–
Nuts and seeds	6.8	25.9	0.0	0.0	14	48.9	186.4	27.7	107.9
Milk/yogurt	0.0	0.0	0.0	0.0	0	–	–	–	–
Cheese	0.0	0.0	0.0	0.0	0	–	–	–	–
Beef, pork, veal, lamb, goat, game meat	1.3	3.6	0.0	0.0	2	64.8	180.1	85.0	215.1
Organ meat	0.0	0.0	0.0	0.0	0	–	–	–	–
Chicken, duck, turkey, pigeon, guinea hen, game birds	5.5	15.9	0.0	0.0	7	81.9	235.7	51.0	145.4
Large whole fish/dried fish/shellfish and other seafood	12.2	23.8	0.0	0.0	18	69.7	136.4	37.1	73.3
Small fish eaten whole with bones	8.1	18.7	0.0	0.0	22	37.0	85.6	22.7	56.5
Insects, grubs, snakes, rodents and other small animal	2.5	3.7	0.0	0.0	5	53.4	77.7	55.0	79.9
Eggs	5.6	9.5	0.0	0.0	8	69.9	119.7	58.0	102.5
Vitamin A-rich dark green leafy vegetables [a]	62.5	11.0	0.0	0.0	31	204.6	35.9	138.8	27.0
Vitamin A-rich deep yellow/orange/red vegetables [a]	6.2	5.8	0.0	0.0	2	314.1	291.8	397.6	308.3
Vitamin C-rich vegetables [b]	27.4	6.6	0.0	0.0	33	82.3	19.8	35.0	10.5
All other vegetables	54.9	10.4	0.0	0.0	44	125.7	23.8	38.2	14.1
Vitamin A-rich fruits [a]	383.3	241.7	272.7	160.2	77	497.9	313.9	390.4	253.8
Vitamin C-rich fruits [b]	10.6	6.5	0.0	0.0	7	148.3	91.5	168.6	89.3
All other fruits	15.8	14.1	0.0	0.0	12	132.4	118.6	121.0	112.5

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100g raw, taking into account retention factors.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100g raw, taking into account retention factors.

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	3.5	0.9	4.0	2-5
FGI-6R [a]	6 major food groups	3.4	0.8	3.0	1-5
FGI-9	9 food subgroups	3.8	1.1	4.0	2-7
FGI-9R [a]	9 food subgroups	3.7	1.0	4.0	1-7
FGI-13	13 food subgroups	4.2	1.3	4.0	2-7
FGI-13R [a]	13 food subgroups	3.9	1.1	4.0	1-7
FGI-21	21 food subgroups	4.7	1.7	5.0	2-9
FGI-21R [a]	21 food subgroups	4.4	1.4	4.0	2-9

[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	0	0	0	0	0	0	0
2	10	14	6	8	6	8	3	5
3	35	39	28	31	23	28	18	22
4	44	39	43	44	34	39	23	28
5	11	8	22	15	26	19	29	29
6	0	0	0	0	10	5	16	12
7			0	0	2	1	9	5
8			0	0	0	0	1	0
9			0	0	0	0	1	0
10					0	0	0	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 L7a. Percent of Observation Days on Which Different Food Groups Were Consumed, by Food Group Diversity Score, Lactating 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)	10 (26)	35 (89)	44 (110)	11 (27)	0 (0)
Food groups	**Percent of observation days on which each food group was consumed**					
All starchy staples	–	100	100	100	100	–
All legumes and nuts	–	19	51	68	100	–
All dairy	–	0	0	0	0	–
Other animal source foods	–	19	37	56	100	–
Vitamin A-rich fruits and vegetables [a]	–	46	76	93	100	–
Other fruits and vegetables	–	15	36	83	100	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100g raw, taking into account retention factors.

Table L7b. Percent of Observation Days on Which Different Food Groups Were Consumed, by Food Group Diversity Score, Lactating 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	0 (1)	14 (34)	39 (99)	39 (99)	8 (19)	0 (0)
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	18	53	72	100	–
All dairy	0	0	0	0	0	–
Other animal source foods	0	21	35	55	100	–
Vitamin A-rich fruits and vegetables [a]	0	47	81	95	100	–
Other fruits and vegetables	0	15	31	79	100	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100g raw, taking into account retention factors.

Table L7c. Percent of Observation Days on Which Different Food Groups Were Consumed, by Food Group Diversity Score, Lactating 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)	6 (16)	28 (71)	43 (108)	22 (55)	0 (1)	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	–	–
All legumes and nuts	–	31	41	64	86	100	100	–	–
All dairy	–	0	0	0	0	0	0	–	–
Organ meat	–	0	0	0	0	0	0	–	–
Eggs	–	0	3	8	15	0	100	–	–
Flesh foods and other miscellaneous small animal protein	–	31	34	47	60	100	100	–	–
Vitamin A-rich dark green leafy vegetables [a]	–	13	21	28	51	100	100	–	–
Other vitamin A-rich vegetables and fruits [a]	–	0	65	89	93	100	100	–	–
Other fruits and vegetables	–	25	37	64	96	100	100	–	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100g raw, taking into account retention factors.

Table L7d. Percent of Observation Days on Which Different Food Groups Were Consumed, by Food Group Diversity Score, Lactating 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	0 (1)	8 (21)	31 (79)	44 (112)	15 (37)	0 (1)	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	29	44	64	89	100	100	–	–
All dairy	0	0	0	0	0	0	0	–	–
Organ meat	0	0	0	0	0	0	0	–	–
Eggs	0	5	4	8	14	0	100	–	–
Flesh foods and other miscellaneous small animal protein	0	29	32	44	54	100	100	–	–
Vitamin A-rich dark green leafy vegetables [a]	0	10	24	31	51	100	100	–	–
Other vitamin A-rich vegetables and fruits [a]	0	5	68	93	92	100	100	–	–
Other fruits and vegetables	0	24	28	60	100	100	100	–	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100g raw, taking into account retention factors.

Table L7e. Percent of Observation Days on Which Different Food Groups Were Consumed, by Food Group Diversity Score, Lactating 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)	6 (14)	23 (58)	34 (86)	26 (65)	10 (24)	2 (5)	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	–	–	–	–	–	–
All legumes and nuts	–	36	40	63	71	83	80	–	–	–	–	–	–
All dairy	–	0	0	0	0	0	0	–	–	–	–	–	–
Organ meat	–	0	0	0	0	0	0	–	–	–	–	–	–
Eggs	–	0	2	9	12	4	40	–	–	–	–	–	–
Small fish eaten whole with bones	–	7	10	19	32	38	40	–	–	–	–	–	–
All other flesh foods and miscellaneous small animal protein	–	29	26	27	26	42	80	–	–	–	–	–	–
Vitamin A-rich dark green leafy vegetables [a]	–	14	22	31	34	42	60	–	–	–	–	–	–
Vitamin A-rich deep yellow/orange/red vegetables [a]	–	0	0	1	5	4	0	–	–	–	–	–	–
Vitamin C-rich vegetables [b]	–	0	10	24	51	88	60	–	–	–	–	–	–
Vitamin A-rich fruits [a]	–	0	71	80	89	88	100	–	–	–	–	–	–
Vitamin C-rich fruits [b]	–	0	0	5	12	13	60	–	–	–	–	–	–
All other fruits and vegetables	–	14	19	41	68	100	80	–	–	–	–	–	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100g raw, taking into account retention factors.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100g raw, taking into account retention factors.

Table L7f. Percent of Observation Days on Which Different Food Groups Were Consumed, by Food Group Diversity Score, Lactating 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	0 (1)	8 (20)	28 (71)	39 (98)	19 (47)	5 (12)	1 (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	35	47	61	79	75	67	–	–	–	–	–	–
All dairy	0	0	0	0	0	0	0	–	–	–	–	–	–
Organ meat	0	0	0	0	0	0	0	–	–	–	–	–	–
Eggs	0	5	4	7	13	0	67	–	–	–	–	–	–
Small fish eaten whole with bones	0	5	9	19	26	33	67	–	–	–	–	–	–
All other flesh foods and miscellaneous small animal protein	0	20	27	26	19	42	100	–	–	–	–	–	–
Vitamin A-rich dark green leafy vegetables [a]	0	10	23	36	36	50	33	–	–	–	–	–	–
Vitamin A-rich deep yellow/orange/red vegetables [a]	0	0	0	1	6	0	0	–	–	–	–	–	–
Vitamin C-rich vegetables [b]	0	5	9	20	53	83	67	–	–	–	–	–	–
Vitamin A-rich fruits [a]	0	5	69	90	87	100	100	–	–	–	–	–	–
Vitamin C-rich fruits [b]	0	0	0	8	9	25	33	–	–	–	–	–	–
All other fruits and vegetables	0	15	14	32	72	92	67	–	–	–	–	–	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100g raw, taking into account retention factors.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100g raw, taking into account retention factors.

Table L7g. Percent of Observation Days on Which Different Food Groups Were Consumed, by Food Group Diversity Score, Lactating 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)	3 (8)	18 (46)	23 (57)	29 (73)	16 (41)	9 (23)	1 (2)	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	91	91	96	98	100	100	100	–	–	–	–	–	–	–	–	–	–	–	–
All other starchy staples	–	0	20	30	55	54	70	100	100	–	–	–	–	–	–	–	–	–	–	–	–
Cooked dry beans and peas	–	25	41	56	51	66	65	50	100	–	–	–	–	–	–	–	–	–	–	–	–
Soybeans and soy products	–	0	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Nuts and seeds	–	0	2	4	18	29	26	50	0	–	–	–	–	–	–	–	–	–	–	–	–
Milk/yogurt	–	0	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Cheese	–	0	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Beef, pork, veal, lamb, goat, game meat	–	13	2	2	1	0	4	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Organ meat	–	0	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Chicken, duck, turkey, pigeon, guinea hen, game birds	–	25	4	11	4	5	9	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Large whole fish/dried fish/shellfish and other seafood	–	0	9	16	15	22	39	50	50	–	–	–	–	–	–	–	–	–	–	–	–
Small fish eaten whole with bones	–	13	11	14	26	29	35	50	50	–	–	–	–	–	–	–	–	–	–	–	–
Insects, grubs, snakes, rodents and other small animal	–	0	2	11	4	2	4	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Eggs	–	0	2	9	10	12	9	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin A-rich dark green leafy vegetables [a]	–	0	22	25	36	37	44	50	50	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin A-rich deep yellow/orange/red vegetables [a]	–	0	0	2	4	0	4	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin C-rich vegetables [b]	–	0	13	19	37	51	70	50	100	–	–	–	–	–	–	–	–	–	–	–	–
All other vegetables	–	25	15	30	47	66	83	100	100	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin A-rich fruits [a]	–	0	65	77	85	81	91	100	100	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin C-rich fruits [b]	–	0	0	5	4	17	13	50	50	–	–	–	–	–	–	–	–	–	–	–	–
All other fruits	–	0	0	0	8	32	35	50	100	–	–	–	–	–	–	–	–	–	–	–	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100g raw, taking into account retention factors.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100g raw, taking into account retention factors.

Table L7h. Percent of Observation Days on Which Different Food Groups Were Consumed, by Food Group Diversity Score, Lactating 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	0 (0)	5 (12)	22 (55)	28 (71)	29 (72)	12 (29)	5 (12)	0 (0)	0 (1)	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	91	94	96	97	100	–	100	–	–	–	–	–	–	–	–	–	–	–	–
All other starchy staples	–	8	24	31	58	69	75	–	100	–	–	–	–	–	–	–	–	–	–	–	–
Cooked dry beans and peas	–	17	47	58	53	72	50	–	100	–	–	–	–	–	–	–	–	–	–	–	–
Soybeans and soy products	–	0	0	0	0	0	0	–	0	–	–	–	–	–	–	–	–	–	–	–	–
Nuts and seeds	–	0	2	3	21	17	33	–	0	–	–	–	–	–	–	–	–	–	–	–	–
Milk/yogurt	–	0	0	0	0	0	0	–	0	–	–	–	–	–	–	–	–	–	–	–	–
Cheese	–	0	0	0	0	0	0	–	0	–	–	–	–	–	–	–	–	–	–	–	–
Beef, pork, veal, lamb, goat, game meat	–	8	2	1	0	0	8	–	0	–	–	–	–	–	–	–	–	–	–	–	–
Organ meat	–	0	0	0	0	0	0	–	0	–	–	–	–	–	–	–	–	–	–	–	–
Chicken, duck, turkey, pigeon, guinea hen, game birds	–	17	4	11	3	3	17	–	0	–	–	–	–	–	–	–	–	–	–	–	–
Large whole fish/dried fish/shellfish and other seafood	–	0	9	17	15	17	33	–	100	–	–	–	–	–	–	–	–	–	–	–	–
Small fish eaten whole with bones	–	8	9	13	22	28	33	–	100	–	–	–	–	–	–	–	–	–	–	–	–
Insects, grubs, snakes, rodents and other small animal	–	0	2	9	4	3	0	–	0	–	–	–	–	–	–	–	–	–	–	–	–
Eggs	–	8	4	7	8	10	17	–	0	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin A-rich dark green leafy vegetables [a]	–	0	22	24	46	31	50	–	0	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin A-rich deep yellow/orange/red vegetables [a]	–	0	0	1	4	0	0	–	0	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin C-rich vegetables [b]	–	8	9	23	24	55	67	–	100	–	–	–	–	–	–	–	–	–	–	–	–
All other vegetables	–	25	11	20	39	52	58	–	100	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin A-rich fruits [a]	–	0	66	80	86	93	92	–	100	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin C-rich fruits [b]	–	0	0	7	6	10	33	–	0	–	–	–	–	–	–	–	–	–	–	–	–
All other fruits	–	0	0	1	15	41	33	–	100	–	–	–	–	–	–	–	–	–	–	–	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100g raw, taking into account retention factors.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100g raw, taking into account retention factors.

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	2,105	768	2,012					
Protein (All Sources) (% of kcal)	11	4	10					
Protein from animal sources (% of kcal)	2	3	0					
Total carbohydrate (% of kcal)	82	8	79					
Total fat (% of kcal)	7	7	5					
Thiamin (mg/d)	1.08	0.49	1.00	1.2	0.12	0.35	0.07	0.196
Riboflavin (mg/d)	0.83	0.46	0.74	1.3	0.13	0.06	0.00	-0.019
Niacin (mg/d)	11.10	6.80	10.02	13	2.0	0.23	0.08	-0.297
Vitamin B6 (mg/d)	1.90	1.09	1.57	1.7	0.17	0.47	0.26	-0.007
Folate (µg/d)	310.71	193.18	289.33	450	45.0	0.12	0.00	0.156
Vitamin B12 (µg/d)	1.72	3.26	0.06	2.4	0.24	0.20	0.00	–
Vitamin C (mg/d)	151.32	152.37	112.44	58	5.8	0.78	1.00	0.398
Vitamin A (RE/d)	875.27	966.03	652.42	450	90	0.67	1.00	0.360
Calcium (mg/d)	315.13	198.87	278.59	1,000 [d]	[d]	0.17	0.25	0.193
Iron (mg/d)	11.73	6.55	10.70	23.40	7.02	0.07	0.04	0.137
Zinc (mg/d)	9.51	4.04	8.90	8	1.00	0.65	0.83	0.193
MPA across 11 micronutrients	0.34	0.21	0.33					

[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 are presented here; see Tables A6-1 and N8 for requirements for NPNL women. Four women in the sub-sample of lactating women were also pregnant.
[c] This documents the transformation parameters selected for each nutrient. The power transformations result in approximately normal distributions. For vitamin B12, more than half of the women had zero vitamin B12 intake in R1. As a result, it was not possible to obtain a satisfactory transformation.
[d] There is no EAR and no SD for calcium; 1,000 mg is the Adequate Intake (AI) value for lactating women.

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	68.8	52.5	74.0	40.0	48.2	31.6	45.6	43.8	31.1	0.0	14.4	6.0	22.5	48.6	68.8
All legumes and nuts	11.4	22.3	9.1	16.0	18.3	15.1	13.3	9.3	29.7	0.0	2.9	2.3	25.7	25.4	18.1
All dairy	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
Other animal source foods	3.7	14.6	0.0	17.9	4.6	11.0	11.0	5.6	3.2	96.1	0.9	7.7	13.2	5.4	6.9
Vitamin A-rich fruits /vegetables [b]	12.1	6.2	14.0	10.2	21.3	30.1	21.4	31.4	26.8	0.0	66.4	75.8	29.1	12.6	3.7
Other fruits and vegetables	1.9	3.6	2.0	2.7	6.8	10.0	6.8	9.1	8.7	0.8	13.5	7.7	8.7	7.0	2.2

[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). Mushrooms consumed by women in our study site were categorized as other fruits and vegetables and contained some vitamin B12. Fish broth was assigned to "other foods" and contributed 2.3% of vitamin B12 intakes.
[b] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100 g raw, taking into account retention factors.

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	68.8	52.5	74.0	40.0	48.2	31.6	45.6	43.8	31.1	0.0	14.4	6.0	22.5	48.6	68.8
All legumes and nuts	11.4	22.3	9.1	16.0	18.3	15.1	13.3	9.3	29.7	0.0	2.9	2.3	25.7	25.4	18.1
All dairy	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
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	0.5	1.4	0.0	3.1	0.5	3.1	0.1	0.6	1.3	11.9	0.0	2.6	1.8	0.9	0.8
Flesh foods and other miscellaneous small animal protein	3.2	13.2	0.0	14.8	4.0	7.9	10.9	5.0	1.9	84.2	0.9	5.1	11.5	4.5	6.1
Vitamin A-rich dark green leafy vegetables	0.5	2.1	0.5	0.8	2.2	6.5	2.6	7.4	7.1	0.0	6.9	9.0	13.6	7.3	1.4
Other vitamin A-rich vegetables and fruits [b]	11.5	4.1	13.6	9.4	19.1	23.7	18.8	24.0	19.7	0.0	59.4	66.8	15.5	5.4	2.2
Other fruits and vegetables	1.9	3.6	2.0	2.7	6.8	10.0	6.8	9.1	8.7	0.8	13.5	7.7	8.7	7.0	2.2

[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). Mushrooms consumed by women in our study site were categorized as other fruits and vegetables and contained some vitamin B12. Fish broth was assigned to "other foods" and contributed 2.3% of vitamin B12 intakes.
[b] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100 g raw, taking into account retention factors.

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	68.8	52.5	74.0	40.0	48.2	31.6	45.6	43.8	31.1	0.0	14.4	6.0	22.5	48.6	68.8
All legumes and nuts	11.4	22.3	9.1	16.0	18.3	15.1	13.3	9.3	29.7	0.0	2.9	2.3	25.7	25.4	18.1
All dairy	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
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	0.5	1.4	0.0	3.1	0.5	3.1	0.1	0.6	1.3	11.9	0.0	2.6	1.8	0.9	0.8
Small fish eaten whole w/bones	1.0	4.8	0.0	4.9	1.2	2.8	4.1	1.7	0.7	38.1	0.2	1.0	8.1	1.5	2.1
All other flesh foods misc. small animal protein	2.2	8.4	0.0	9.9	2.8	5.1	6.8	3.3	1.1	46.1	0.7	4.1	3.4	2.9	4.0
Vitamin A-rich dark green leafy vegetables [b]	0.5	2.1	0.5	0.8	2.2	6.5	2.6	7.4	7.1	0.0	6.9	9.0	13.6	7.3	1.4
Vitamin A-rich deep yellow/orange/red vegetables [b]	0.2	0.2	0.2	0.0	0.3	0.5	0.3	0.5	0.2	0.0	0.2	1.2	0.4	0.3	0.2
Vitamin C-rich vegetables [c]	0.3	0.9	0.3	0.6	2.1	1.7	1.9	1.9	2.2	0.0	4.8	3.4	2.4	1.7	0.7
Vitamin A-rich fruits [b]	11.3	3.9	13.3	9.3	18.8	23.2	18.5	23.5	19.5	0.0	59.2	65.6	15.1	5.1	2.1
Vitamin C-rich fruits [c]	0.4	0.2	0.5	0.3	0.8	0.8	0.7	0.8	0.8	0.0	2.1	0.2	0.5	0.2	0.1
All other fruits and vegetables	1.2	2.6	1.2	1.8	3.8	7.6	4.2	6.4	5.7	0.8	6.7	4.1	5.8	5.1	1.3

[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). Mushrooms consumed by women in our study site were categorized as other fruits and vegetables and contained some vitamin B12. Fish broth was assigned to "other foods" and contributed 2.3 percent of vitamin B12 intakes.
[b] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100 g raw, taking into account retention factors.
[c] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g raw, taking into account retention factors.

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	57.7	48.2	61.6	36.1	38.5	24.2	37.1	28.5	22.3	0.0	1.1	1.4	11.1	38.5	61.0
All other starchy staples	11.0	4.3	12.4	3.9	9.7	7.4	8.5	15.2	8.7	0.0	13.3	4.6	11.4	10.1	7.8
Cooked dry beans and peas	10.2	20.5	8.9	8.3	16.1	14.0	10.8	8.2	28.2	0.0	2.5	1.8	24.7	23.6	16.1
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	1.2	1.9	0.3	7.6	2.2	1.1	2.6	1.1	1.4	0.0	0.3	0.5	1.0	1.9	2.0
Milk/yogurt	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
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	0.2	0.8	0.0	1.1	0.3	0.6	0.6	0.2	0.0	3.2	0.4	0.4	0.2	0.4	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
Chicken, duck, turkey, pigeon, guinea hen, game birds	0.7	1.9	0.0	3.5	0.5	1.4	2.0	1.0	0.2	9.9	0.0	1.7	0.6	0.8	1.0
Large whole fish/dried fish/shellfish, other seafood	1.1	4.7	0.0	4.8	1.8	2.6	3.4	1.6	0.9	26.3	0.3	2.1	2.2	1.3	1.4
Small fish eaten whole w/bones	1.0	4.8	0.0	4.9	1.2	2.8	4.1	1.7	0.7	38.1	0.2	1.0	8.1	1.5	2.1
Insects, grubs, snakes, rodents and other small animal	0.2	1.0	0.0	0.4	0.2	0.6	0.8	0.5	0.0	6.6	0.0	0.0	0.4	0.4	0.9
Eggs	0.5	1.4	0.0	3.1	0.5	3.1	0.1	0.6	1.3	11.9	0.0	2.6	1.8	0.9	0.8
Vitamin A-rich dark green leafy vegetables [b]	0.5	2.1	0.5	0.8	2.2	6.5	2.6	7.4	7.1	0.0	6.9	9.0	13.6	7.3	1.4
Vitamin A-rich deep yellow/orange/red vegetables [b]	0.2	0.2	0.2	0.0	0.3	0.5	0.3	0.5	0.2	0.0	0.2	1.2	0.4	0.3	0.2
Vitamin C-rich vegetables [c]	0.3	0.9	0.3	0.6	2.1	1.7	1.9	1.9	2.2	0.0	4.8	3.4	2.4	1.7	0.7
All other vegetables	0.5	2.3	0.4	1.4	3.3	6.3	3.3	3.9	4.7	0.8	5.0	3.5	5.6	4.7	1.1
Vitamin A-rich fruits [b]	11.3	3.9	13.3	9.3	18.8	23.2	18.5	23.5	19.5	0.0	59.2	65.6	15.1	5.1	2.1
Vitamin C-rich fruits [c]	0.4	0.2	0.5	0.3	0.8	0.8	0.7	0.8	0.8	0.0	2.1	0.2	0.5	0.2	0.1
All other fruits	0.6	0.3	0.8	0.5	0.5	1.2	0.9	2.6	0.9	0.0	1.6	0.6	0.3	0.4	0.3

[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). Mushrooms consumed by women in our study site were categorized as other fruits and vegetables and contained some vitamin B12. Fish broth was assigned to "other foods" and contributed 2.3 percent of vitamin B12 intakes.
[b] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100 g raw, taking into account retention factors.
[c] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g raw, taking into account retention factors.

Table L10. Correlations between Food Group Diversity Scores and Estimated Usual Intakes of Individual Nutrients, Lactating 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	0.133 *		0.170 **		0.138 *		0.168 **		0.161 *		0.161 *		0.223 ***		0.224 ***	
Thiamin	0.064	-0.072	0.143 *	0.012	0.084	-0.046	0.163 **	0.047	0.109	-0.034	0.163 **	0.057	0.158 *	-0.037	0.196 **	0.028
Riboflavin	0.079	-0.009	0.160 *	0.066	0.163 **	0.098	0.237 ***	0.170 **	0.171 **	0.089	0.238 ***	0.178 **	0.150 *	0.007	0.201 **	0.076
Niacin	0.130 *	0.044	0.204 **	0.118	0.153 *	0.075	0.225 ***	0.152 *	0.155 *	0.050	0.214 ***	0.142 *	0.194 **	0.036	0.237 ***	0.105
Vitamin B6	0.112	0.041	0.159 *	0.074	0.252 ***	0.214 ***	0.302 ***	0.255 ***	0.221 ***	0.158 *	0.280 ***	0.233 ***	0.259 ***	0.162 *	0.313 ***	0.230 ***
Folate	0.139 *	0.072	0.225 ***	0.155 *	0.173 **	0.112	0.260 ***	0.201 **	0.156 *	0.072	0.224 ***	0.161 *	0.174 **	0.046	0.216 ***	0.101
Vitamin B12	0.218 ***	0.216 ***	0.217 ***	0.215 ***	0.120	0.117	0.118	0.115	0.102	0.098	0.108	0.105	0.095	0.091	0.090	0.085
Vitamin C	0.176 **	0.141 *	0.184 **	0.137 *	0.302 ***	0.274 ***	0.318 ***	0.281 ***	0.274 ***	0.237 ***	0.309 ***	0.275 ***	0.263 ***	0.205 **	0.297 ***	0.242 ***
Vitamin A	0.086	0.052	0.119	0.077	0.264 ***	0.238 ***	0.299 ***	0.266 ***	0.224 ***	0.190 **	0.297 ***	0.267 ***	0.136 *	0.080	0.190 **	0.137 *
Calcium	0.107	0.059	0.140 *	0.080	0.267 ***	0.233 ***	0.300 ***	0.257 ***	0.207 ***	0.157 *	0.251 ***	0.206 **	0.190 **	0.112	0.227 ***	0.153 *
Iron	0.048	-0.062	0.113	-0.006	0.084	-0.016	0.147 *	0.043	0.075	-0.051	0.109	-0.003	0.124 *	-0.044	0.150 *	-0.007
Zinc	0.057	-0.063	0.127 *	0.002	0.008	-0.142 *	0.071	-0.081	0.038	-0.123	0.070	-0.074	0.074	-0.141 *	0.091	-0.115

[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 the MPA (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	**0.386** ***	**-0.400** ***
All legumes and nuts	0.183 **	-0.040
All dairy	–	–
Other animal source foods	0.146 *	0.063
Vitamin A-rich fruits and vegetables [c]	0.623 ***	0.576 ***
Other fruits and vegetables	0.149 *	0.135 *

[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 > 120 RE/100 g raw, taking into account retention factors.

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	**0.386** ***	**-0.400** ***
All legumes and nuts	0.183 **	-0.040
All dairy	–	–
Organ meat	–	–
Eggs	-0.070	-0.062
Flesh foods and other miscellaneous small animal protein	0.173 **	0.085
Vitamin A-rich dark green leafy vegetables [c]	0.243 ***	0.260 ***
Other vitamin A-rich vegetables and fruits [c]	0.608 ***	0.557 ***
Other fruits and vegetables	0.149 *	0.135 *

[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 is used in the correlations.
[c] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100 g raw, taking into account retention factors.

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	**0.386** ***	**-0.400** ***
All legumes and nuts	0.183 **	-0.040
All dairy	–	–
Organ meat	–	–
Eggs	-0.070	-0.062
Small fish eaten whole with bones	0.073	0.128 *
All other flesh foods and miscellaneous small animal protein	0.153 *	0.038
Vitamin A-rich dark green leafy vegetables [c]	0.243 ***	0.260 ***
Vitamin A-rich deep yellow/orange/red vegetables [c]	0.114	0.080
Vitamin C-rich vegetables [d]	0.198 **	0.176 **
Vitamin A-rich fruits [c]	0.597 ***	0.549 ***
Vitamin C-rich fruits [d]	-0.060	0.039
All other fruits and vegetables	0.149 *	0.082

[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 is used in the correlations.
[c] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100 g raw, taking into account retention factors.
[d] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g raw, taking into account retention factors.

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	**0.253** ***	**-0.245** ***
All other starchy staples	0.130 *	-0.029
Cooked dry beans and peas	0.161 *	-0.042
Soybeans and soy products	–	–
Nuts and seeds	0.082	-0.002
Milk/yogurt	–	–
Cheese	–	–
Beef, pork, veal, lamb, goat, game meat	-0.059	-0.068
Organ meat	–	–
Chicken, duck, turkey, pigeon, guinea hen, game birds	0.084	-0.020
Large whole fish/dried fish/shellfish and other seafood	0.156 *	0.104
Small fish eaten whole with bones	0.073	0.128 *
Insects, grubs, snakes, rodents and other small animal	-0.034	-0.092
Eggs	-0.070	-0.062
Vitamin A-rich dark green leafy vegetables [c]	0.243 ***	0.260 ***
Vitamin A-rich deep yellow/orange/red vegetables [c]	0.114	0.080
Vitamin C-rich vegetables [d]	0.198 **	0.176 **
All other vegetables	0.091	0.102
Vitamin A-rich fruits [c]	0.597 ***	0.549 ***
Vitamin C-rich fruits [d]	-0.060	0.039
All other fruits	0.125 *	0.042

[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 is used in the correlations.

[c] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100 g raw, taking into account retention factors.

[d] Vitamin C-rich fruits and vegetables are defined as those with >9 mg/100 g raw, taking into account retention factors.

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	1803	(1088-3332)	1756	(889-3332)	1673	(1088-3332)	1583	(889-3332)	1843	(1088-3332)	1673	(889-3332)	1437	(1088-2843)	1379	(1049-2843)
3	1930	(738-3747)	2022	(738-3790)	1851	(738-3160)	1922	(738-3790)	1819	(738-3160)	1927	(738-3790)	1752	(738-3332)	1849	(738-3434)
4	2141	(935-3790)	2143	(935-3753)	2052	(935-3790)	2109	(935-3753)	2027	(889-3790)	2133	(935-3753)	2010	(1006-3434)	2069	(1006-3790)
5	2061	(1373-3525)	2316	(1469-3525)	2140	(1314-3525)	2143	(1445-3525)	2140	(1097-3635)	1990	(1203-3476)	2061	(889-3790)	2039	(935-3753)
6	–	–	–	–	–	–	–	–	1997	(1484-3525)	1966	(1561-3525)	2035	(1097-3635)	2367	(1445-3476)
7					–	–	–	–	2993	(1561-3498)	–	–	2294	(1575-3525)	1966	(1561-3525)
8					–	–	–	–	–	–	–	–	–	–	–	–
9					–	–	–	–	–	–	–	–	–	–	–	–
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		Total energy intake		Correlation Coefficient [b]
	(mean)	(median)	(mean)	(median)	
FGI-6	3.5	4.0	2,105	2,012	0.152 *
FGI-6R [c]	3.4	3.0	2,105	2,012	0.186 **
FGI-9	3.8	4.0	2,105	2,012	0.161 *
FGI-9R [c]	3.7	4.0	2,105	2,012	0.190 **
FGI-13	4.2	4.0	2,105	2,012	0.173 **
FGI-13R [c]	3.9	4.0	2,105	2,012	0.180 **
FGI-21	4.7	5.0	2,105	2,012	0.246 ***
FGI-21R [c]	4.4	4.0	2,105	2,012	0.255 ***

[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	0.21	(0.00-0.67)	0.21	(0.00-0.67)	0.12	(0.00-0.40)	0.14	(0.00-0.40)	0.12	(0.00-0.40)	0.12	(0.00-0.40)	0.07	(0.00-0.21)	0.04	(0.00-0.21)
3	0.32	(0.00-0.74)	0.33	(0.00-0.77)	0.29	(0.00-0.74)	0.30	(0.00-0.77)	0.32	(0.00-0.74)	0.30	(0.00-0.77)	0.29	(0.00-0.74)	0.29	(0.00-0.77)
4	0.36	(0.01-0.80)	0.36	(0.01-0.80)	0.35	(0.01-0.77)	0.35	(0.01-0.73)	0.33	(0.01-0.77)	0.34	(0.01-0.73)	0.35	(0.01-0.77)	0.31	(0.04-0.73)
5	0.33	(0.01-0.77)	0.37	(0.03-0.77)	0.34	(0.01-0.80)	0.39	(0.03-0.80)	0.35	(0.01-0.80)	0.39	(0.03-0.80)	0.34	(0.01-0.80)	0.35	(0.01-0.80)
6	–	–	–	–	–	–	–	–	0.33	(0.15-0.59)	0.36	(0.25-0.59)	0.33	(0.01-0.77)	0.40	(0.03-0.68)
7					–	–	–	–	0.57	(0.37-0.72)	–	–	0.38	(0.19-0.62)	0.37	(0.19-0.60)
8					–	–	–	–	–	–	–	–	–	–	–	–
9					–	–	–	–	–	–	–	–	–	–	–	–
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)		
FGI-6	3.5	4.0	0.34	0.33	0.193 **	0.123
FGI-6R [c]	3.4	3.0	0.34	0.33	0.280 ***	0.213 ***
FGI-9	3.8	4.0	0.34	0.33	0.296 ***	0.260 ***
FGI-9R [c]	3.7	4.0	0.34	0.33	0.383 ***	0.357 ***
FGI-13	4.2	4.0	0.34	0.33	0.272 ***	0.215 ***
FGI-13R [c]	3.9	4.0	0.34	0.33	0.356 ***	0.328 ***
FGI-21	4.7	5.0	0.34	0.33	0.274 ***	0.148 *
FGI-21R [c]	4.4	4.0	0.34	0.33	0.340 ***	0.233 ***

[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 L16. Results of ordinary least squares regression analysis of the determinants of MPA, Lactating 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	-0.556	0.434	-0.680	0.427	-0.653	0.424	-0.790	0.413	-0.625	0.429	-0.794	0.421	-0.684	0.431	-0.829	0.426
Woman's height	-0.001	0.003	-0.001	0.003	-0.001	0.003	0.000	0.003	-0.001	0.003	0.000	0.003	0.000	0.003	0.000	0.003
Age	-0.006 **	0.002	-0.006 **	0.002	-0.006 **	0.002	-0.005 *	0.002	-0.005 *	0.002	-0.005 *	0.002	-0.006 **	0.002	-0.005 *	0.002
Pregnant (0/1)	-0.038	0.102	-0.052	0.100	-0.022	0.099	-0.033	0.096	-0.020	0.101	-0.034	0.098	-0.020	0.100	-0.033	0.098
Dietary diversity score	0.042 *	0.018	0.064 ***	0.018	0.062 ***	0.016	0.082 ***	0.016	0.042 **	0.013	0.061 ***	0.013	0.036 **	0.011	0.049 ***	0.011
Adjusted R^2	0.043 *		0.082 ***		0.088 ***		0.143 ***		0.068 **		0.116 ***		0.072 **		0.108 ***	
	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	-1.144 ***	0.318	-1.211 ***	0.315	-1.223 ***	0.310	-1.305 ***	0.303	-1.203 ***	0.314	-1.312 ***	0.308	-1.183 ***	0.318	-1.263 ***	0.316
Woman's height	0.000	0.002	0.001	0.002	0.000	0.002	0.001	0.002	0.001	0.002	0.001	0.002	0.001	0.002	0.001	0.002
Age	-0.005 ***	0.002	-0.005 ***	0.002	-0.005 ***	0.002	-0.005 **	0.001	-0.005 ***	0.002	-0.005 **	0.001	-0.005 ***	0.002	-0.005 **	0.002
Pregnant (0/1)	0.060	0.074	0.050	0.073	0.066	0.072	0.057	0.070	0.067	0.073	0.057	0.071	0.066	0.074	0.058	0.073
Dietary diversity score	0.016	0.013	0.032 *	0.013	0.038 **	0.012	0.054 ***	0.012	0.024 *	0.010	0.039 ***	0.010	0.014	0.008	0.023 **	0.009
Total energy intake [c]	0.217 ***	0.017	0.212 ***	0.017	0.212 ***	0.017	0.206 ***	0.016	0.214 ***	0.017	0.209 ***	0.017	0.213 ***	0.017	0.209 ***	0.017
Adjusted R^2	0.498 ***		0.511 ***		0.522 ***		0.548 ***		0.512 ***		0.536 ***		0.502 ***		0.514 ***	

[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 asterisks 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 1000 before running the regressions to take into account the large scale of the energy variable and the small scale of MPA.

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

	Percent (number)	
Women with MPA >50%	21	(53)
Women with MPA >60%	11	(27)
Women with MPA >70%	3	(7)
Women with MPA >80%	0	(1)
Women with MPA >90%	0	(0)

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

Table L18. MPA: Performance of Diversity Scores, Lactating Women [a]

	Range	AUC	p-value [b]	SEM [c]	95% CI [d]
			MPA >50% (first cutoff)		
FGI-6	2.0-5.0	0.581	0.076	0.036	0.510-0.653
FGI-6R [e]	1.0-5.0	0.608	0.018	0.037	0.536-0.680
FGI-9	2.0-7.0	0.596	0.035	0.035	0.528-0.664
FGI-9R [e]	1.0-7.0	0.631	0.004	0.035	0.563-0.699
FGI-13	2.0-7.0	0.598	0.029	0.037	0.525-0.670
FGI-13R [e]	1.0-7.0	0.635	0.002	0.035	0.566-0.704
FGI-21	2.0-9.0	0.603	0.017	0.040	0.525-0.680
FGI-21R [e]	2.0-9.0	0.638	0.002	0.038	0.563-0.713
			MPA > 60% (second cutoff)		
FGI-6	2.0-5.0	0.573	0.210	0.050	0.474-0.671
FGI-6R [e]	1.0-5.0	0.578	0.171	0.051	0.478-0.678
FGI-9	2.0-7.0	0.621	0.041	0.044	0.535-0.708
FGI-9R [e]	1.0-7.0	0.636	0.021	0.046	0.545-0.727
FGI-13	2.0-7.0	0.584	0.161	0.048	0.491-0.677
FGI-13R [e]	1.0-7.0	0.605	0.073	0.048	0.510-0.699
FGI-21	2.0-9.0	0.600	0.095	0.053	0.496-0.704
FGI-21R [e]	2.0-9.0	0.622	0.037	0.051	0.523-0.721

[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 L19. MPA: Tests Comparing AUC for Various Diversity Scores, Lactating 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]	0.581	0.608	0.596	0.631	0.598	0.635	0.603	0.638
		P-values							
FGI-6	0.581								
FGI-6R [d]	0.608	0.112							
FGI-9	0.596	0.552	0.686						
FGI-9R [d]	0.631	0.095	0.354	**0.033**					
FGI-13	0.598	0.549	0.730	0.944	0.187				
FGI-13R [d]	0.635	0.085	0.322	0.104	0.820	**0.046**			
FGI-21	0.603	0.525	0.883	0.808	0.343	0.783	0.207		
FGI-21R [d]	0.638	0.131	0.401	0.151	0.790	0.122	0.900	**0.031**	
MPA > 60% (second cutoff)									
		FGI-6	**FGI-6R**	**FGI-9**	**FGI-9R**	**FGI-13**	**FGI-13R**	**FGI-21**	**FGI-21R**
	AUC[c]	0.573	0.578	0.621	0.636	0.584	0.605	0.600	0.622
		P-values							
FGI-6	0.573								
FGI-6R [d]	0.578	0.822							
FGI-9	0.621	0.160	0.293						
FGI-9R [d]	0.636	0.143	0.095	0.522					
FGI-13	0.584	0.749	0.879	0.139	0.081				
FGI-13R [d]	0.605	0.483	0.480	0.577	0.073	0.426			
FGI-21	0.600	0.527	0.644	0.546	0.363	0.532	0.895		
FGI-21R [d]	0.622	0.308	0.335	0.975	0.659	0.203	0.573	0.272	

[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 AUC 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 L20a. Sensitivity/Specificity Analysis of the Relationship between Food Group Diversity (FGI-6) and MPA, by Diversity Cutoffs, Lactating Women [a]

N	Cutoff	Sensitivity	Specificity	Proportion of false positives	Proportion of false negatives	Total proportion misclassified
MPA > 50%						
252	≥ 1	100.0	0.0	79.0	0.0	79.0
252	≥ 2	100.0	0.0	79.0	0.0	79.0
226	≥ 3	98.1	12.6	69.0	0.4	69.4
137	≥ 4	67.9	49.2	40.1	6.7	46.8
27	≥ 5	7.5	88.4	9.1	19.4	28.6
0	6	–	–	–	–	–
MPA > 60%						
252	≥ 1	100.0	0.0	89.3	0.0	89.3
252	≥ 2	100.0	0.0	89.3	0.0	89.3
226	≥ 3	96.3	11.1	79.4	0.4	79.8
137	≥ 4	66.7	47.1	47.2	3.6	50.8
27	≥ 5	11.1	89.3	9.5	9.5	19.0
0	6	–	–	–	–	–

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

Table L20b. Sensitivity/Specificity Analysis of the Relationship between Food Group Diversity (FGI-6R) and MPA, by Diversity Cutoffs, Lactating Women [a]

n	Cutoff	Sensitivity	Specificity	Proportion of false positives	Proportion of false negatives	Total proportion misclassified
				MPA > 50%		
252	≥ 1	100.0	0.0	79.0	0.0	79.0
251	≥ 2	100.0	0.5	78.6	0.0	78.6
217	≥ 3	98.1	17.1	65.5	0.4	65.9
118	≥ 4	60.4	56.8	34.1	8.3	42.5
19	≥ 5	7.5	92.5	6.0	19.4	25.4
0	6	–	–	–	–	–
				MPA > 60%		
252	≥ 1	100.0	0.0	89.3	0.0	89.3
251	≥ 2	100.0	0.4	88.9	0.0	88.9
217	≥ 3	96.3	15.1	75.8	0.4	76.2
118	≥ 4	55.6	54.2	40.9	4.8	45.6
19	≥ 5	11.1	92.9	6.3	9.5	15.9
0	6	–	–	–	–	–

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

Table L20c. Sensitivity/Specificity Analysis of the Relationship between Food Group Diversity (FGI-9) and MPA, by Diversity Cutoffs, Lactating Women [a]

n	Cutoff	Sensitivity	Specificity	Proportion of false positives	Proportion of false negatives	Total proportion misclassified
				MPA > 50%		
252	≥ 1	100.0	0.0	79.0	0.0	79.0
252	≥ 2	100.0	0.0	79.0	0.0	79.0
236	≥ 3	100.0	8.0	72.6	0.0	72.6
165	≥ 4	86.8	40.2	47.2	2.8	50.0
57	≥ 5	18.9	76.4	18.7	17.1	35.7
2	≥ 6	1.9	99.5	0.4	20.6	21.0
1	≥ 7	1.9	100.0	0.0	20.6	20.6
0	≥ 8	–	–	–	–	–
0	9	–	–	–	–	–
				MPA > 60%		
252	≥ 1	100.0	0.0	89.3	0.0	89.3
252	≥ 2	100.0	0.0	89.3	0.0	89.3
236	≥ 3	100.0	7.1	82.9	0.0	82.9
165	≥ 4	88.9	37.3	56.0	1.2	57.1
57	≥ 5	25.9	77.8	19.8	7.9	27.8
2	≥ 6	3.7	99.6	0.4	10.3	10.7
1	≥ 7	3.7	100.0	0.0	10.3	10.3
0	≥ 8	–	–	–	–	–
0	9	–	–	–	–	–

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

Table L20d. Sensitivity/Specificity Analysis of the Relationship between Food Group Diversity (FGI-9R) and MPA, by Diversity Cutoffs, Lactating Women [a]

n	Cutoff	Sensitivity	Specificity	Proportion of false positives	Proportion of false negatives	Total proportion misclassified
				MPA > 50%		
252	≥ 1	100.0	0.0	79.0	0.0	79.0
251	≥ 2	100.0	0.5	78.6	0.0	78.6
230	≥ 3	100.0	11.1	70.2	0.0	70.2
151	≥ 4	81.1	45.7	42.9	4.0	46.8
39	≥ 5	17.0	84.9	11.9	17.5	29.4
2	≥ 6	1.9	99.5	0.4	20.6	21.0
1	≥ 7	1.9	100.0	0.0	20.6	20.6
0	≥ 8	–	–	–	–	–
0	9	–	–	–	–	–
				MPA > 60%		
252	≥ 1	100.0	0.0	89.3	0.0	89.3
251	≥ 2	100.0	0.4	88.9	0.0	88.9
230	≥ 3	100.0	9.8	80.6	0.0	80.6
151	≥ 4	81.5	42.7	51.2	2.0	53.2
39	≥ 5	22.2	85.3	13.1	8.3	21.4
2	≥ 6	3.7	99.6	0.4	10.3	10.7
1	≥ 7	3.7	100.0	0.0	10.3	10.3
0	≥ 8	–	–	–	–	–
0	9	–	–	–	–	–

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

Table L20e. Sensitivity/Specificity Analysis of the Relationship between Food Group Diversity (FGI-13) and MPA, by Diversity Cutoffs, Lactating Women [a]

n	Cutoff	Sensitivity	Specificity	Proportion of false positives	Proportion of false negatives	Total proportion misclassified
				MPA > 50%		
252	≥ 1	100.0	0.0	79.0	0.0	79.0
252	≥ 2	100.0	0.0	79.0	0.0	79.0
238	≥ 3	100.0	7.0	73.4	0.0	73.4
180	≥ 4	90.6	33.7	52.4	2.0	54.4
94	≥ 5	41.5	63.8	28.6	12.3	40.9
29	≥ 6	11.3	88.4	9.1	18.7	27.8
5	≥ 7	5.7	99.0	0.8	19.8	20.6
0	≥ 8	–	–	–	–	–
0	≥ 9	–	–	–	–	–
0	≥10	–	–	–	–	–
0	≥ 11	–	–	–	–	–
0	≥ 12	–	–	–	–	–
0	13	–	–	–	–	–
				MPA > 60%		
252	≥ 1	100.0	0.0	89.3	0.0	89.3
252	≥ 2	100.0	0.0	89.3	0.0	89.3
238	≥ 3	100.0	6.2	83.7	0.0	83.7
180	≥ 4	88.9	30.7	61.9	1.2	63.1
94	≥ 5	44.4	63.6	32.5	6.0	38.5
29	≥ 6	7.4	88.0	10.7	9.9	20.6
5	≥ 7	7.4	98.7	1.2	9.9	11.1
0	≥ 8	–	–	–	–	–
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 L20f. Sensitivity/Specificity Analysis of the Relationship between Food Group Diversity (FGI-13R) and MPA, by Diversity Cutoffs, Lactating Women [a]

n	Cutoff	Sensitivity	Specificity	Proportion of false positives	Proportion of false negatives	Total proportion misclassified
				MPA > 50%		
252	≥ 1	100.0	0.0	79.0	0.0	79.0
251	≥ 2	100.0	0.5	78.6	0.0	78.6
231	≥ 3	100.0	10.6	70.6	0.0	70.6
160	≥ 4	86.8	42.7	45.2	2.8	48.0
62	≥ 5	28.3	76.4	18.7	15.1	33.7
15	≥ 6	7.5	94.5	4.4	19.4	23.8
3	≥ 7	3.8	99.5	0.4	20.2	20.6
0	≥ 8	–	–	–	–	–
0	≥ 9	–	–	–	–	–
0	≥ 10	–	–	–	–	–
0	≥ 11	–	–	–	–	–
0	≥ 12	–	–	–	–	–
0	13	–	–	–	–	–
				MPA > 60%		
252	≥ 1	100.0	0.0	89.3	0.0	89.3
251	≥ 2	100.0	0.4	88.9	0.0	88.9
231	≥ 3	100.0	9.3	81.0	0.0	81.0
160	≥ 4	81.5	38.7	54.8	2.0	56.7
62	≥ 5	29.6	76.0	21.4	7.5	29.0
15	≥ 6	7.4	94.2	5.2	9.9	15.1
3	≥ 7	7.4	99.6	0.4	9.9	10.3
0	≥ 8	–	–	–	–	–
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 L20g. Sensitivity/Specificity Analysis of the Relationship between Food Group Diversity (FGI-21) and MPA, by Diversity Cutoffs, Lactating Women [a]

n	Cutoff	Sensitivity	Specificity	Proportion of false positives	Proportion of false negatives	Total proportion misclassified
				MPA > 50%		
252	≥ 1	100.0	0.0	79.0	0.0	79.0
252	≥ 2	100.0	0.0	79.0	0.0	79.0
244	≥ 3	100.0	4.0	75.8	0.0	75.8
198	≥ 4	92.5	25.1	59.1	1.6	60.7
141	≥ 5	67.9	47.2	41.7	6.7	48.4
68	≥ 6	32.1	74.4	20.2	14.3	34.5
27	≥ 7	15.1	90.5	7.5	17.9	25.4
4	≥ 8	3.8	99.0	0.8	20.2	21.0
2	≥ 9	3.8	100.0	0.0	20.2	20.2
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%		
252	≥ 1	100.0	0.0	89.3	0.0	89.3
252	≥ 2	100.0	0.0	89.3	0.0	89.3
244	≥ 3	100.0	3.6	86.1	0.0	86.1
198	≥ 4	92.6	23.1	68.7	0.8	69.4
141	≥ 5	66.7	45.3	48.8	3.6	52.4
68	≥ 6	37.0	74.2	23.0	6.7	29.8
27	≥ 7	14.8	89.8	9.1	9.1	18.3
4	≥ 8	3.7	98.7	1.2	10.3	11.5
2	≥ 9	3.7	99.6	0.4	10.3	10.7
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.

Table L20h. Sensitivity/Specificity Analysis of the Relationship between Food Group Diversity (FGI-21R) and MPA, by Diversity Cutoffs, Lactating Women [a]

n	Cutoff	Sensitivity	Specificity	Proportion of false positives	Proportion of false negatives	Total proportion misclassified
				MPA > 50%		
252	≥ 1	100.0	0.0	79.0	0.0	79.0
252	≥ 2	100.0	0.0	79.0	0.0	79.0
240	≥ 3	100.0	6.0	74.2	0.0	74.2
185	≥ 4	90.6	31.2	54.4	2.0	56.3
114	≥ 5	60.4	58.8	32.5	8.3	40.9
42	≥ 6	24.5	85.4	11.5	15.9	27.4
13	≥ 7	5.7	95.0	4.0	19.8	23.8
1	≥ 8	1.9	100.0	0.0	20.6	20.6
1	≥ 9	1.9	100.0	0.0	20.6	20.6
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%		
252	≥ 1	100.0	0.0	89.3	0.0	89.3
252	≥ 2	100.0	0.0	89.3	0.0	89.3
240	≥ 3	100.0	5.3	84.5	0.0	84.5
185	≥ 4	88.9	28.4	63.9	1.2	65.1
114	≥ 5	63.0	56.9	38.5	4.0	42.5
42	≥ 6	22.2	84.0	14.3	8.3	22.6
13	≥ 7	7.4	95.1	4.4	9.9	14.3
1	≥ 8	3.7	100.0	0.0	10.3	10.3
1	≥ 9	3.7	100.0	0.0	10.3	10.3
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 L1-L11

Histograms for intra-individual SDs of intake, based on data from two rounds: Figures L12-L22

Histograms for FGIs (R1 data): Figures L23-L30

Histograms of PA for 11 micronutrients, based on data from two rounds: Figures L31-L41

Histogram of MPA, based on data from two rounds: Figure L42

Figure L1. Distribution of Thiamin Intakes, Lactating Women

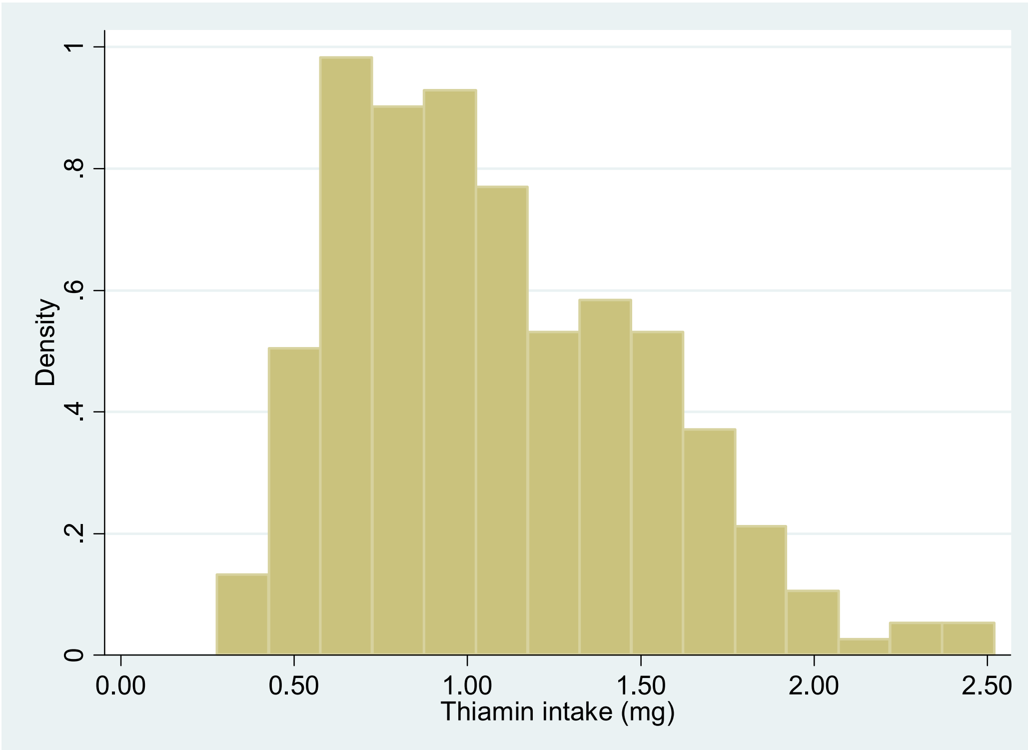


Figure L2. Distribution of Riboflavin Intakes, Lactating Women

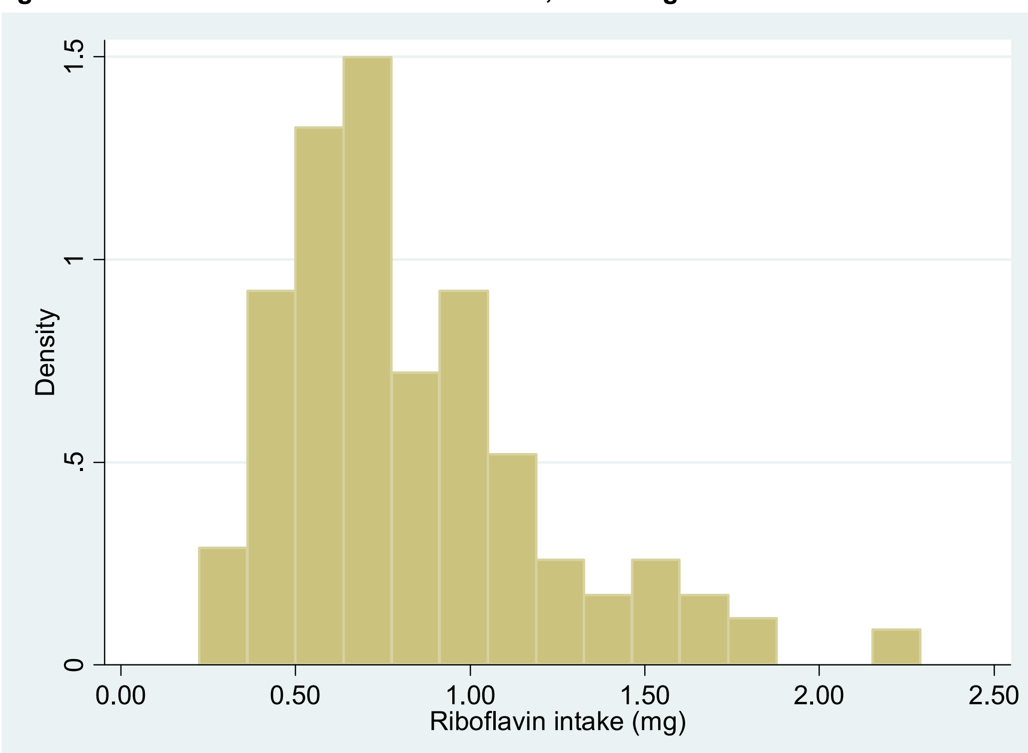


Figure L3. Distribution of Niacin Intakes, Lactating Women

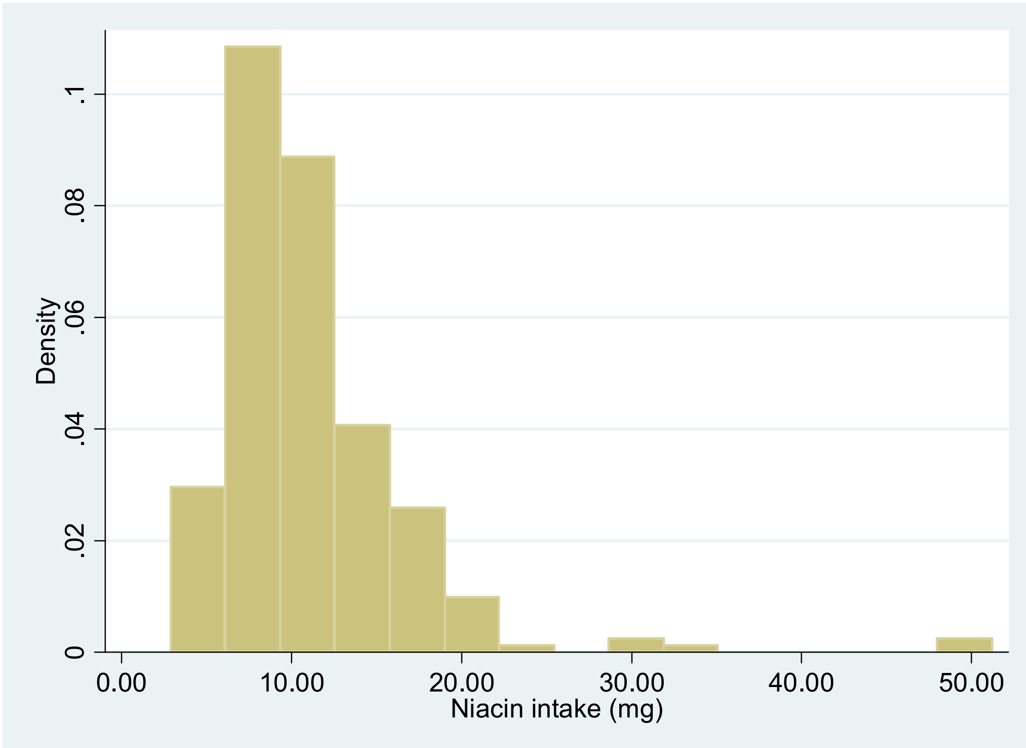


Figure L4. Distribution of Vitamin B6 Intakes, Lactating Women

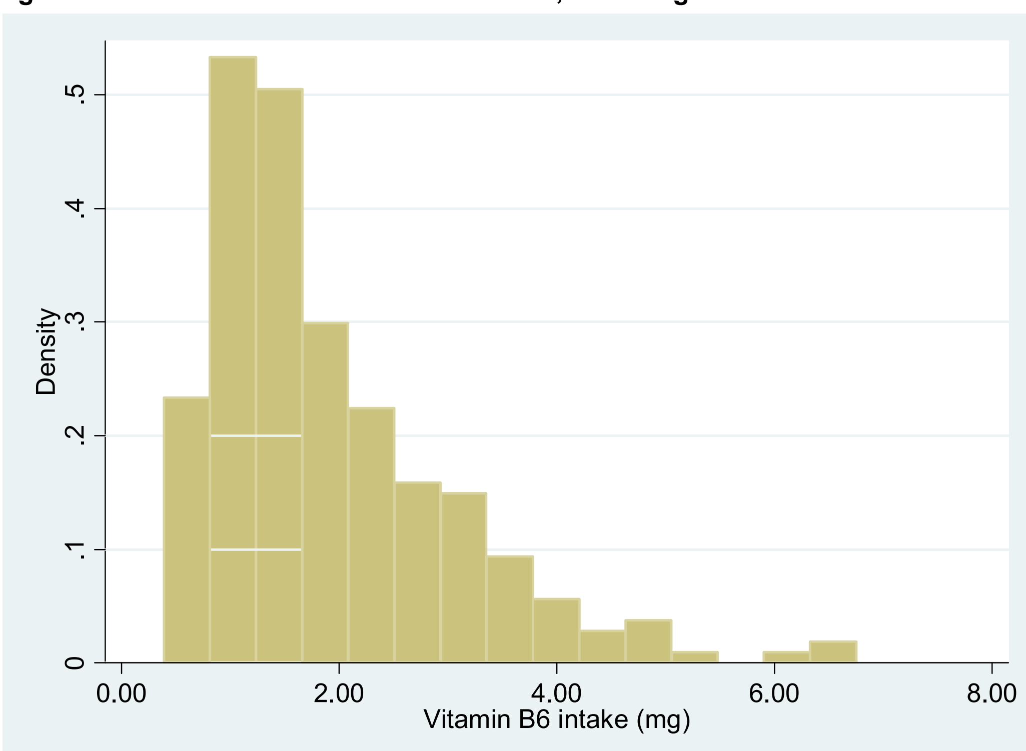


Figure L5. Distribution of Folate Intakes, Lactating Women

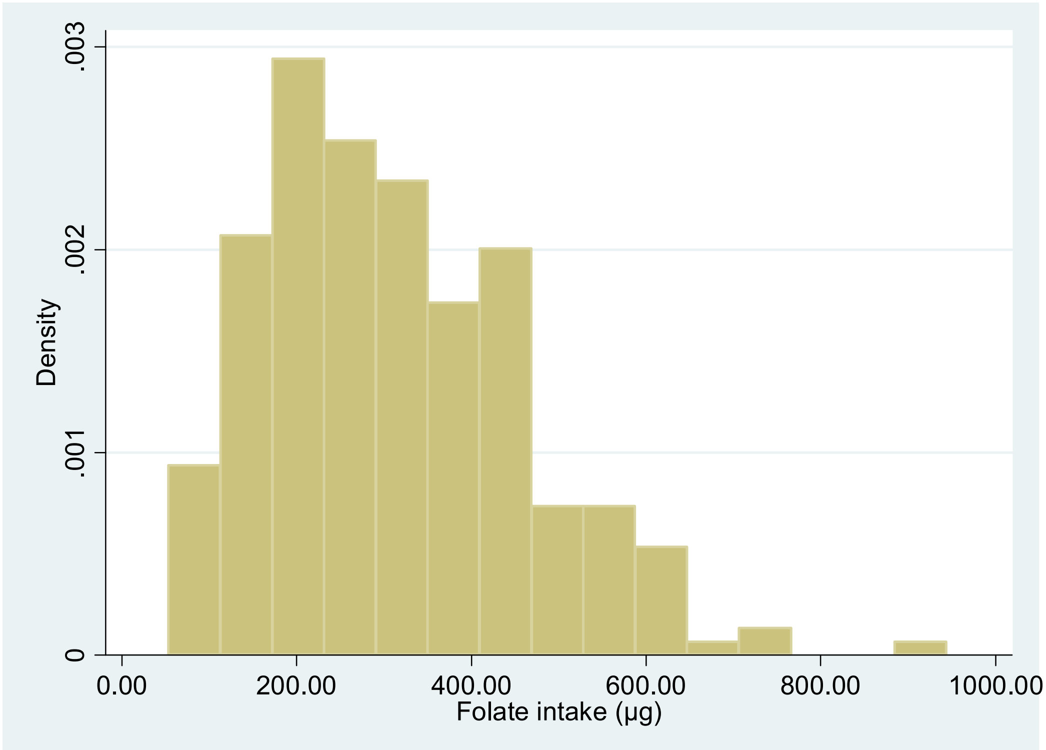


Figure L6. Distribution of Vitamin B12 Intakes, Lactating Women

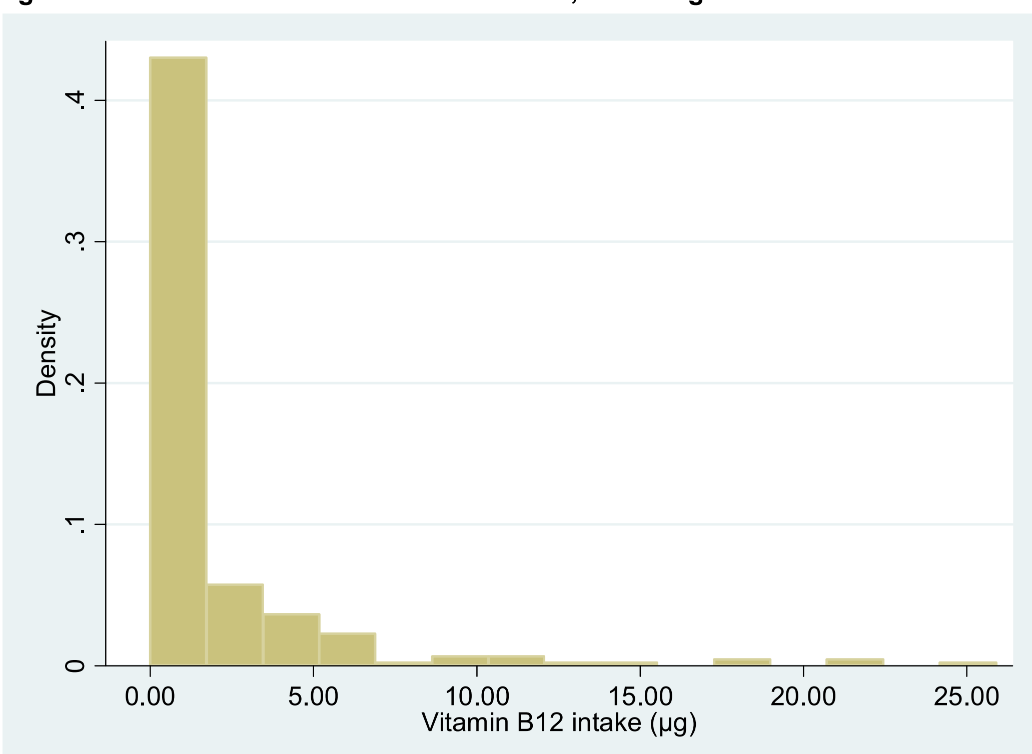


Figure L7. Distribution of Vitamin C Intakes, Lactating Women

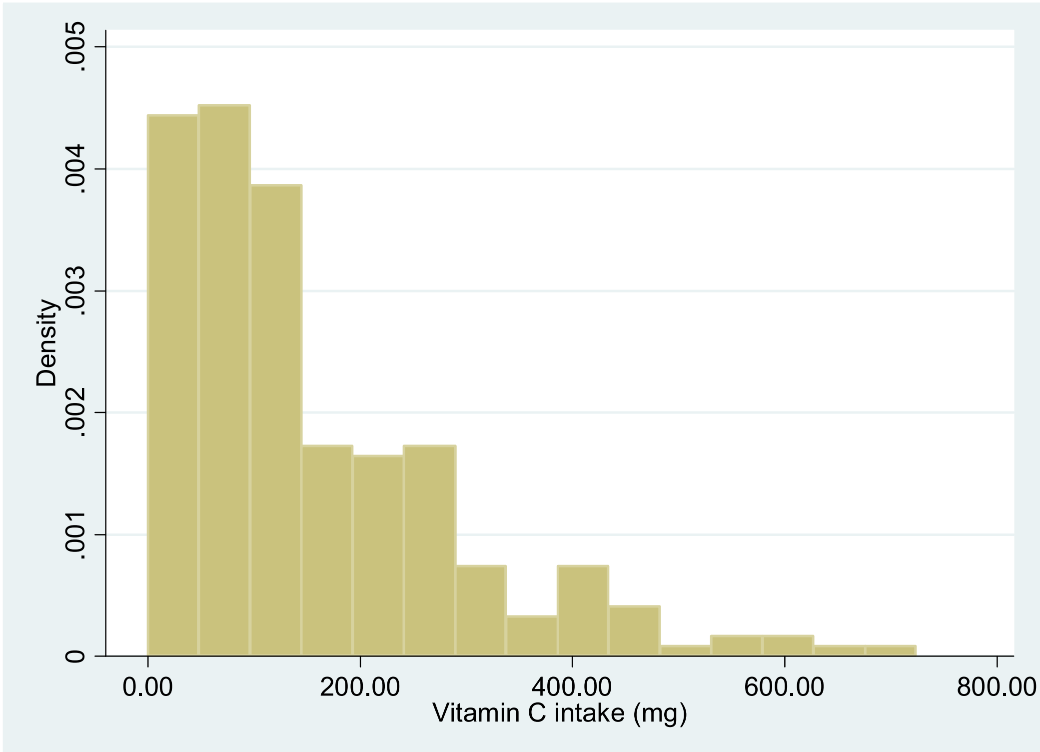


Figure L8. Distribution of Vitamin A Intakes, Lactating Women

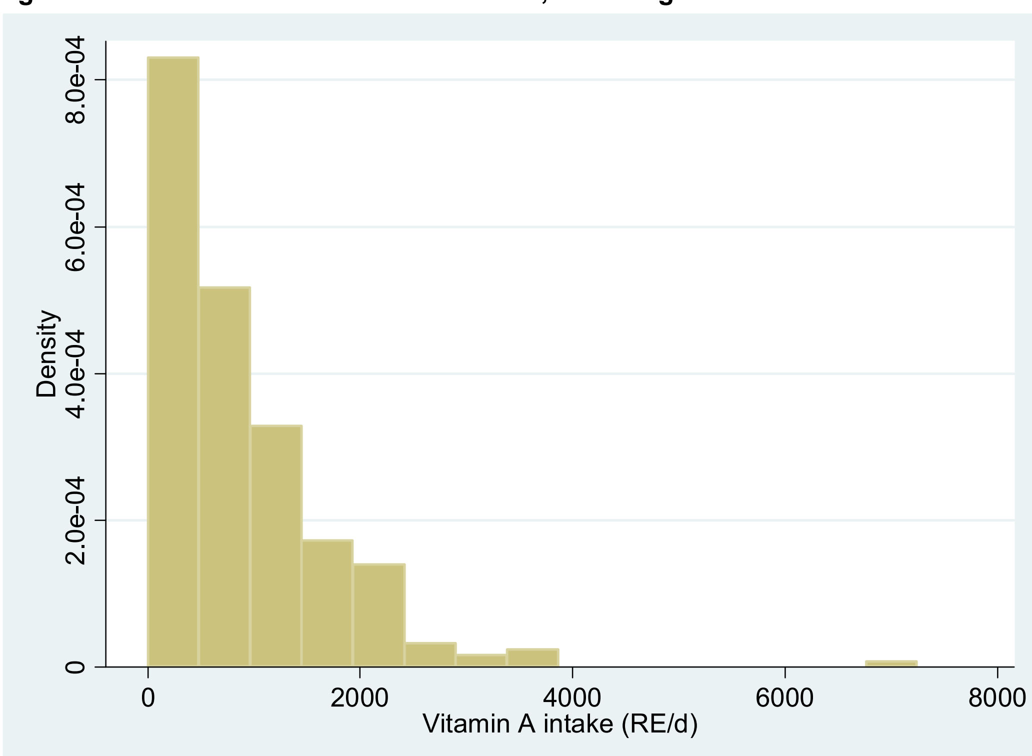


Figure L9. Distribution of Calcium Intakes, Lactating Women

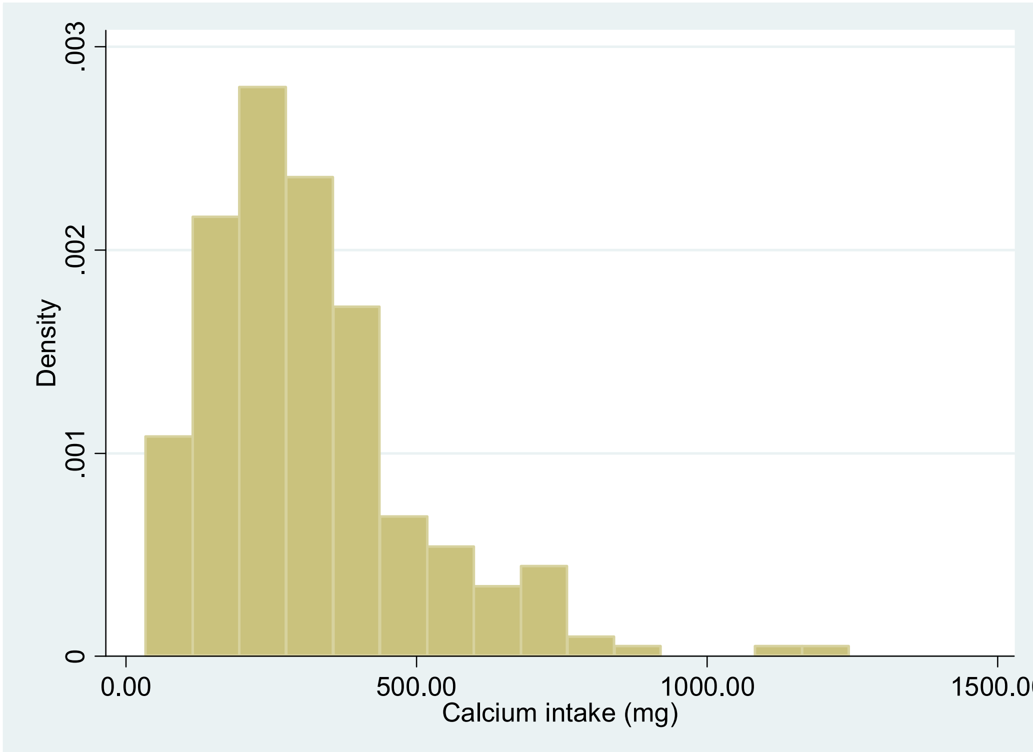


Figure L10. Distribution of Iron Intakes, Lactating Women

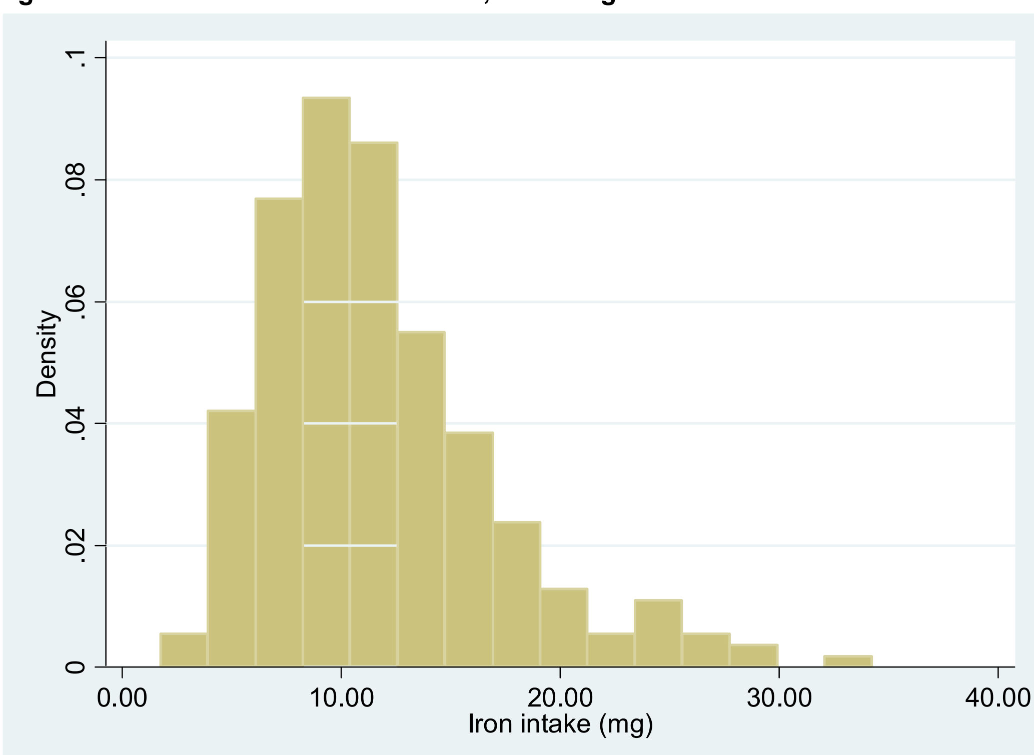


Figure L11. Distribution of Zinc Intakes, Lactating Women

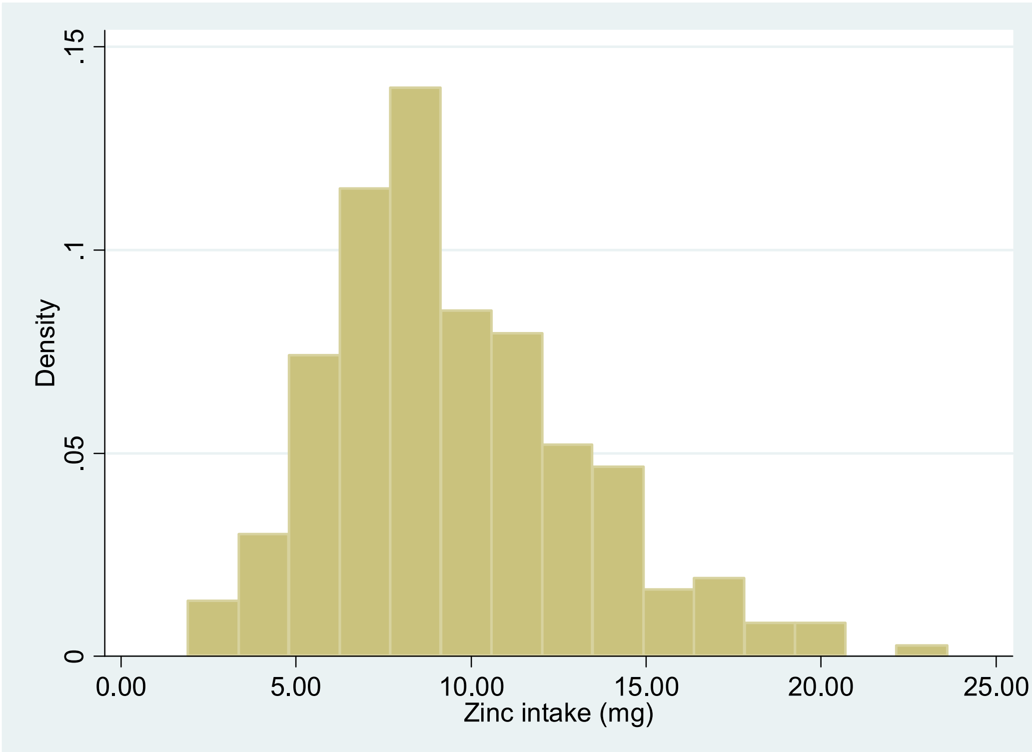


Figure L12. Intra-Individual SD of Thiamin Intakes, Lactating Women

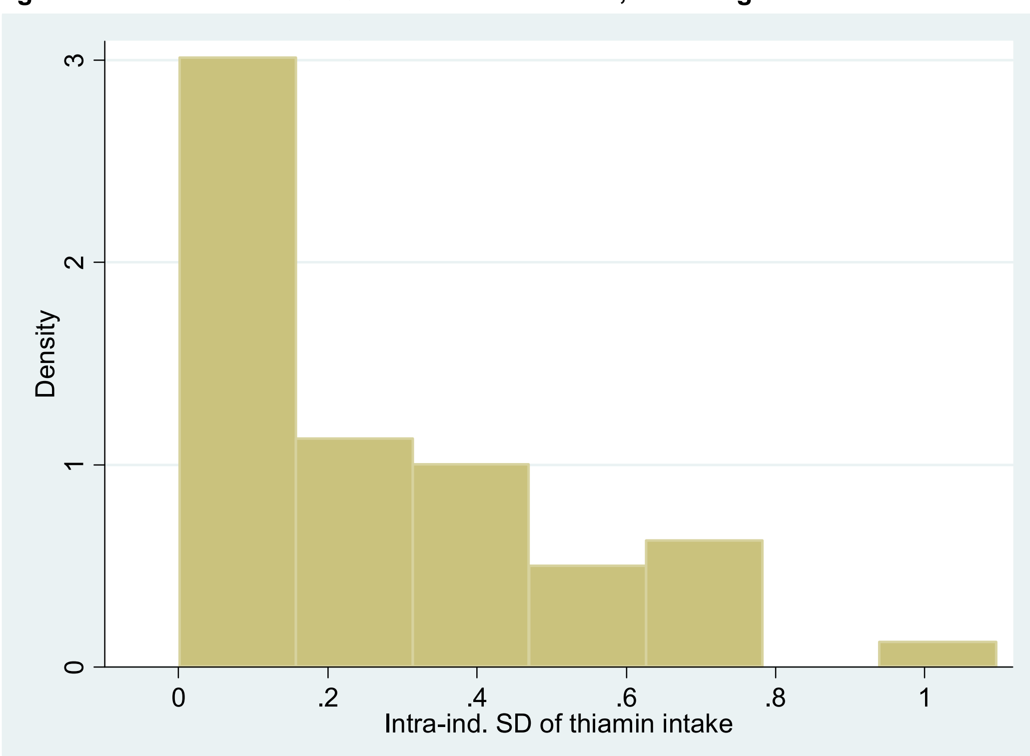


Figure L13. Intra-Individual SD of Riboflavin Intakes, Lactating Women

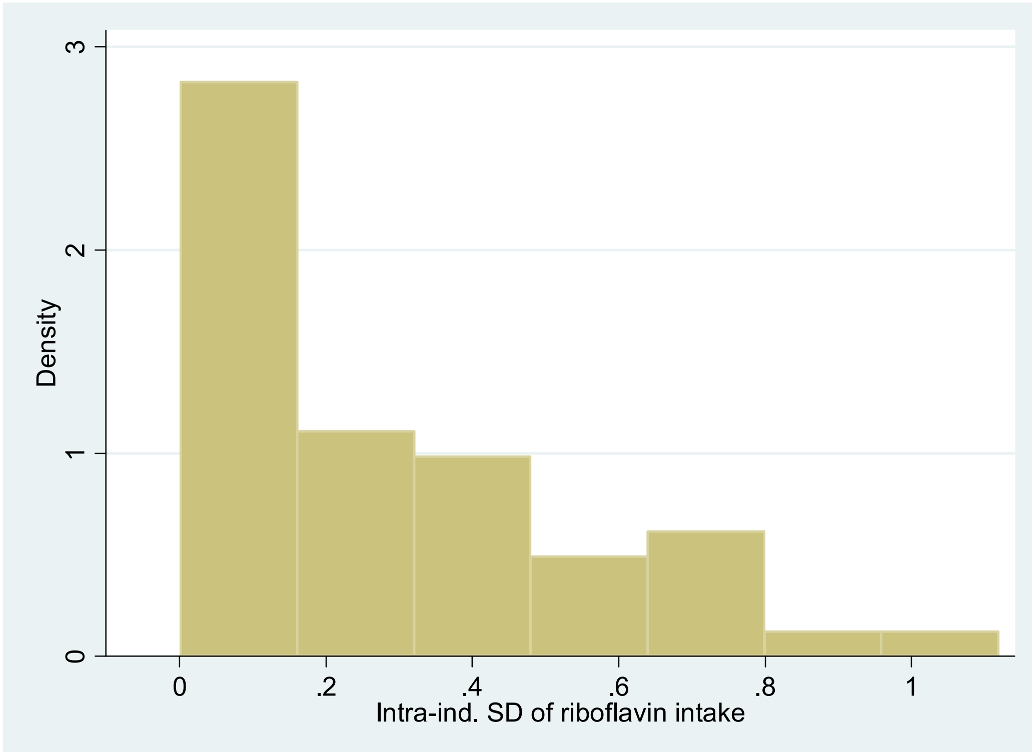


Figure L14. Intra-Individual SD of Niacin Intakes, Lactating Women

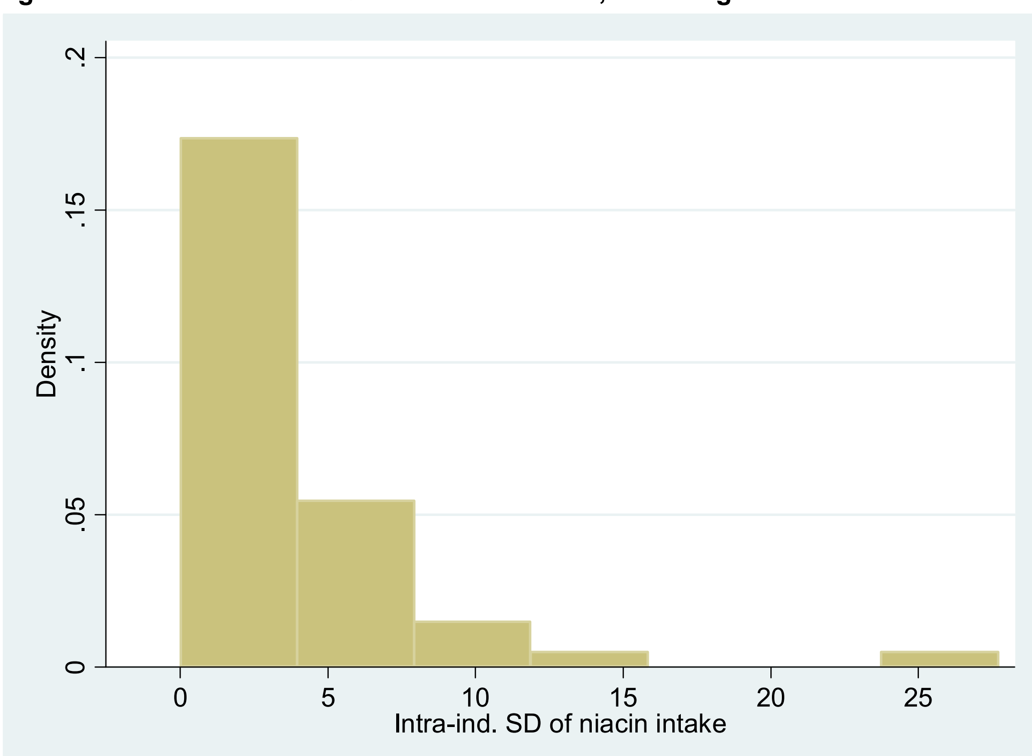


Figure L15. Intra-Individual SD of Vitamin B6 Intakes, Lactating Women

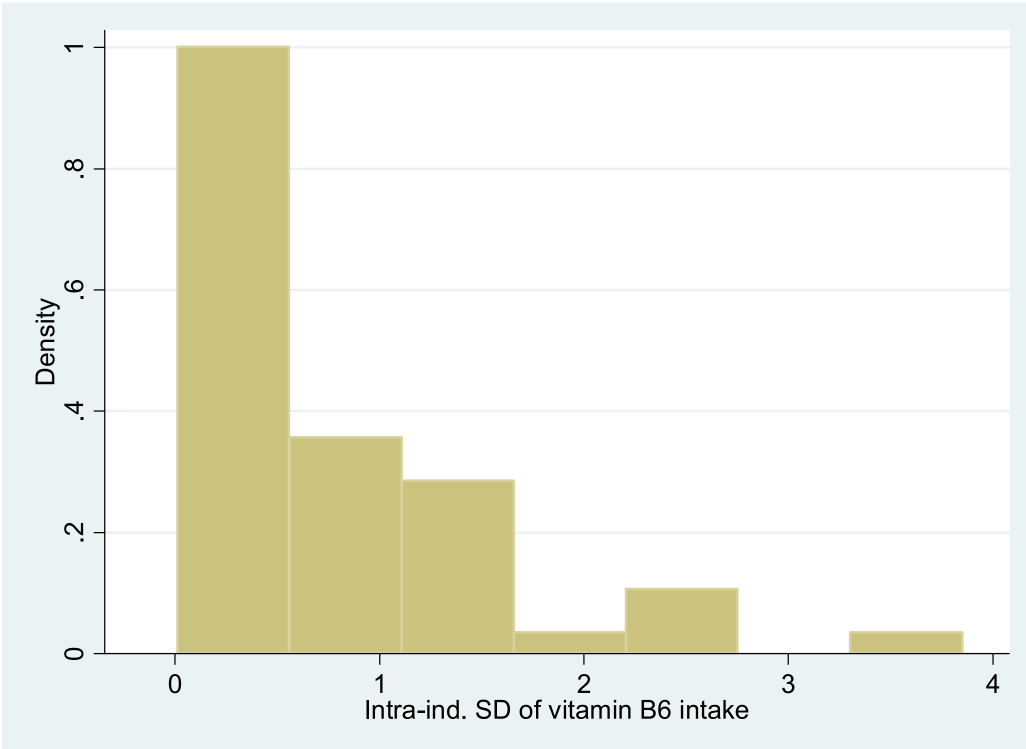


Figure L16. Intra-Individual SD of Folate Intakes, Lactating Women

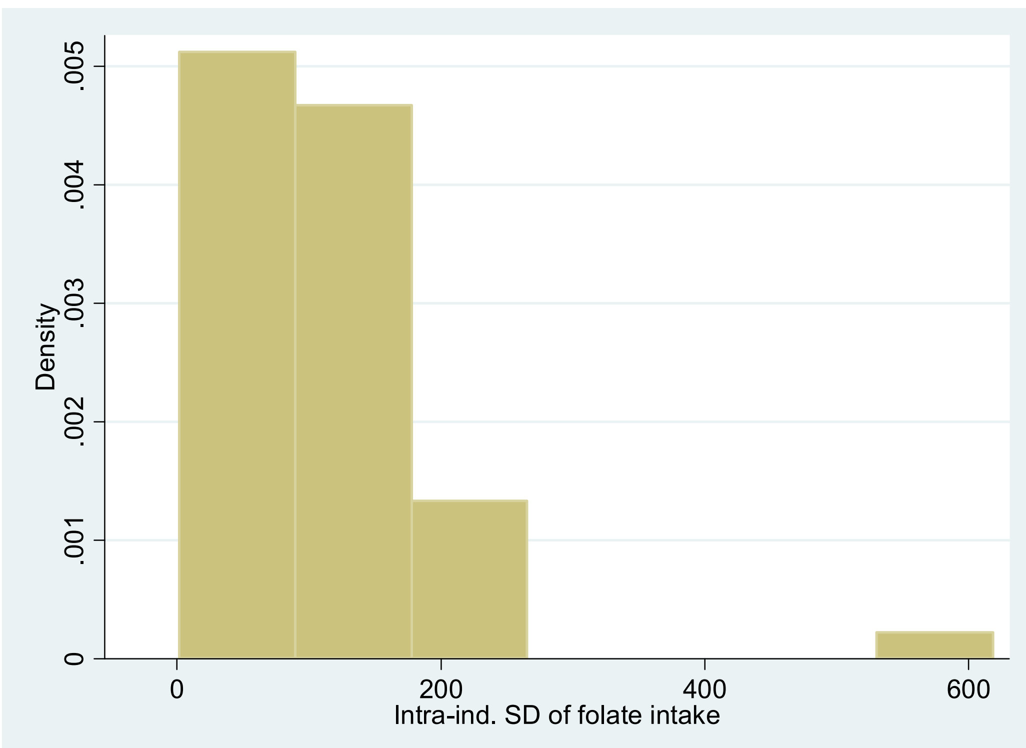


Figure L17. Intra-Individual SD of Vitamin B12 Intakes, Lactating Women

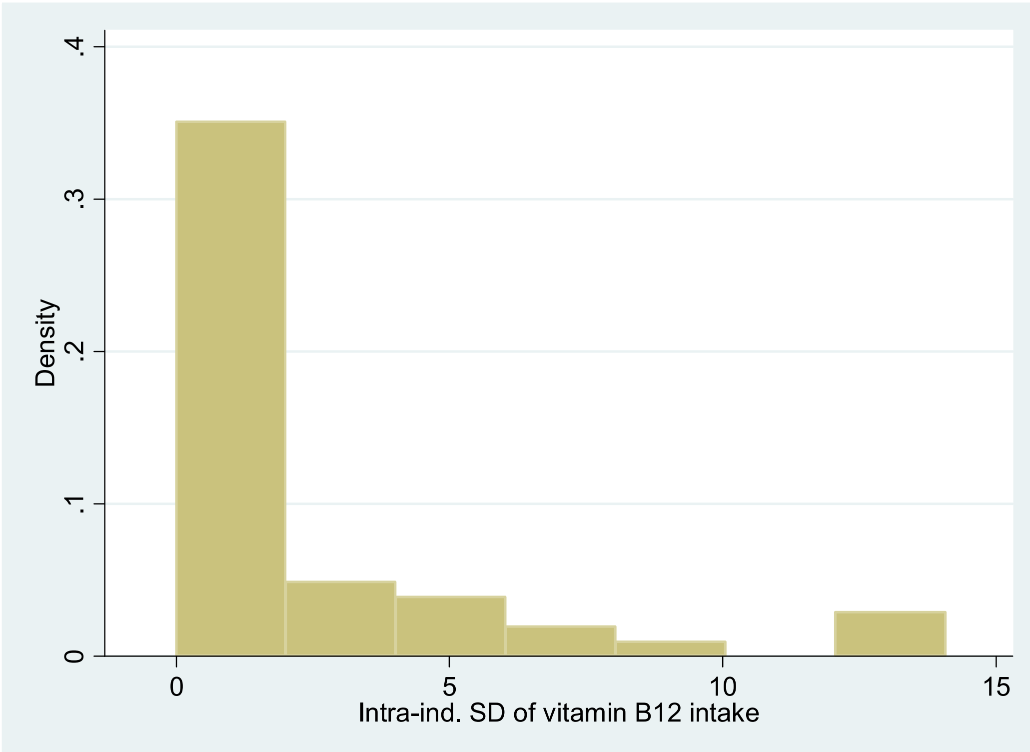


Figure L18. Intra-Individual SD of Vitamin C Intakes, Lactating Women

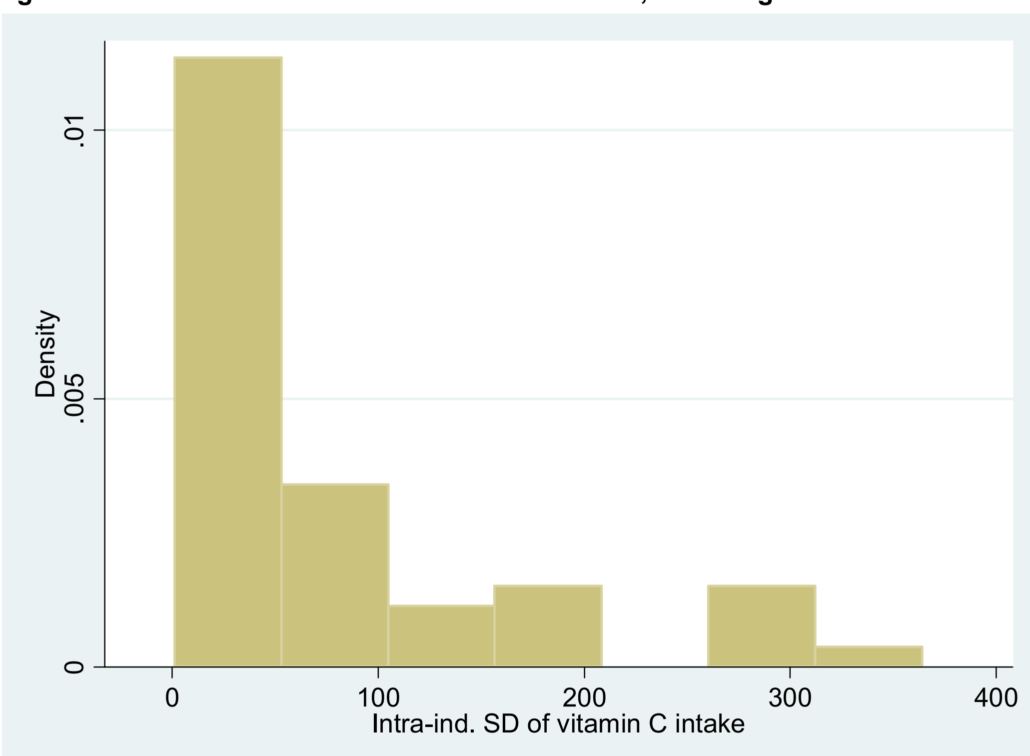


Figure L19. Intra-Individual SD of Vitamin A Intakes, Lactating Women

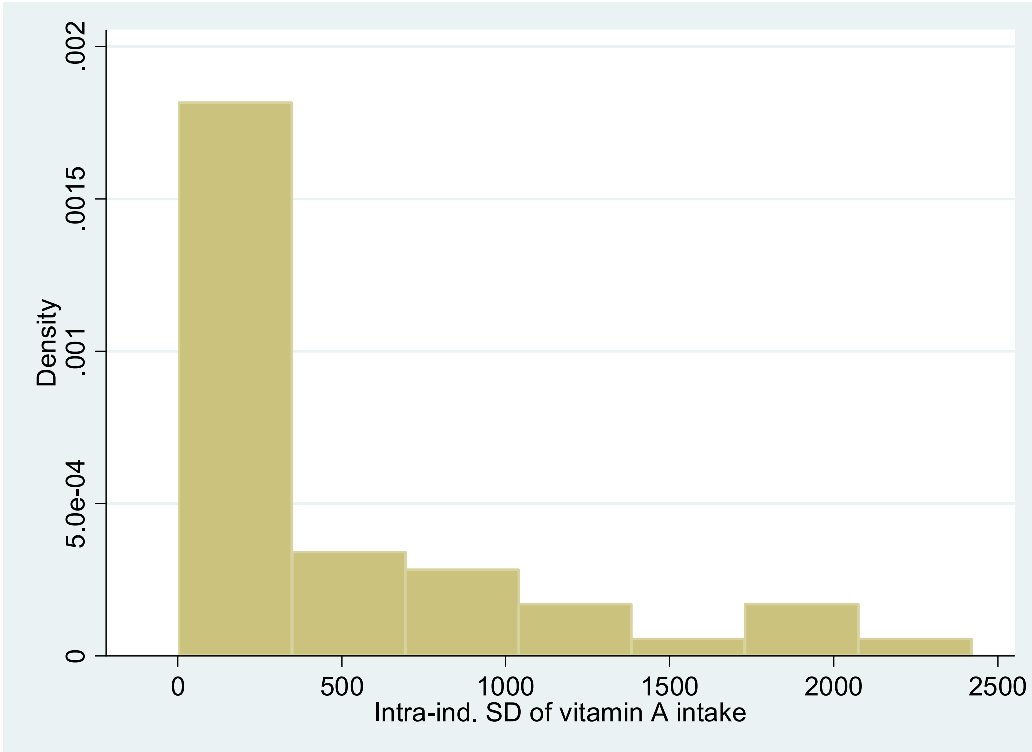


Figure L20. Intra-Individual SD of Calcium Intakes, Lactating Women

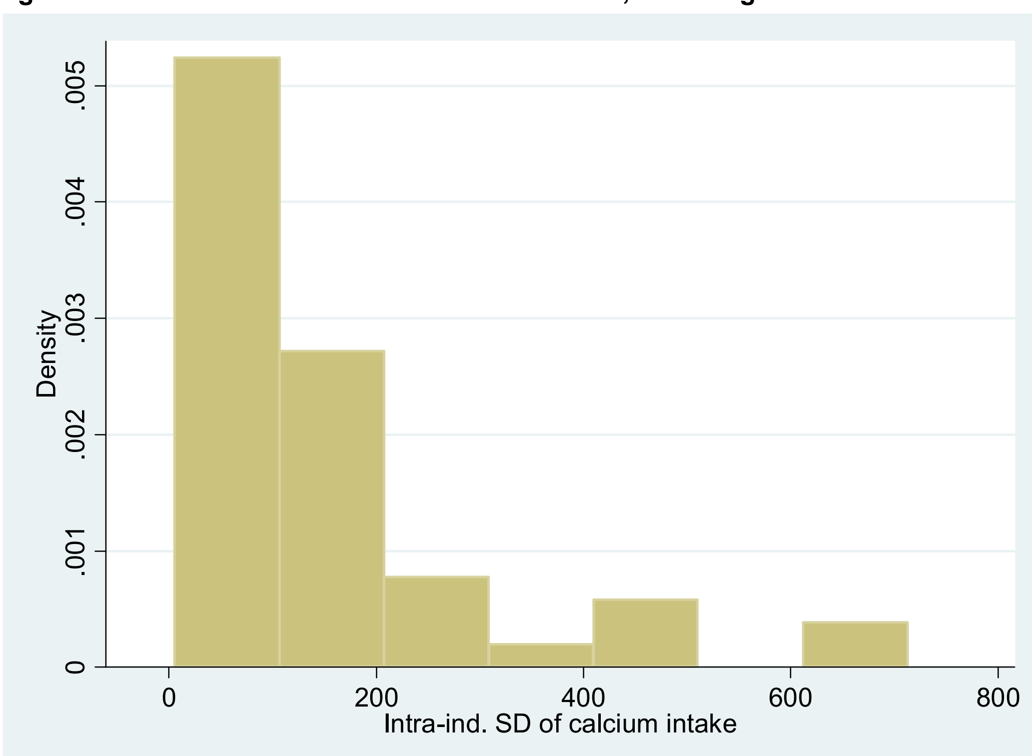


Figure L21. Intra-Individual SD of Iron Intakes, Lactating Women

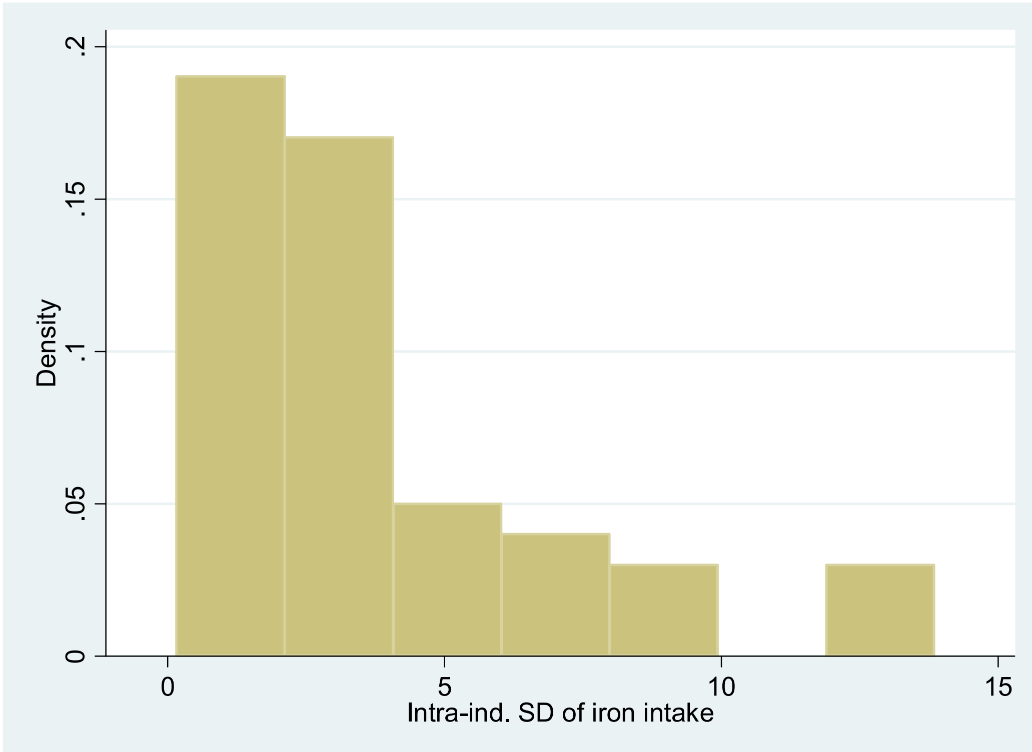


Figure L22. Intra-Individual SD of Zinc Intakes, Lactating Women

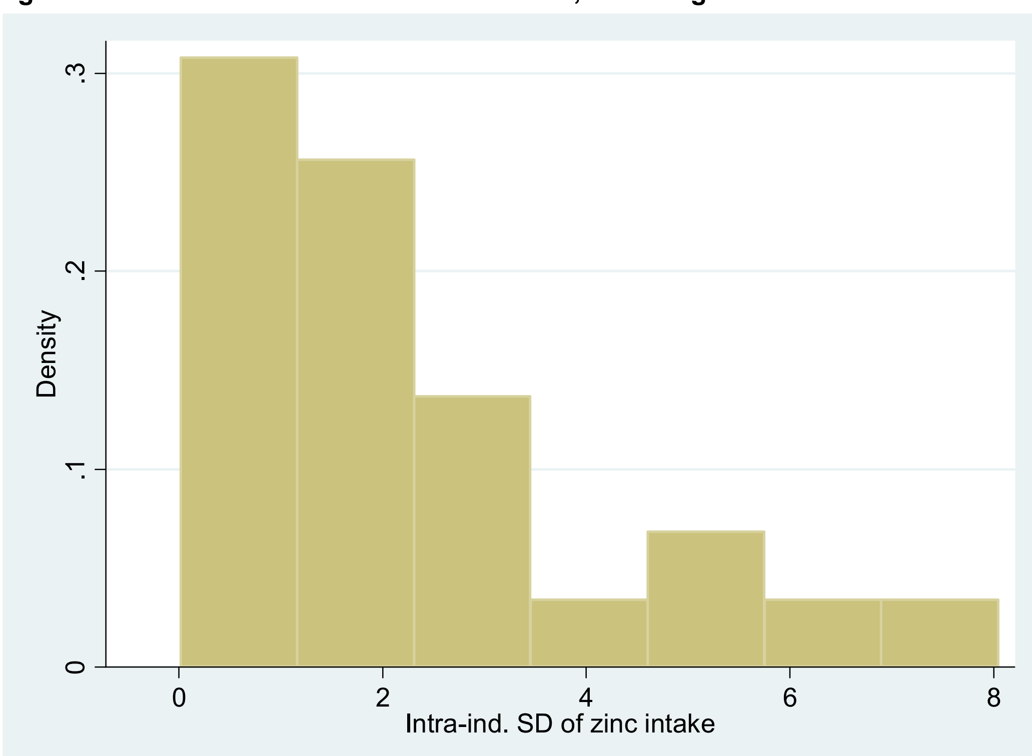


Figure L23. Distribution of Scores for FGI-6, Lactating Women

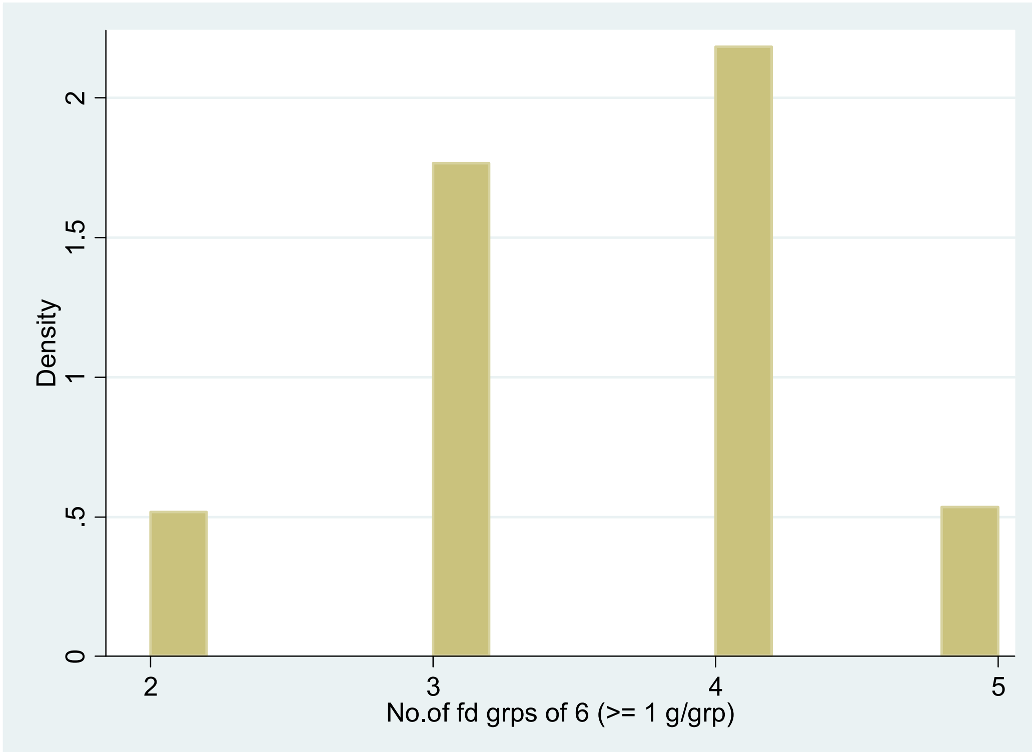


Figure L24. Distribution of Scores for FGI-6R, Lactating Women

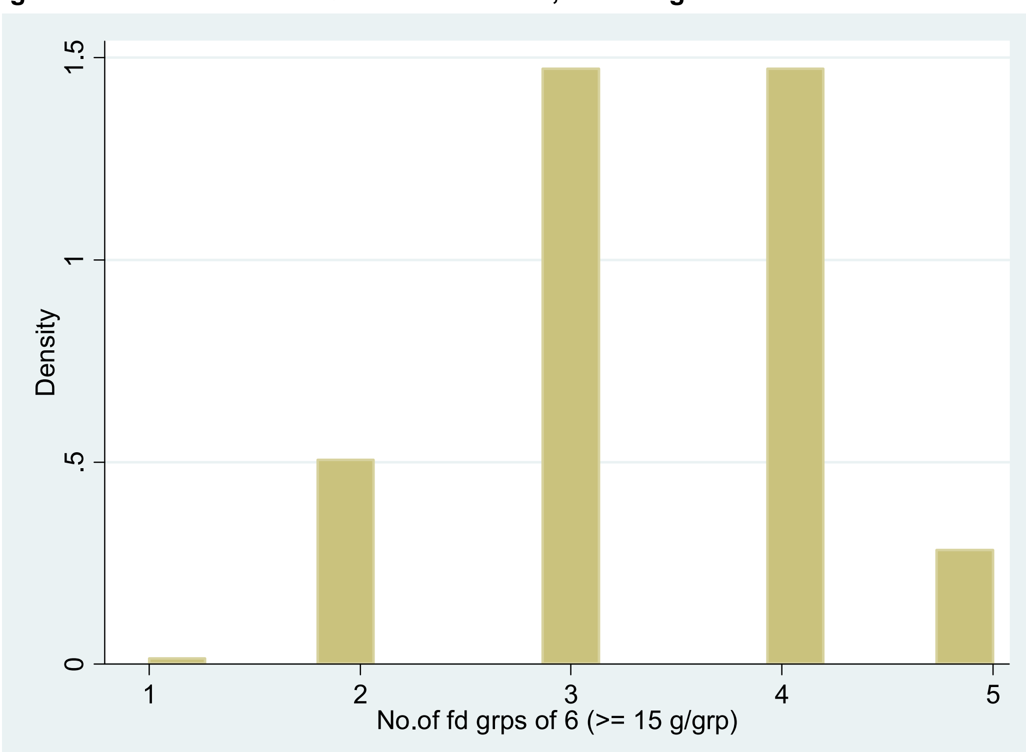


Figure L25. Distribution of Scores for FGI-9, Lactating Women

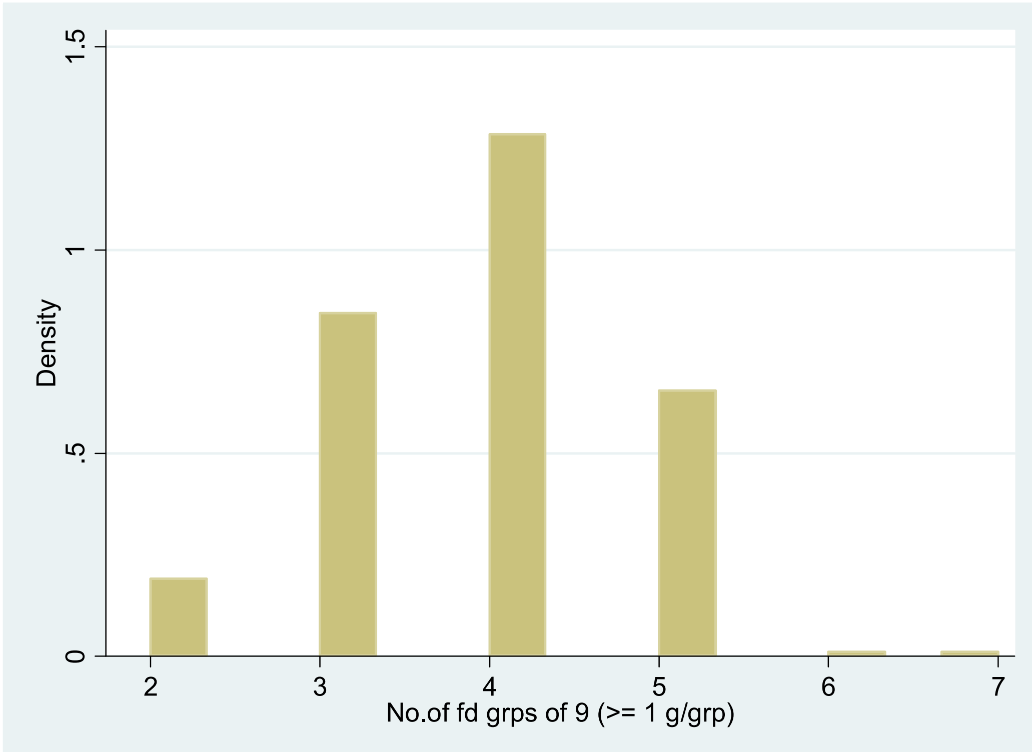


Figure L26. Distribution of Scores for FGI-9R, Lactating Women

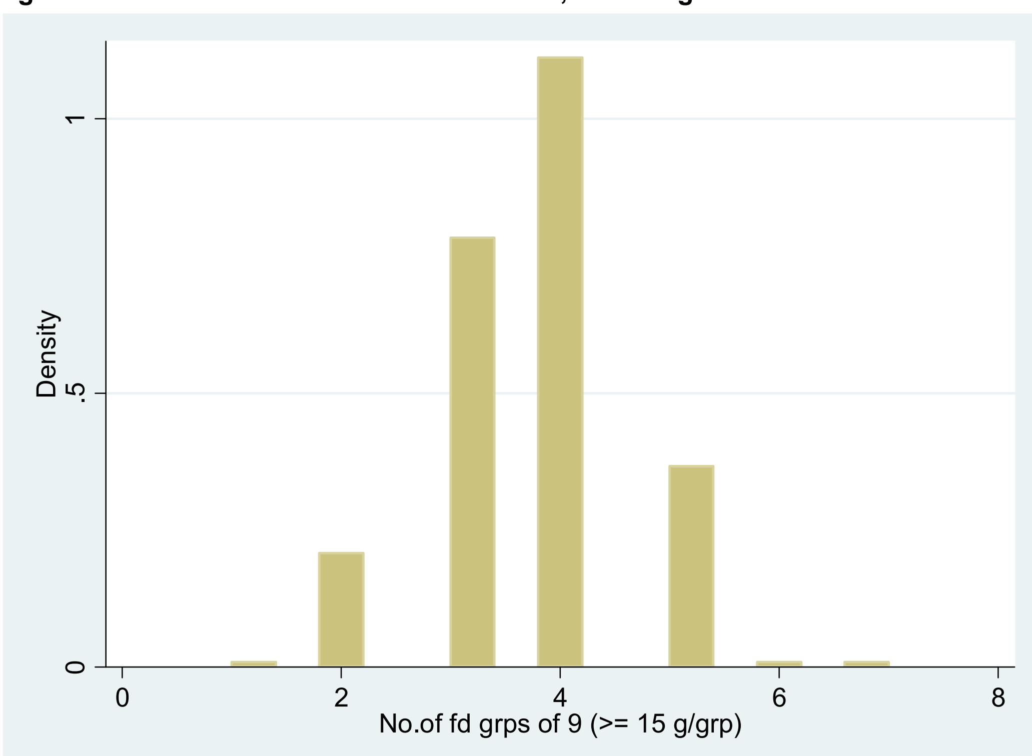


Figure L27. Distribution of Scores for FGI-13, Lactating Women

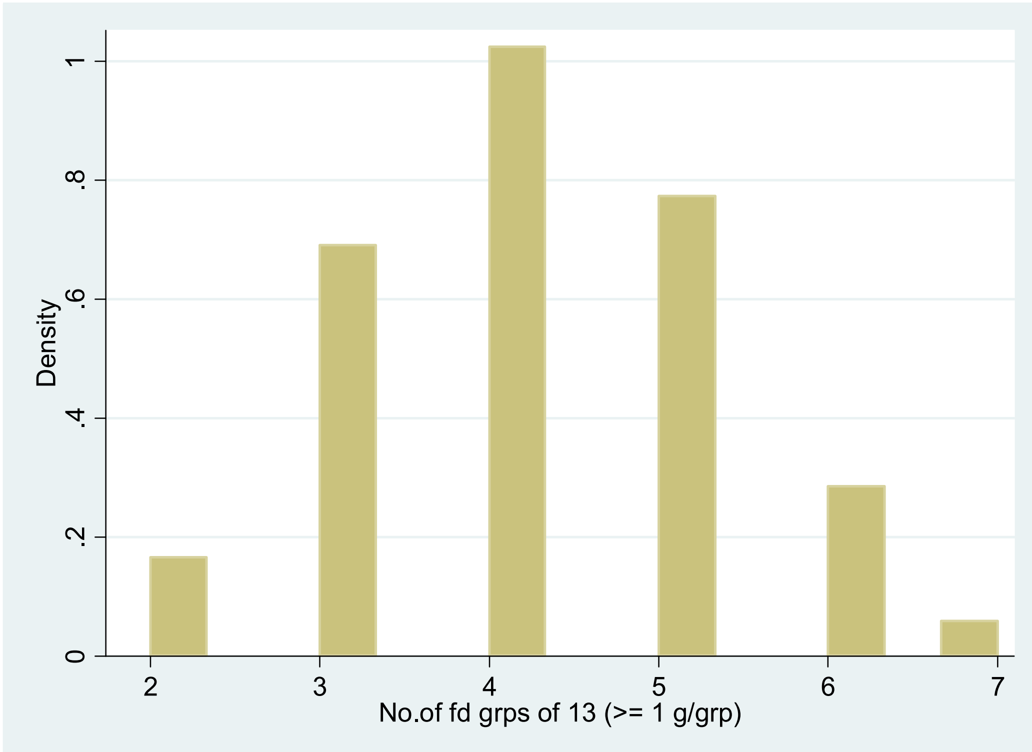


Figure L28. Distribution of Scores for FGI-13R, Lactating Women

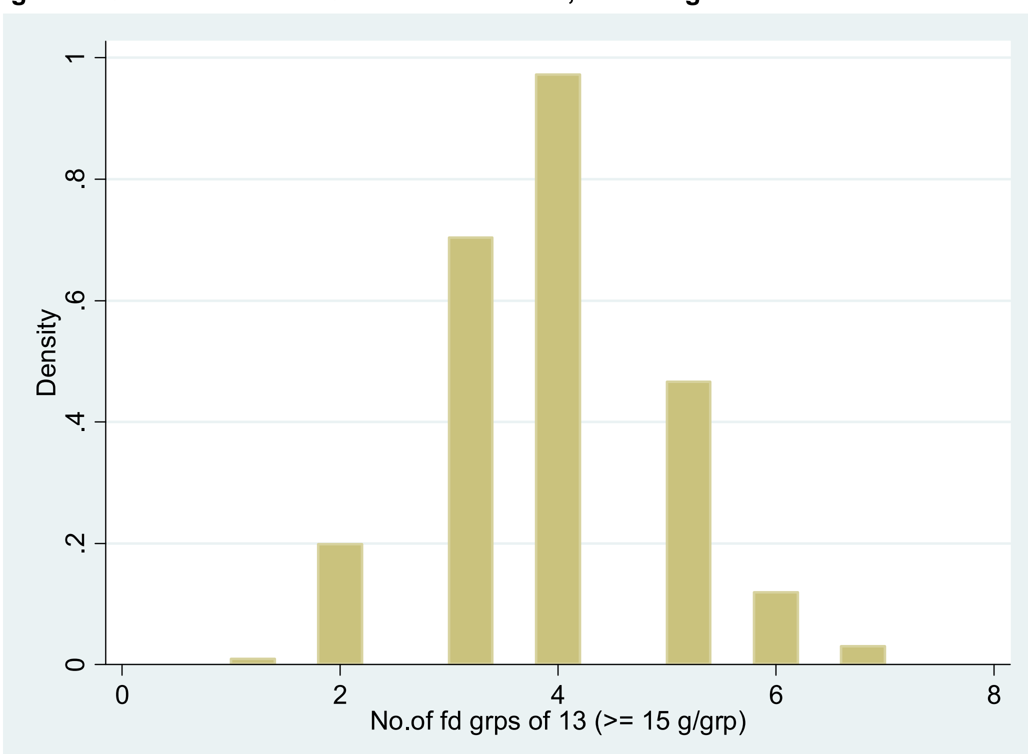


Figure L29. Distribution of Scores for FGI-21, Lactating Women

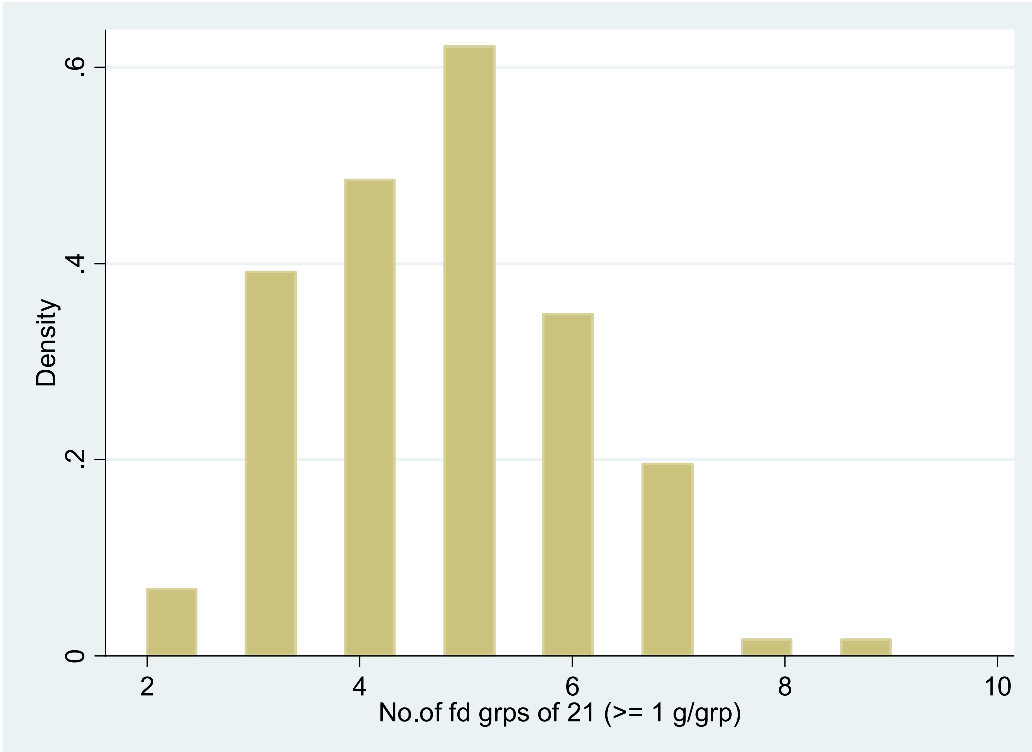


Figure L30. Distribution of Scores for FGI-21R, Lactating Women

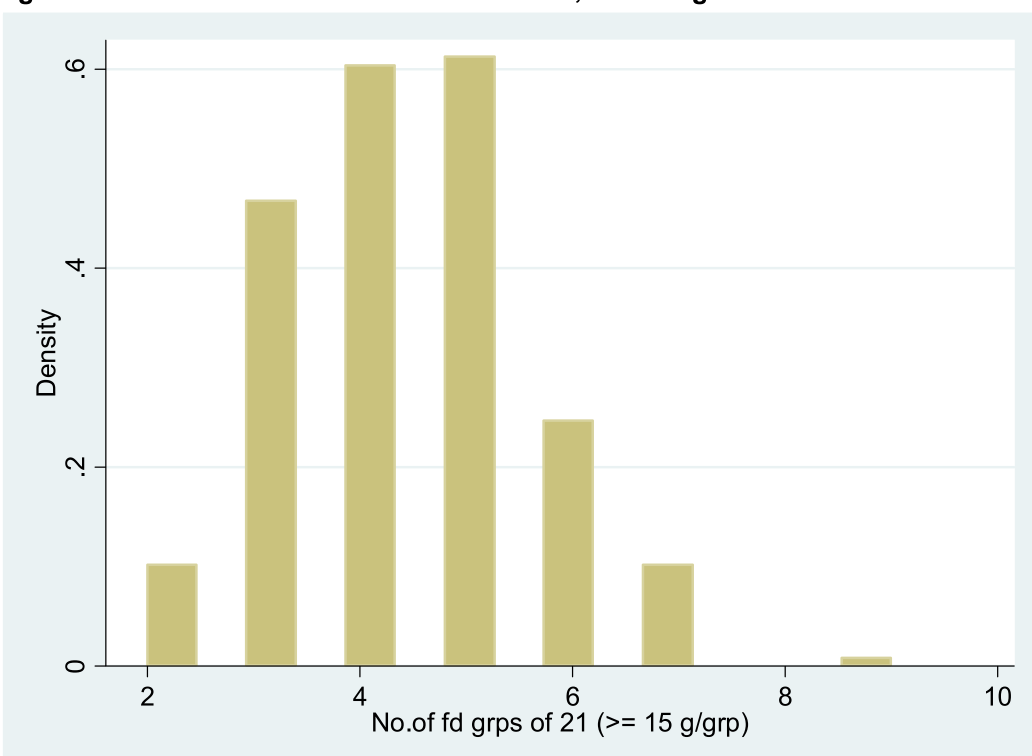


Table L6. Percent of Observation Days at Each Food Group Diversity Score, Lactating Women, R1

Number of food groups eaten	FGI-6	FGI-6R	FGI-9	FGI-9R	FGI-13	FGI-13R	FGI-21	FGI-21R
1	0	0	0	0	0	0	0	0
2	10	14	6	8	6	8	3	5
3	35	39	28	31	23	28	18	22
4	44	39	43	44	34	39	23	28
5	11	8	22	15	26	19	29	29
6	0	0	0	0	10	5	16	12
7			0	0	2	1	9	5
8			0	0	0	0	1	0
9			0	0	0	0	1	0
10					0	0	0	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 L31. Distribution of PA for Thiamin, Lactating Women

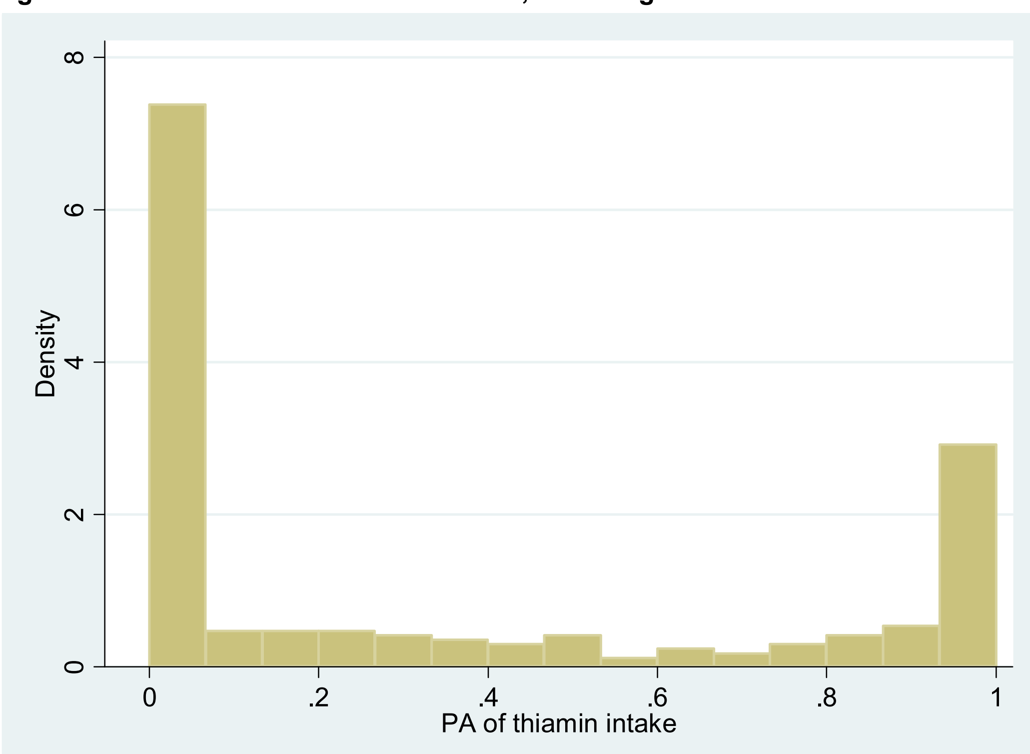


Figure L32. Distribution of PA for Riboflavin, Lactating Women

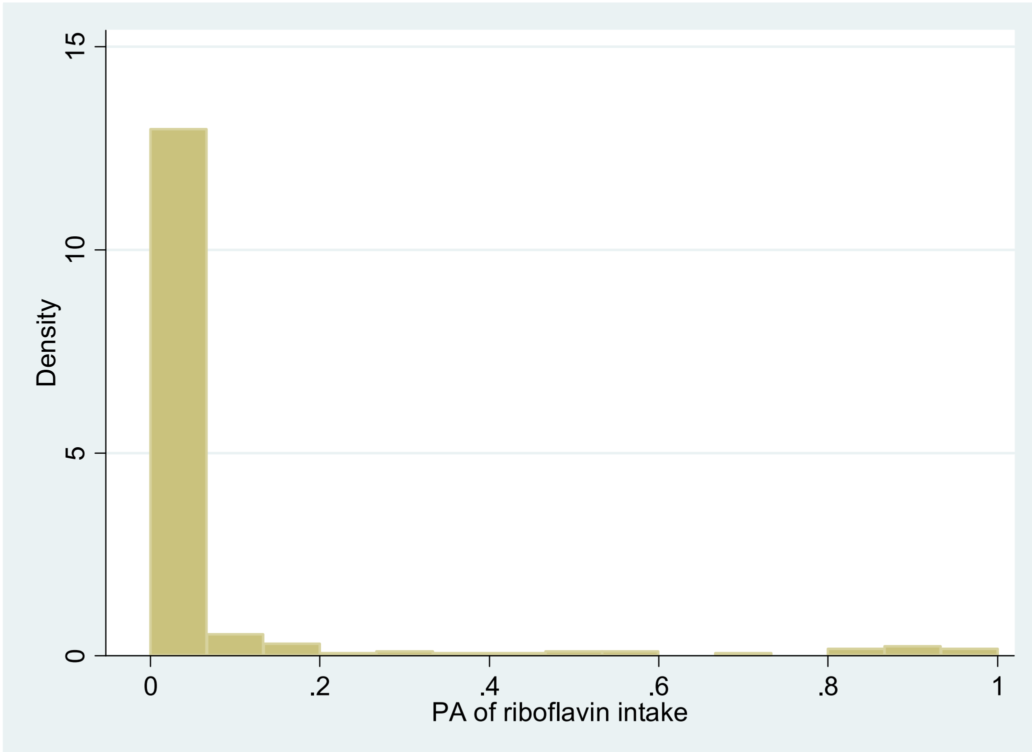


Figure L33. Distribution of PA for Niacin, Lactating Women

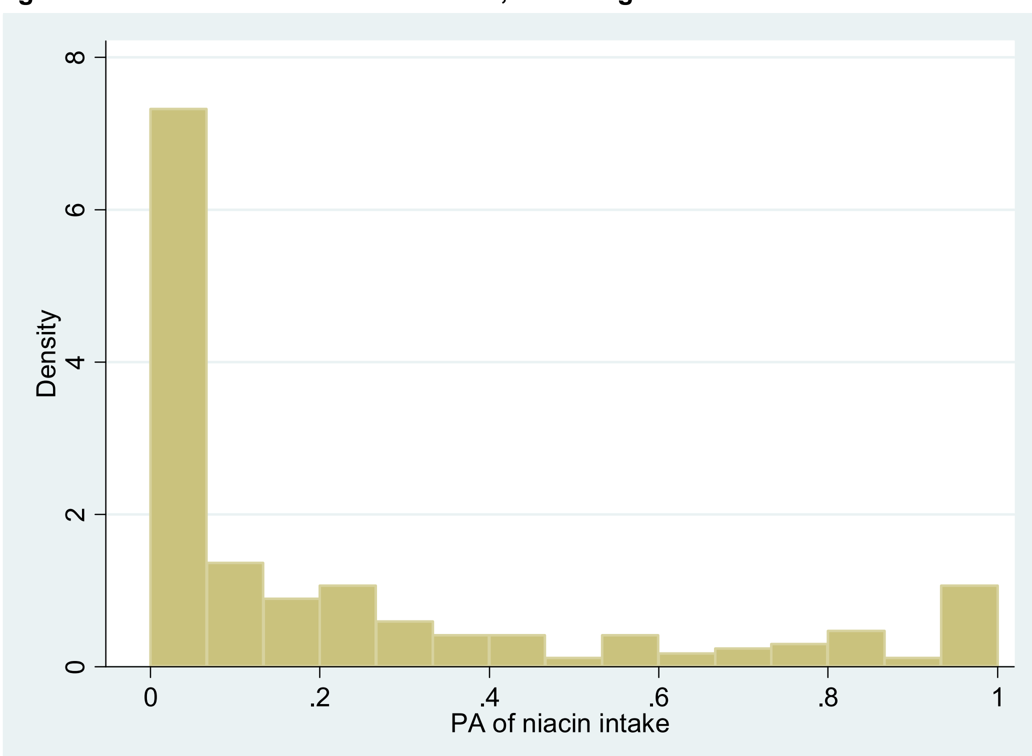


Figure L34. Distribution of PA for Vitamin B6, Lactating Women

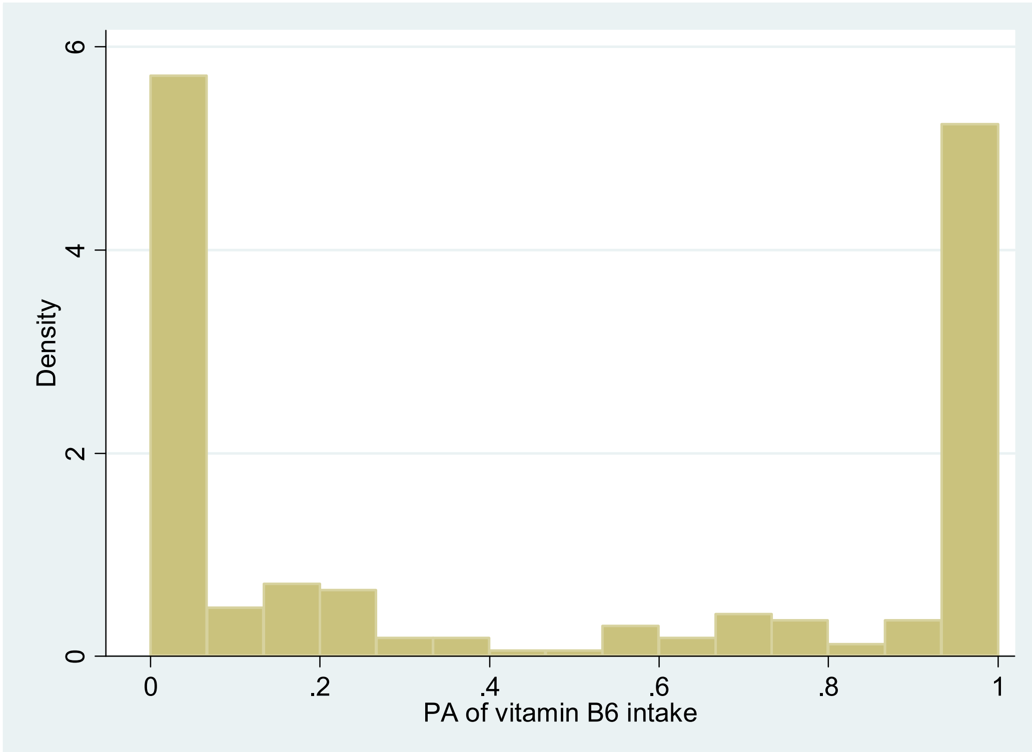


Figure L35. Distribution of PA for Folate, Lactating Women

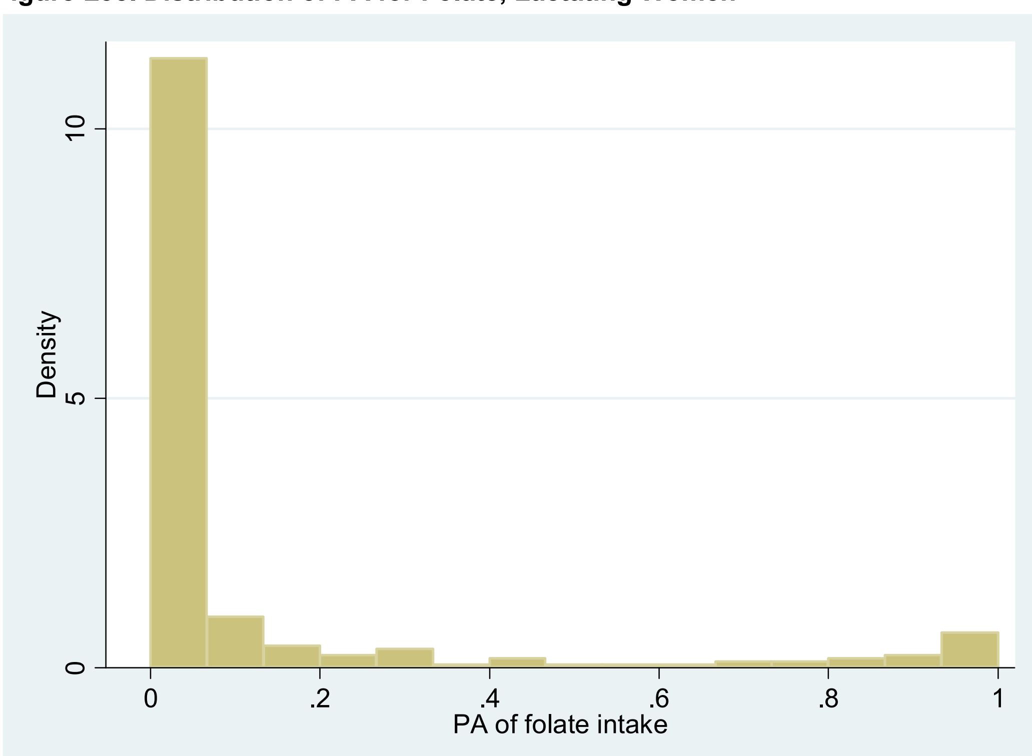


Figure L36. Distribution of PA for Vitamin B12, Lactating Women

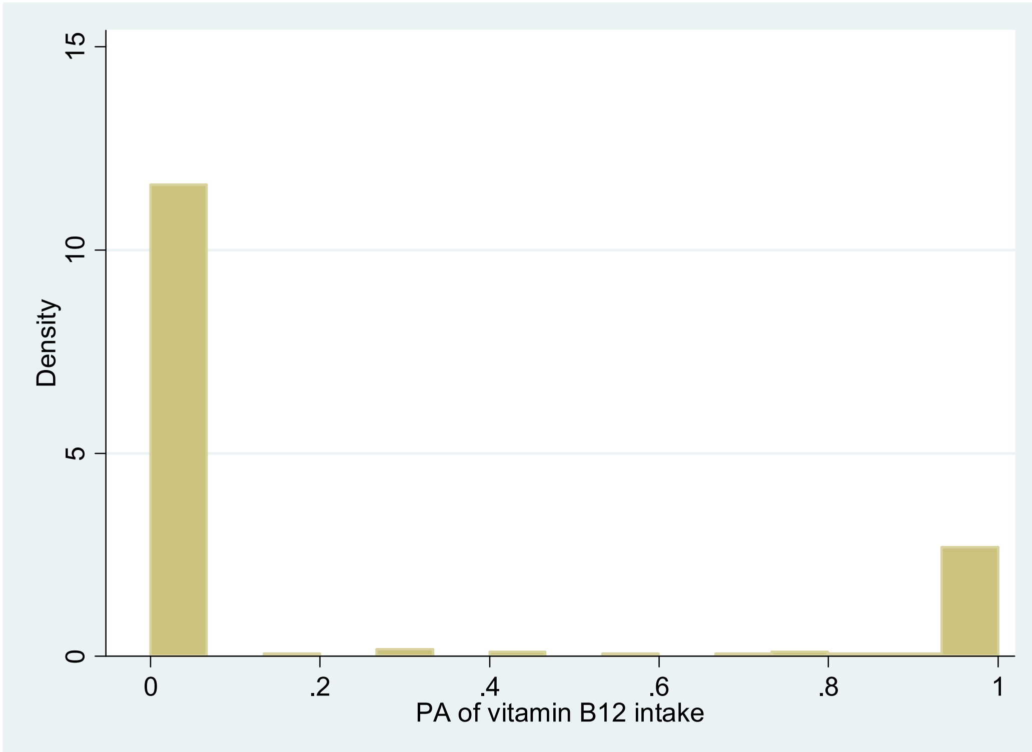


Figure L37. Distribution of PA for Vitamin C, Lactating Women

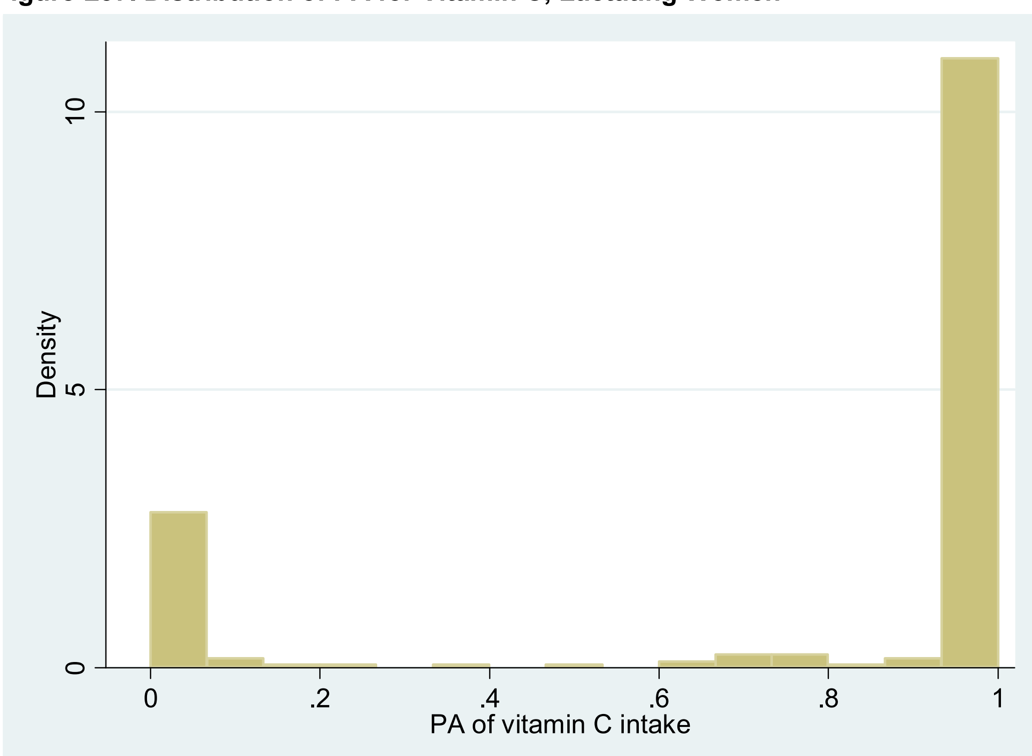


Figure L38. Distribution of PA for Vitamin A, Lactating Women

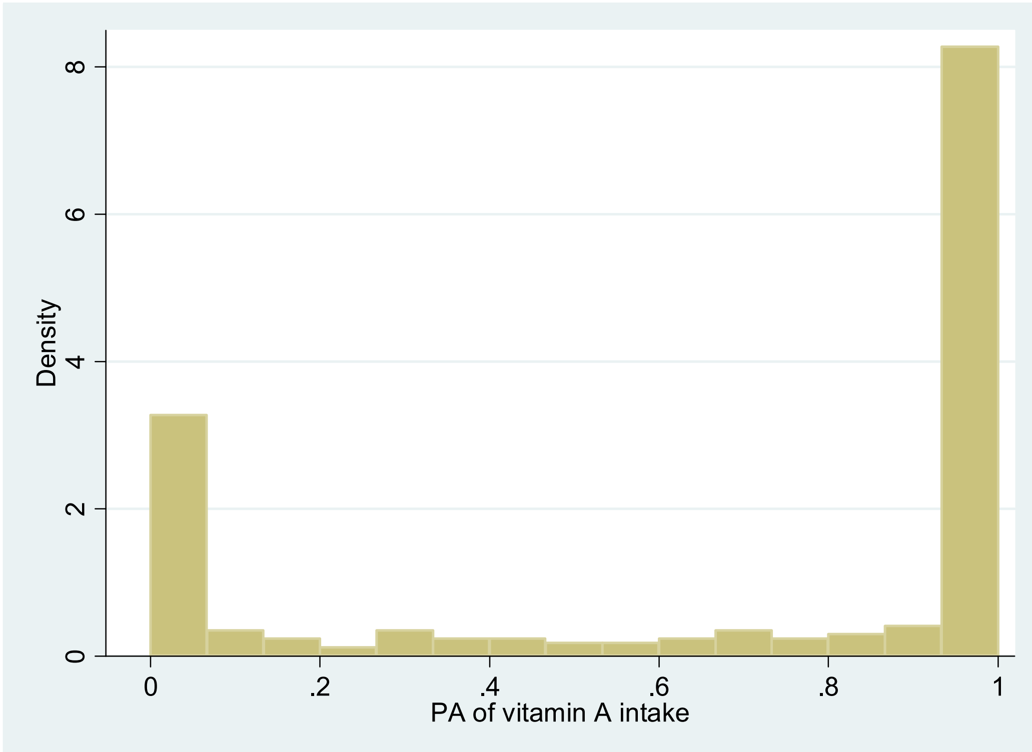


Figure L39. Distribution of PA for Calcium, Lactating Women

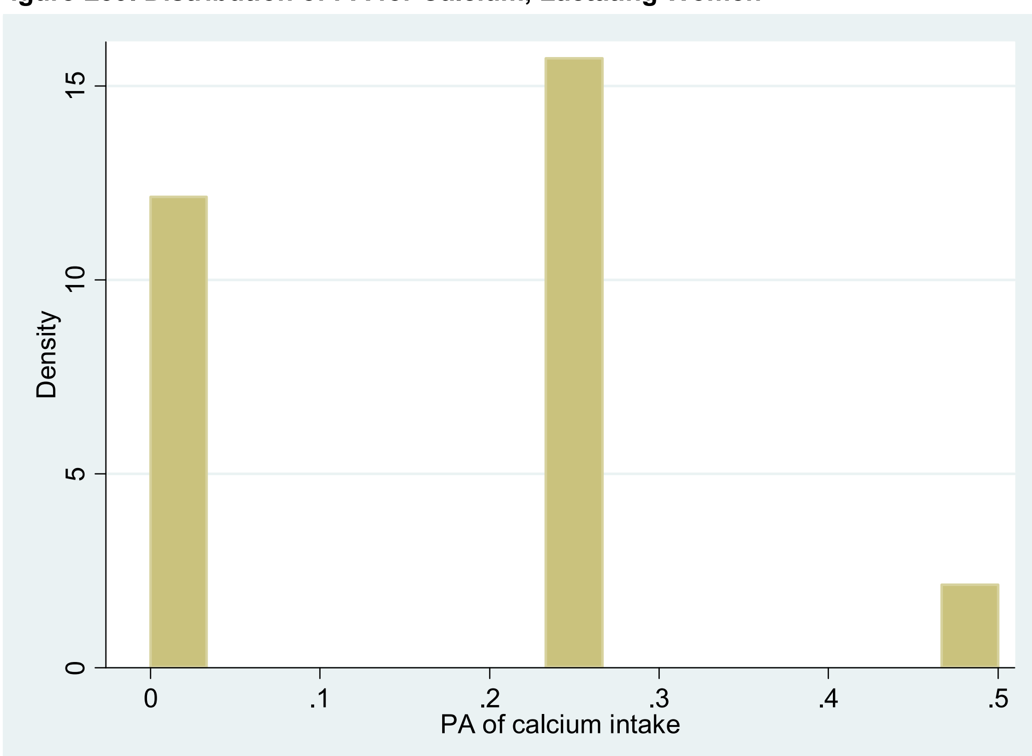


Figure L40. Distribution of PA for Iron, Lactating Women

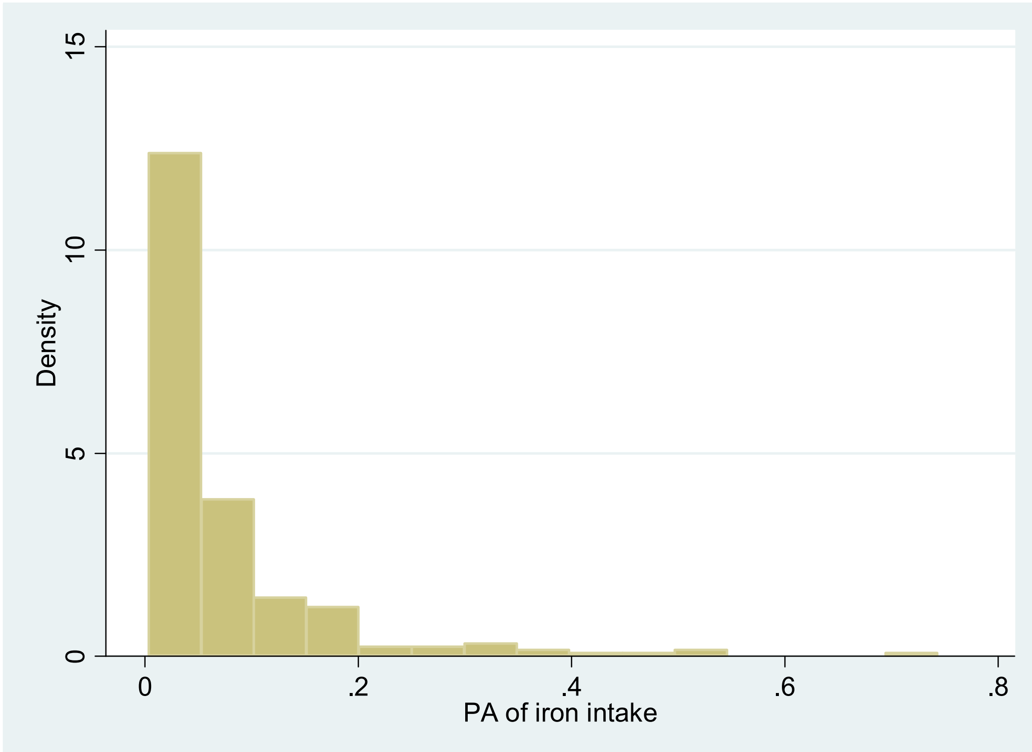


Figure L41. Distribution of PA for Zinc, Lactating Women

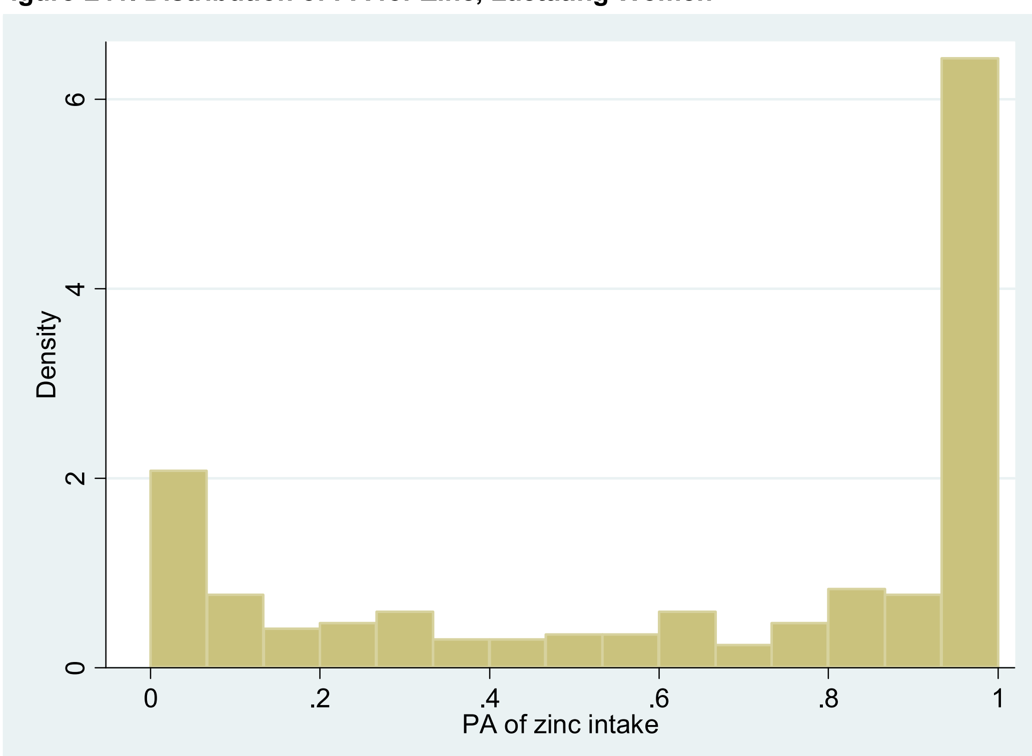
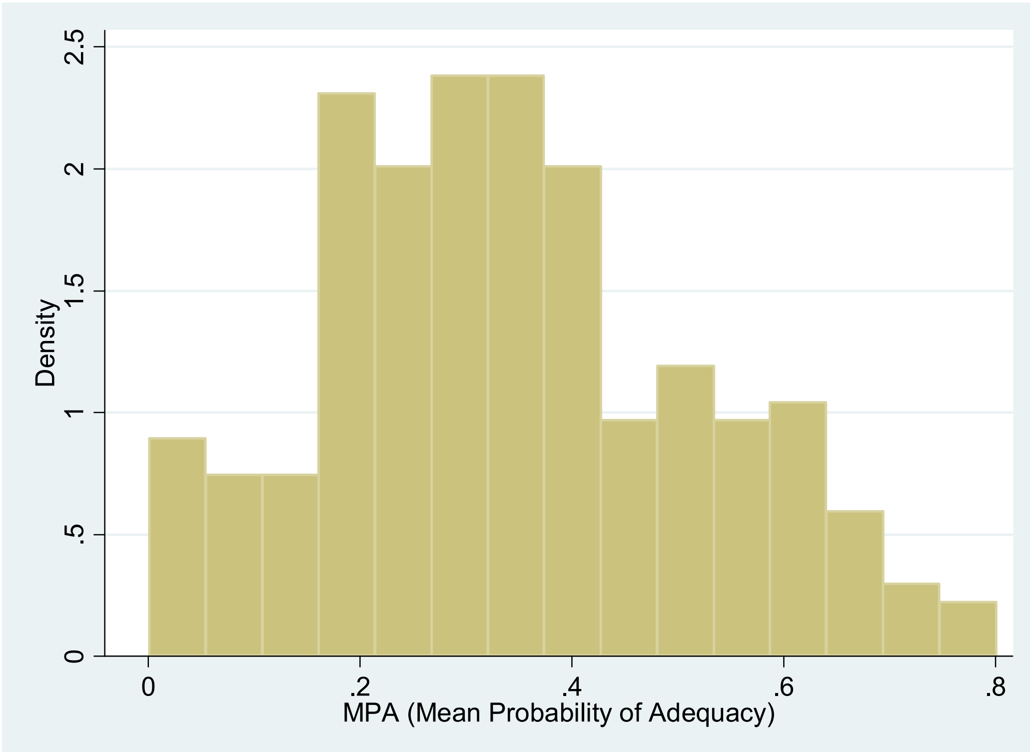


Figure L42. Distribution of MPA across 11 Micronutrients, Lactating Women



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

Table N1. Description of Sample, NPNL Women, R1

	n	Mean	SD	Median	Range
Age (year)	79	30.3	7.0	29.0	15.0-49.0
Height (cm)	103	153.8	6.7	154.3	137.8-168.2
Weight (kg)	103	50.3	8.5	49.6	33.7-71.9
BMI	103	21.2	2.9	21.1	16.2-30.9
% Literate	103	18.4			
% Lactating	103	0.0			
% Pregnant	103	0.0			
	n	**Percent**			
BMI <16	0	0.0			
BMI 16-16.9	3	2.9			
BMI 17-18.49	9	8.7			
BMI 18.5-24.9	84	81.6			
BMI 25-29.9	6	5.8			
BMI ≥ 30	1	1.0			

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

	Mean	SD	Median	Range	Percent of kcal
Energy (kcal)	2,117.9	557.9	2,085.9	852.2-3,579.3	
Protein (g)	60.9	21.9	59.6	9.6-191.9	11
Animal source (g)	10.8	23.2	0.0	0.0-152.4	2
Plant source (g)	50.1	25.6	46.9	5.3-116.0	9
Total carbohydrate (g)	455.5	151.9	446.2	175.1-828.7	82
Total fat (g)	16.6	15.2	11.2	2.9-99.2	7

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	54	53
All dairy	0	0
Other animal source foods	46	41
Vitamin A-rich fruits and vegetables [a]	85	85
Other fruits and vegetables	65	52

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100 g raw, taking into account retention factors.

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	54	53
All dairy	0	0
Organ meat	0	0
Eggs	2	2
Flesh foods and other miscellaneous small animal protein	44	39
Vitamin A-rich dark green leafy vegetables [a]	42	42
Other vitamin A-rich vegetables and fruits [a]	75	75
Other fruits and vegetables	65	52

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100 g raw, taking into account retention factors.

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	54	53
All dairy	0	0
Organ meat	0	0
Eggs	2	2
Small fish eaten whole with bones	18	14
All other flesh foods and miscellaneous small animal protein	32	28
Vitamin A-rich dark green leafy vegetables [a]	42	42
Vitamin A-rich deep yellow/orange/red vegetables [a]	2	2
Vitamin C-rich vegetables [b]	36	26
Vitamin A-rich fruits [a]	75	75
Vitamin C-rich fruits [b]	8	8
All other fruits and vegetables	53	37

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100 g raw, taking into account retention factors.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g raw, taking into account retention factors.

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

	≥ 1 g	≥ 15 g
Grains and grain products	87	87
All other starchy staples	48	48
Cooked dry beans and peas	48	48
Soybeans and soy products	1	1
Nuts and seeds	14	13
Milk/yogurt	0	0
Cheese	0	0
Beef, pork, veal, lamb, goat, game meat	2	1
Organ meat	0	0
Chicken, duck, turkey, pigeon, guinea hen, game birds	6	6
Large whole fish/dried fish/shellfish and other seafood	20	17
Small fish eaten whole with bones	18	14
Insects, grubs, snakes, rodents and other small animal	6	6
Eggs	2	2
Vitamin A-rich dark green leafy vegetables [a]	42	42
Vitamin A-rich deep yellow/orange/red vegetables [a]	2	2
Vitamin C-rich vegetables [b]	36	26
All other vegetables	50	30
Vitamin A-rich fruits [a]	75	75
Vitamin C-rich fruits [b]	8	8
All other fruits	12	12

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100 g raw, taking into account retention factors.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g raw, taking into account retention factors.

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

Food group	All (n = 103)					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	1,243.6	1,374.3	1,158.0	1,244.6	100	1,243.6	1,374.3	1,158.0	1,244.6
All legumes and nuts	194.4	269.3	33.6	120.4	54	357.5	495.4	314.1	433.3
All dairy	0.0	0.0	0.0	0.0	0	–	–	–	–
Other animal source foods	39.9	74.6	0.0	0.0	46	87.4	163.5	56.9	129.1
Vitamin A-rich fruits and vegetables [a]	490.8	282.0	411.5	222.0	85	581.0	333.8	473.4	272.0
Other fruits and vegetables	138.9	62.9	16.9	7.2	65	213.6	96.8	149.0	37.3

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100 g raw, taking into account retention factors.

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

Food group	All (n = 103)					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	1,243.6	1,374.3	1,158.0	1,244.6	100	1,243.6	1,374.3	1,158.0	1,244.6
All legumes and nuts	194.4	269.3	33.6	120.4	54	357.5	495.4	314.1	433.3
All dairy	0.0	0.0	0.0	0.0	0	–	–	–	–
Organ meat	0.0	0.0	0.0	0.0	0	–	–	–	–
Eggs	2.3	4.0	0.0	0.0	2	116.2	207.0	116.2	207.0
Flesh foods and other miscellaneous small animal protein	37.6	70.6	0.0	0.0	44	86.1	161.5	56.5	123.7
Vitamin A-rich dark green leafy vegetables [a]	70.3	12.4	0.0	0.0	42	168.3	29.8	112.9	20.9
Other vitamin A-rich vegetables and fruits [a]	420.5	269.5	315.6	205.1	75	562.5	360.5	473.4	300.8
Other fruits and vegetables	138.9	62.9	16.9	7.2	65	213.6	96.8	149.0	37.3

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100 g raw, taking into account retention factors.

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 = 103)					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	1,243.6	1,374.3	1,158.0	1,244.6	100	1,243.6	1,374.3	1,158.0	1,244.6
All legumes and nuts	194.4	269.3	33.6	120.4	54	357.5	495.4	314.1	433.3
All dairy	0.0	0.0	0.0	0.0	0	–	–	–	–
Organ meat	0.0	0.0	0.0	0.0	0	–	–	–	–
Eggs	2.3	4.0	0.0	0.0	2	116.2	207.0	116.2	207.0
Small fish eaten whole with bones	8.6	17.4	0.0	0.0	18	49.3	99.4	42.8	105.4
All other flesh foods and miscellaneous small animal protein	29.0	53.2	0.0	0.0	32	90.5	166.1	56.9	107.8
Vitamin A-rich dark green leafy vegetables [a]	70.3	12.4	0.0	0.0	42	168.3	29.8	112.9	20.9
Vitamin A-rich deep yellow/orange/red vegetables [a]	3.6	4.3	0.0	0.0	2	185.9	220.6	185.9	220.6
Vitamin C-rich vegetables [b]	25.5	6.0	0.0	0.0	36	70.9	16.8	42.8	11.5
Vitamin A-rich fruits [a]	416.9	265.2	315.6	205.1	75	557.7	354.8	462.8	285.5
Vitamin C-rich fruits [b]	28.3	27.7	0.0	0.0	8	364.0	357.0	196.0	192.3
All other fruits and vegetables	85.2	29.2	2.6	1.3	53	159.6	54.6	87.5	24.9

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100 g raw, taking into account retention factors.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g raw, taking into account retention factors.

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

	All (n = 103)					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	974.4	1,039.1	1,038.0	1,121.3	87	1,115.2	1,189.1	1,087.6	1,155.4
All other starchy staples	269.2	335.2	0.0	0.0	48	565.9	704.7	276.1	389.4
Cooked dry beans and peas	183.6	227.3	0.0	0.0	48	385.9	477.9	359.5	422.9
Soybeans and soy products	1.6	3.1	0.0	0.0	1	162.6	323.7	162.6	323.7
Nuts and seeds	9.2	38.8	0.0	0.0	14	67.9	285.8	34.5	136.5
Milk/yogurt	0.0	0.0	0.0	0.0	0	–	–	–	–
Cheese	0.0	0.0	0.0	0.0	0	–	–	–	–
Beef, pork, veal, lamb, goat, game meat	2.0	5.2	0.0	0.0	2	105.0	269.5	105.0	269.5
Organ meat	0.0	0.0	0.0	0.0	0	–	–	–	–
Chicken, duck, turkey, pigeon, guinea hen, game birds	5.0	14.1	0.0	0.0	6	86.1	242.6	81.6	232.6
Large whole fish/dried fish/shellfish and other seafood	17.4	27.0	0.0	0.0	20	85.3	132.3	56.5	101.4
Small fish eaten whole with bones	8.6	17.4	0.0	0.0	18	49.3	99.4	42.8	105.4
Insects, grubs, snakes, rodents and other small animal	4.6	6.9	0.0	0.0	6	78.1	117.9	71.3	115.9
Eggs	2.3	4.0	0.0	0.0	2	116.2	207.0	116.2	207.0
Vitamin A-rich dark green leafy vegetables [a]	70.3	12.4	0.0	0.0	42	168.3	29.8	112.9	20.9
Vitamin A-rich deep yellow/orange/red vegetables [a]	3.6	4.3	0.0	0.0	2	185.9	220.6	185.9	220.6
Vitamin C-rich vegetables [b]	25.5	6.0	0.0	0.0	36	70.9	16.8	42.8	11.5
All other vegetables	66.4	13.5	0.0	0.0	50	134.2	27.3	32.7	12.6
Vitamin A-rich fruits [a]	416.9	265.2	315.6	205.1	75	557.7	354.8	462.8	285.5
Vitamin C-rich fruits [b]	28.3	27.7	0.0	0.0	8	364.0	357.0	196.0	192.3
All other fruits	18.7	15.7	0.0	0.0	12	160.9	134.4	158.6	128.7

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100 g raw, taking into account retention factors.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g raw, taking into account retention factors.

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	3.5	0.9	4.0	2-5
FGI-6R [a]	6 major food groups	3.3	0.8	3.0	2-5
FGI-9	9 food subgroups	3.8	0.8	4.0	2-6
FGI-9R [a]	9 food subgroups	3.6	0.7	4.0	2-6
FGI-13	13 food subgroups	4.2	1.1	4.0	2-8
FGI-13R [a]	13 food subgroups	3.9	1.0	4.0	2-7
FGI-21	21 food subgroups	4.7	1.3	5.0	2-9
FGI-21R [a]	21 food subgroups	4.3	1.2	4.0	2-8

[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	0	0	0	0	0	0	0
2	9	10	5	6	5	7	3	4
3	40	55	29	36	23	28	18	22
4	45	30	47	50	31	44	26	30
5	7	5	18	8	29	16	24	30
6	0	0	1	1	11	5	18	7
7			0	0	0	1	8	6
8			0	0	1	0	2	1
9			0	0	0	0	1	0
10					0	0	0	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)	9 (9)	40 (41)	45 (46)	7 (7)	0 (0)
Food groups	**Percent of observation days on which each food group was consumed**					
All starchy staples	–	100	100	100	100	–
All legumes and nuts	–	22	46	61	100	–
All dairy	–	0	0	0	0	–
Other animal source foods	–	22	29	57	100	–
Vitamin A-rich fruits and vegetables [a]	–	44	83	91	100	–
Other fruits and vegetables	–	11	42	91	100	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100 g raw, taking into account retention factors.

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	0 (0)	10 (10)	55 (57)	30 (31)	5 (5)	0 (0)
Food groups	**Percent of observation days on which each food group was consumed**					
All starchy staples	–	100	100	100	100	–
All legumes and nuts	–	20	44	74	100	–
All dairy	–	0	0	0	0	–
Other animal source foods	–	20	37	45	100	–
Vitamin A-rich fruits and vegetables [a]	–	50	86	90	100	–
Other fruits and vegetables	–	10	33	90	100	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100 g raw, taking into account retention factors.

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)	5 (5)	29 (30)	47 (48)	18 (19)	1 (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	–	–	–
All legumes and nuts	–	40	50	54	63	100	–	–	–
All dairy	–	0	0	0	0	0	–	–	–
Organ meat	–	0	0	0	0	0	–	–	–
Eggs	–	20	0	2	0	0	–	–	–
Flesh foods and other miscellaneous small animal protein	–	20	27	42	79	100	–	–	–
Vitamin A-rich dark green leafy vegetables [a]	–	0	27	42	74	100	–	–	–
Other vitamin A-rich vegetables and fruits [a]	–	0	63	81	95	100	–	–	–
Other fruits and vegetables	–	20	33	79	90	100	–	–	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100 g raw, taking into account retention factors.

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	0 (0)	6 (6)	36 (37)	50 (51)	8 (8)	1 (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	–	–	–
All legumes and nuts	–	33	49	53	88	100	–	–	–
All dairy	–	0	0	0	0	0	–	–	–
Organ meat	–	0	0	0	0	0	–	–	–
Eggs	–	17	0	2	0	0	–	–	–
Flesh foods and other miscellaneous small animal protein	–	17	30	43	63	100	–	–	–
Vitamin A-rich dark green leafy vegetables [a]	–	0	22	57	63	100	–	–	–
Other vitamin A-rich vegetables and fruits [a]	–	17	68	84	88	100	–	–	–
Other fruits and vegetables	–	17	32	61	100	100	–	–	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100 g raw, taking into account retention factors.

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)	5 (5)	23 (24)	31 (32)	29 (30)	11 (11)	0 (0)	1 (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	–	–	–	–	–
All legumes and nuts	–	40	54	50	53	73	–	100	–	–	–	–	–
All dairy	–	0	0	0	0	0	–	0	–	–	–	–	–
Organ meat	–	0	0	0	0	0	–	0	–	–	–	–	–
Eggs	–	20	0	0	3	0	–	0	–	–	–	–	–
Small fish eaten whole with bones	–	20	4	9	27	46	–	0	–	–	–	–	–
All other flesh foods and miscellaneous small animal protein	–	0	21	34	30	64	–	100	–	–	–	–	–
Vitamin A-rich dark green leafy vegetables [a]	–	0	33	44	50	46	–	100	–	–	–	–	–
Vitamin A-rich deep yellow/orange/red vegetables [a]	–	0	0	0	0	9	–	100	–	–	–	–	–
Vitamin C-rich vegetables [b]	–	20	0	25	63	82	–	0	–	–	–	–	–
Vitamin A-rich fruits [a]	–	0	67	81	80	91	–	100	–	–	–	–	–
Vitamin C-rich fruits [b]	–	0	4	6	7	18	–	100	–	–	–	–	–
All other fruits and vegetables	–	0	17	50	87	73	–	100	–	–	–	–	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100 g raw, taking into account retention factors.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g raw, taking into account retention factors.

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	0 (0)	7 (7)	28 (29)	44 (45)	16 (16)	5 (5)	1 (1)	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	–	–	–	–	–	–
All legumes and nuts	–	43	55	44	63	100	100	–	–	–	–	–	–
All dairy	–	0	0	0	0	0	0	–	–	–	–	–	–
Organ meat	–	0	0	0	0	0	0	–	–	–	–	–	–
Eggs	–	14	0	0	6	0	0	–	–	–	–	–	–
Small fish eaten whole with bones	–	14	3	16	25	20	0	–	–	–	–	–	–
All other flesh foods and miscellaneous small animal protein	–	0	24	38	6	60	100	–	–	–	–	–	–
Vitamin A-rich dark green leafy vegetables [a]	–	0	28	56	44	40	100	–	–	–	–	–	–
Vitamin A-rich deep yellow/orange/red vegetables [a]	–	0	0	0	0	20	100	–	–	–	–	–	–
Vitamin C-rich vegetables [b]	–	14	3	18	81	80	0	–	–	–	–	–	–
Vitamin A-rich fruits [a]	–	14	69	87	75	80	100	–	–	–	–	–	–
Vitamin C-rich fruits [b]	–	0	3	7	6	40	100	–	–	–	–	–	–
All other fruits and vegetables	–	0	14	36	94	60	0	–	–	–	–	–	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100 g raw, taking into account retention factors.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g raw, taking into account retention factors.

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)	3 (3)	18 (18)	26 (27)	24 (25)	18 (19)	8 (8)	2 (2)	1 (1)	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	–	67	89	74	88	100	100	100	100	–	–	–	–	–	–	–	–	–	–	–	–
All other starchy staples	–	33	22	52	52	53	75	50	0	–	–	–	–	–	–	–	–	–	–	–	–
Cooked dry beans and peas	–	67	39	41	44	47	88	100	0	–	–	–	–	–	–	–	–	–	–	–	–
Soybeans and soy products	–	0	0	0	0	5	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Nuts and seeds	–	0	0	7	20	16	25	50	100	–	–	–	–	–	–	–	–	–	–	–	–
Milk/yogurt	–	0	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Cheese	–	0	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Beef, pork, veal, lamb, goat, game meat	–	0	6	0	0	0	13	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Organ meat	–	0	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Chicken, duck, turkey, pigeon, guinea hen, game birds	–	0	6	4	4	0	25	0	100	–	–	–	–	–	–	–	–	–	–	–	–
Large whole fish/dried fish/shellfish and other seafood	–	0	6	19	32	26	13	0	100	–	–	–	–	–	–	–	–	–	–	–	–
Small fish eaten whole with bones	–	0	11	7	28	21	38	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Insects, grubs, snakes, rodents and other small animal	–	0	6	4	4	0	38	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Eggs	–	33	0	0	4	0	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin A-rich dark green leafy vegetables [a]	–	0	33	41	40	58	25	100	100	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin A-rich deep yellow/orange/red vegetables [a]	–	0	0	0	0	0	13	0	100	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin C-rich vegetables [b]	–	0	6	26	28	68	88	100	0	–	–	–	–	–	–	–	–	–	–	–	–
All other vegetables	–	0	11	37	60	84	63	100	100	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin A-rich fruits [a]	–	0	67	74	80	84	75	100	100	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin C-rich fruits [b]	–	0	0	7	8	5	25	0	100	–	–	–	–	–	–	–	–	–	–	–	–
All other fruits	–	0	0	7	8	32	0	100	0	–	–	–	–	–	–	–	–	–	–	–	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100 g raw, taking into account retention factors.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g raw, taking into account retention factors.

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	0 (0)	4 (4)	22 (23)	30 (31)	30 (31)	7 (7)	6 (6)	1 (1)	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)
Food groups	**Percent of observation days on which each food group was consumed**																				
Grains and grain products	–	50	83	77	100	100	100	100	–	–	–	–	–	–	–	–	–	–	–	–	–
All other starchy staples	–	50	26	48	58	43	67	100	–	–	–	–	–	–	–	–	–	–	–	–	–
Cooked dry beans and peas	–	50	44	36	48	71	83	100	–	–	–	–	–	–	–	–	–	–	–	–	–
Soybeans and soy products	–	0	4	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–	–
Nuts and seeds	–	0	0	10	19	14	50	0	–	–	–	–	–	–	–	–	–	–	–	–	–
Milk/yogurt	–	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–	–
Cheese	–	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–	–
Beef, pork, veal, lamb, goat, game meat	–	0	4	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–	–
Organ meat	–	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–	–
Chicken, duck, turkey, pigeon, guinea hen, game birds	–	0	4	3	7	0	33	0	–	–	–	–	–	–	–	–	–	–	–	–	–
Large whole fish/dried fish/shellfish and other seafood	–	0	13	23	23	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–	–
Small fish eaten whole with bones	–	0	9	13	19	14	17	0	–	–	–	–	–	–	–	–	–	–	–	–	–
Insects, grubs, snakes, rodents and other small animal	–	0	4	3	7	0	33	0	–	–	–	–	–	–	–	–	–	–	–	–	–
Eggs	–	25	0	0	3	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin A-rich dark green leafy vegetables [a]	–	0	26	52	42	57	50	100	–	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin A-rich deep yellow/orange/red vegetables [a]	–	0	0	0	0	0	33	0	–	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin C-rich vegetables [b]	–	0	9	16	32	71	67	100	–	–	–	–	–	–	–	–	–	–	–	–	–
All other vegetables	–	0	9	26	39	71	50	100	–	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin A-rich fruits [a]	–	25	65	81	77	100	67	100	–	–	–	–	–	–	–	–	–	–	–	–	–
Vitamin C-rich fruits [b]	–	0	0	7	10	0	50	0	–	–	–	–	–	–	–	–	–	–	–	–	–
All other fruits	–	0	0	7	16	57	0	100	–	–	–	–	–	–	–	–	–	–	–	–	–

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100 g raw, taking into account retention factors.
[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g raw, taking into account retention factors.

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	2,118	558	2,086					
Protein (All Sources) (% of kcal)	11	4	11					
Protein from animal sources (% of kcal)	2	4	0					
Total carbohydrate (% of kcal)	82	10	81					
Total fat (% of kcal)	7	6	5					
Thiamin (mg/d)	1.08	0.42	1.10	0.9	0.09	0.68	0.97	0.388
Riboflavin (mg/d)	0.92	0.41	0.92	0.9	0.09	0.45	0.43	0.095
Niacin (mg/d)	11.73	4.43	10.79	11.0	1.6	0.49	0.54	-0.215
Vitamin B6 (mg/d)	2.23	1.29	1.90	1.1	0.11	0.90	1.00	0.003
Folate (µg/d)	326.65	175.88	309.96	320	32	0.45	0.23	0.331
Vitamin B12 (µg/d)	1.87	3.55	0.02	2.0	0.2	0.26	0.00	–
Vitamin C (mg/d)	162.05	173.24	128.51	38	3.8	0.90	1.00	0.411
Vitamin A (RE/d)	945.24	1,048.58	792.48	270	54	0.86	1.00	0.398
Calcium (mg/d)	336.62	185.48	304.94	1,000 [d]	[d]	0.18	0.25	0.196
Iron (mg/d)	12.16	5.48	10.83	See Table A6-2		0.01	0.00	0.168
Zinc (mg/d)	9.31	3.72	9.35	7	0.88	0.76	1.00	0.410
MPA across 11 micronutrients	0.54	0.17	0.58					

[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.

[c] This documents the transformation parameters selected for each nutrient. The power transformations result in approximately normal distributions. For vitamin B12, more than half of the women had zero vitamin B12 intake in R1. As a result, it was not possible to obtain a satisfactory transformation.

[d] There is no EAR and no SD for calcium; 1,000 mg is the Adequate Intake (AI) value for NPNL 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	65.8	47.2	71.6	34.9	44.5	28.2	41.2	42.0	30.3	0.0	13.9	4.7	23.0	46.6	65.7
All legumes and nuts	11.7	22.9	9.1	17.3	18.1	15.2	13.8	8.8	27.3	0.0	0.9	2.8	23.3	24.5	18.8
All dairy	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
Other animal source foods	3.9	16.9	0.0	16.6	5.3	10.0	12.1	5.7	3.2	83.0	0.3	3.6	12.2	6.1	7.8
Vitamin A-rich fruits /vegetables [b]	12.8	7.2	15.0	10.9	23.1	31.0	21.9	32.1	28.9	0.0	69.6	78.6	32.7	14.1	4.2
Other fruits and vegetables	2.9	4.5	3.1	3.5	7.5	12.6	8.1	10.2	9.4	5.7	14.1	10.1	7.4	6.9	2.9

[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). Mushrooms consumed by women in the study site were categorized as other fruits and vegetables and contained some vitamin B12. Fish broth was assigned to "other foods" and contributed about 4 percent of vitamin B12 intakes.
[b] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100 g raw, taking into account retention factors.

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	65.8	47.2	71.6	34.9	44.5	28.2	41.2	42.0	30.3	0.0	13.9	4.7	23.0	46.6	65.7
All legumes and nuts	11.7	22.9	9.1	17.3	18.1	15.2	13.8	8.8	27.3	0.0	0.9	2.8	23.3	24.5	18.8
All dairy	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
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	0.3	0.7	0.0	0.9	0.3	1.2	0.0	0.4	0.7	3.8	0.0	1.0	1.0	0.5	0.4
Flesh foods and other miscellaneous small animal protein	3.7	16.3	0.0	15.7	5.1	8.8	12.0	5.3	2.4	79.2	0.3	2.5	11.2	5.6	7.4
Vitamin A-rich dark green leafy vegetables	0.6	2.5	0.5	0.8	2.5	7.4	2.8	9.1	8.4	0.0	9.8	11.6	17.4	8.7	1.6
Other vitamin A-rich vegetables and fruits [b]	12.1	4.7	14.4	10.1	20.6	23.6	19.1	23.0	20.5	0.0	59.8	67.1	15.2	5.5	2.6
Other fruits and vegetables	2.9	4.5	3.1	3.5	7.5	12.6	8.1	10.2	9.4	5.7	14.1	10.1	7.4	6.9	2.9

[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). Mushrooms consumed by women in the study site were categorized as other fruits and vegetables and contained some vitamin B12. Fish broth was assigned to "other foods" and contributed about 4 percent of vitamin B12 intakes.
[b] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100 g raw, taking into account retention factors.

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	65.8	47.2	71.6	34.9	44.5	28.2	41.2	42.0	30.3	0.0	13.9	4.7	23.0	46.6	65.7
All legumes and nuts	11.7	22.9	9.1	17.3	18.1	15.2	13.8	8.8	27.3	0.0	0.9	2.8	23.3	24.5	18.8
All dairy	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
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	0.3	0.7	0.0	0.9	0.3	1.2	0.0	0.4	0.7	3.8	0.0	1.0	1.0	0.5	0.4
Small fish eaten whole w/bones	1.0	5.1	0.0	5.3	1.0	3.0	3.9	1.7	0.8	26.5	0.1	1.1	6.6	1.5	1.9
All other flesh foods misc. small animal protein	2.7	11.2	0.0	10.4	4.1	5.9	8.1	3.7	1.6	52.7	0.2	1.5	4.6	4.1	5.5
Vitamin A-rich dark green leafy vegetables [b]	0.6	2.5	0.5	0.8	2.5	7.4	2.8	9.1	8.4	0.0	9.8	11.6	17.4	8.7	1.6
Vitamin A-rich deep yellow/orange/red vegetables [b]	0.2	0.1	0.3	0.0	0.3	0.4	0.2	0.6	0.1	0.0	0.1	1.4	0.5	0.2	0.1
Vitamin C-rich vegetables [c]	0.3	0.7	0.3	0.6	1.8	1.3	1.7	1.5	1.7	0.0	5.4	4.8	1.7	1.3	0.6
Vitamin A-rich fruits [b]	12.0	4.6	14.2	10.1	20.3	23.2	18.9	22.4	20.3	0.0	59.7	65.7	14.7	5.3	2.5
Vitamin C-rich fruits [c]	1.3	0.7	1.5	0.9	1.3	2.1	1.6	2.7	1.9	0.0	3.4	1.4	1.0	0.9	0.5
All other fruits and vegetables	1.3	3.1	1.3	1.9	4.3	9.2	4.9	6.0	5.8	5.7	5.3	3.9	4.8	4.7	1.8

[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). Mushrooms consumed by women in the study site were categorized as other fruits and vegetables and contained some vitamin B12. Fish broth was assigned to "other foods" and contributed about 4 percent of vitamin B12 intakes.
[b] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100 g raw, taking into account retention factors.
[c] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g raw, taking into account retention factors.

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	50.8	40.4	55.1	29.9	32.9	18.6	30.4	23.3	19.4	0.0	1.1	0.9	8.6	32.2	52.8
All other starchy staples	15.0	6.8	16.6	5.0	11.7	9.6	10.8	18.7	11.0	0.0	12.8	3.8	14.4	14.4	13.0
Cooked dry beans and peas	10.0	20.3	8.6	8.6	15.3	13.2	10.6	7.3	25.0	0.0	0.9	2.0	21.5	21.7	16.2
Soybeans and soy products	0.2	0.4	0.1	0.4	0.4	0.7	0.3	0.4	0.5	0.0	0.0	0.8	0.6	0.5	0.3
Nuts and seeds	1.6	2.2	0.5	8.3	2.4	1.2	2.9	1.1	1.8	0.0	0.0	0.0	1.2	2.3	2.4
Milk/yogurt	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
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	0.7	0.0	1.0	0.4	0.8	0.7	0.3	0.1	3.8	0.0	0.0	0.4	0.6	0.6
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	0.6	1.9	0.0	2.7	0.5	1.0	1.6	0.6	0.1	8.5	0.0	0.3	0.3	0.8	1.1
Large whole fish/dried fish/shellfish, other seafood	1.4	6.6	0.0	5.7	2.9	3.2	4.3	2.0	1.3	29.4	0.2	1.1	2.8	1.7	2.1
Small fish eaten whole w/bones	1.0	5.1	0.0	5.3	1.0	3.0	3.9	1.7	0.8	26.5	0.1	1.1	6.6	1.5	1.9
Insects, grubs, snakes, rodents and other small animal	0.4	2.0	0.0	1.0	0.4	0.8	1.5	0.7	0.1	11.0	0.0	0.0	1.0	1.0	1.6
Eggs	0.3	0.7	0.0	0.9	0.3	1.2	0.0	0.4	0.7	3.8	0.0	1.0	1.0	0.5	0.4
Vitamin A-rich dark green leafy vegetables [b]	0.6	2.5	0.5	0.8	2.5	7.4	2.8	9.1	8.4	0.0	9.8	11.6	17.4	8.7	1.6
Vitamin A-rich deep yellow/orange/red vegetables [b]	0.2	0.1	0.3	0.0	0.3	0.4	0.2	0.6	0.1	0.0	0.1	1.4	0.5	0.2	0.1
Vitamin C-rich vegetables [c]	0.3	0.7	0.3	0.6	1.8	1.3	1.7	1.5	1.7	0.0	5.4	4.8	1.7	1.3	0.6
All other vegetables	0.7	2.8	0.6	1.5	3.9	8.0	4.0	3.7	5.0	5.7	4.4	3.4	4.4	4.2	1.5
Vitamin A-rich fruits [b]	12.0	4.6	14.2	10.1	20.3	23.2	18.9	22.4	20.3	0.0	59.7	65.7	14.7	5.3	2.5
Vitamin C-rich fruits [c]	1.3	0.7	1.5	0.9	1.3	2.1	1.6	2.7	1.9	0.0	3.4	1.4	1.0	0.9	0.5
All other fruits	0.7	0.3	0.8	0.5	0.4	1.2	0.9	2.3	0.8	0.0	0.9	0.5	0.3	0.5	0.3

[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). Mushrooms consumed by women in the study site were categorized as other fruits and vegetables and contained some vitamin B12. Fish broth was assigned to "other foods" and contributed about 4 percent of vitamin B12 intakes.

[a] Vitamin A-rich fruits and vegetables are defined as those with > 120 RE/100 g raw, taking into account retention factors.

[b] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g raw, taking into account retention factors.

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	0.203 *		0.279 **		0.260 **		0.345 ***		0.254 **		0.260 **		0.371 ***		0.389 ***	
Thiamin	0.205 *	0.074	0.331 ***	0.188	0.225 *	0.035	0.354 ***	0.143	0.254 **	0.092	0.344 ***	0.235 *	0.386 ***	0.164	0.477 ***	0.301 **
Riboflavin	0.094	-0.043	0.200 *	0.034	0.137	-0.033	0.244 *	0.040	0.213 *	0.072	0.286 **	0.164	0.258 **	0.037	0.330 ***	0.122
Niacin	0.219 *	0.107	0.295 **	0.143	0.281 **	0.142	0.368 ***	0.185	0.296 **	0.169	0.323 ***	0.203 *	0.396 ***	0.202 *	0.434 ***	0.242 *
Vitamin B6	0.059	-0.095	0.109	-0.095	0.213 *	0.062	0.277 **	0.078	0.220 *	0.077	0.269 **	0.138	0.249 *	0.016	0.299 **	0.070
Folate	0.146	0.003	0.305 **	0.158	0.120	-0.095	0.272 **	0.042	0.168	-0.017	0.283 **	0.145	0.288 **	0.038	0.394 ***	0.181
Vitamin B12	0.111	0.138	0.027	0.062	0.106	0.142	0.031	0.076	0.078	0.111	0.007	0.038	0.049	0.100	0.009	0.059
Vitamin C	0.215 *	0.130	0.216 *	0.087	0.379 ***	0.296 **	0.404 ***	0.281 **	0.382 ***	0.303 **	0.366 ***	0.280 **	0.375 ***	0.230 *	0.364 ***	0.206 *
Vitamin A	0.130	0.042	0.142	0.015	0.373 ***	0.296 **	0.412 ***	0.304 **	0.366 ***	0.290 **	0.393 ***	0.319 **	0.283 **	0.136	0.297 **	0.144
Calcium	0.100	-0.028	0.175	0.011	0.203 *	0.062	0.288 **	0.109	0.184	0.041	0.250 *	0.122	0.241 *	0.025	0.315 **	0.111
Iron	0.083	-0.095	0.239 *	0.056	0.071	-0.177	0.220 *	-0.047	0.066	-0.176	0.179	-0.014	0.198 *	-0.111	0.301 **	0.029
Zinc	0.242 *	0.157	0.376 ***	0.275 **	0.145	-0.005	0.271 **	0.097	0.141	-0.004	0.241 *	0.117	0.290 **	0.102	0.380 ***	0.208 *

[a] Usual intake of energy and individual nutrients are estimated by the BLUP following the method described in Arimond et al., 2007**.** 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	**0.367** ***	**-0.333** ***
All legumes and nuts	0.306 **	0.015
All dairy	–	–
Other animal source foods	0.046	0.110
Vitamin A-rich fruits and vegetables [c]	0.465 ***	0.270 **
Other fruits and vegetables		

[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 > 120 RE/100 g raw, taking into account retention factors.

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	**0.367** ***	**-0.333** ***
All legumes and nuts	0.306 **	0.015
All dairy	–	–
Organ meat	–	–
Eggs	-0.151	-0.130
Flesh foods and other miscellaneous small animal protein	0.081	0.140
Vitamin A-rich dark green leafy vegetables [c]	0.191	0.136
Other vitamin A-rich vegetables and fruits [c]	0.458 ***	0.263 **
Other fruits and vegetables	0.178	0.126

[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 > 120 RE/100 g raw, taking into account retention factors.

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	**0.367** ***	**-0.333** ***
All legumes and nuts	0.306 **	0.015
All dairy	–	–
Organ meat	–	–
Eggs	-0.151	-0.130
Small fish eaten whole with bones	0.022	0.043
All other flesh foods and miscellaneous small animal protein	0.077	0.132
Vitamin A-rich dark green leafy vegetables [c]	0.191	0.136
Vitamin A-rich deep yellow/orange/red vegetables [c]	0.029	0.022
Vitamin C-rich vegetables [d]	0.238 *	0.301 **
Vitamin A-rich fruits [c]	0.455 ***	0.261 **
Vitamin C-rich fruits [d]	0.031	-0.011
All other fruits and vegetables	0.315 **	0.270 **

[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 > 120 RE/100 g raw, taking into account retention factors.
[d] Vitamin C-rich fruits and vegetables are defined as those with >9 mg/100 g raw, taking into account retention factors.

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	0.181	-0.064
All other starchy staples	0.133	-0.139
Cooked dry beans and peas	0.255 **	0.000
Soybeans and soy products	0.079	0.143
Nuts and seeds	0.135	0.000
Milk/yogurt	–	–
Cheese	–	–
Beef, pork, veal, lamb, goat, game meat	-0.024	0.014
Organ meat	–	–
Chicken, duck, turkey, pigeon, guinea hen, game birds	0.057	0.026
Large whole fish/dried fish/shellfish and other seafood	0.089	0.131
Small fish eaten whole with bones	0.022	0.043
Insects, grubs, snakes, rodents and other small animal	-0.027	0.073
Eggs	-0.151	-0.130
Vitamin A-rich dark green leafy vegetables [c]	0.191	0.136
Vitamin A-rich deep yellow/orange/red vegetables [c]	0.029	0.022
Vitamin C-rich vegetables [d]	0.238 *	0.301 **
All other vegetables	0.261 **	0.352 ***
Vitamin A-rich fruits [c]	0.455 ***	0.261 **
Vitamin C-rich fruits [d]	0.031	-0.011
All other fruits	0.209 *	0.098

[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 > 120 RE/100 g raw, taking into account retention factors.

[d] Vitamin C-rich fruits and vegetables are defined as those with > 9 mg/100 g raw, taking into account retention factors.

Table N12. Total Energy Intake (kcal), by Food Group Diversity Scores, NPNL 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	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2	1580	(1056-3151)	1547	(1056-3151)	1513	(1056-2112)	1405	(1056-2112)	1513	(1056-2112)	1513	(1056-2112)	–	–	–	–
3	1966	(926-3515)	1966	(852-3515)	1826	(926-3515)	1862	(852-3515)	1852	(926-3515)	1935	(852-3515)	1836	(926-3151)	1935	(852-3151)
4	2313	(852-3579)	2446	(1515-3579)	2196	(852-3579)	2275	(1148-3579)	1997	(852-3579)	2160	(1097-3579)	1750	(852-3515)	1769	(1097-3515)
5	2445	(1843-3030)	2445	(1843-3030)	2362	(1148-3056)	2516	(1843-3056)	2254	(1097-2783)	2316	(1515-3056)	2191	(1097-3579)	2352	(1148-3579)
6	–	–	–	–	–	–	–	–	2514	(1843-3056)	2514	(1843-3056)	2317	(1148-2783)	2519	(2002-3056)
7					–	–	–	–	–	–	–	–	2480	(1843-3030)	2479	(1843-3030)
8					–	–	–	–	–	–	–	–	–	–	–	–
9					–	–	–	–	–	–	–	–	–	–	–	–
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 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)	
FGI-6	3.5	4.0	2,118	2,086	0.229*
FGI-6R [c]	3.3	3.0	2,118	2,086	0.330***
FGI-9	3.8	4.0	2,118	2,086	0.249*
FGI-9R [c]	3.6	4.0	2,118	2,086	0.355***
FGI-13	4.2	4.0	2,118	2,086	0.247*
FGI-13R [c]	3.9	4.0	2,118	2,086	0.288**
FGI-21	4.7	5.0	2,118	2,086	0.372***
FGI-21R [c]	4.3	4.0	2,118	2,086	0.407***

[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	0.31	(0.10-0.78)	0.30	(0.10-0.78)	0.16	(0.10-0.46)	0.22	(0.10-0.46)	0.16	(0.10-0.46)	0.27	(0.10-0.69)	–	–	–	–
3	0.54	(0.10-0.75)	0.55	(0.09-0.75)	0.50	(0.10-0.78)	0.51	(0.09-0.78)	0.50	(0.10-0.78)	0.49	(0.09-0.78)	0.47	(0.10-0.78)	0.46	(0.09-0.78)
4	0.62	(0.09-0.87)	0.64	(0.33-0.87)	0.64	(0.09-0.87)	0.63	(0.11-0.87)	0.55	(0.09-0.87)	0.59	(0.11-0.87)	0.45	(0.09-0.75)	0.52	(0.11-0.75)
5	0.63	(0.53-0.71)	0.69	(0.57-0.71)	0.63	(0.11-0.75)	0.70	(0.57-0.75)	0.64	(0.11-0.78)	0.68	(0.33-0.78)	0.61	(0.11-0.87)	0.64	(0.33-0.87)
6	–	–	–	–	–	–	–	–	0.69	(0.53-0.75)	0.69	(0.57-0.75)	0.67	(0.39-0.75)	0.71	(0.64-0.75)
7					–	–	–	–	–	–	–	–	0.69	(0.53-0.78)	0.69	(0.57-0.78)
8					–	–	–	–	–	–	–	–	–	–	–	–
9					–	–	–	–	–	–	–	–	–	–	–	–
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 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)		
FGI-6	3.5	4.0	0.54	0.58	0.300 **	0.200 *
FGI-6R [c]	3.3	3.0	0.54	0.58	0.380 ***	0.217 *
FGI-9	3.8	4.0	0.54	0.58	0.340 ***	0.239 *
FGI-9R [c]	3.6	4.0	0.54	0.58	0.431 ***	0.270 **
FGI-13	4.2	4.0	0.54	0.58	0.380 ***	0.301 **
FGI-13R [c]	3.9	4.0	0.54	0.58	0.423 ***	0.324 ***
FGI-21	4.7	5.0	0.54	0.58	0.480 ***	0.329 ***
FGI-21R [c]	4.3	4.0	0.54	0.58	0.529 ***	0.371 ***

[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	-1.315 *	0.555	-1.369 *	0.538	-1.222 *	0.542	-1.242 *	0.512	-1.075 *	0.538	-1.217 *	0.516	-0.975	0.507	-1.086 *	0.478
Woman's height	0.003	0.004	0.003	0.003	0.002	0.004	0.001	0.003	0.002	0.004	0.002	0.003	0.001	0.003	0.001	0.003
Age	0.001	0.003	0.001	0.003	0.002	0.003	0.003	0.003	0.001	0.003	0.002	0.003	0.002	0.003	0.002	0.003
Dietary diversity score	0.077 *	0.031	0.107 ***	0.031	0.087 **	0.028	0.129 ***	0.029	0.068 **	0.020	0.093***	0.022	0.071 ***	0.015	0.092 ***	0.016
Adjusted R^2	0.060		0.121 **		0.102 *		0.197 ***		0.119 **		0.185***		0.223 ***		0.302 ***	
	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	-1.359 **	0.411	-1.374 **	0.410	-1.318 **	0.407	-1.321 **	0.402	-1.243 **	0.405	-1.310 **	0.396	-1.188 **	0.399	-1.231 **	0.387
Woman's height	0.002	0.003	0.002	0.003	0.002	0.003	0.001	0.003	0.001	0.003	0.001	0.003	0.001	0.003	0.001	0.003
Age	-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
Dietary diversity score	0.032	0.023	0.041	0.025	0.039	0.022	0.057 *	0.025	0.034 *	0.015	0.048 **	0.018	0.035 **	0.013	0.050 ***	0.014
Total energy intake [c]	0.225 ***	0.028	0.218 ***	0.029	0.220 ***	0.029	0.206 ***	0.030	0.217 ***	0.028	0.207 ***	0.028	0.201 ***	0.029	0.188 ***	0.029
Adjusted R^2	0.485 ***		0.490 ***		0.494 ***		0.506 ***		0.504 ***		0.520 ***		0.521 ***		0.545 ***	

[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 1000 before running the regressions to take into account the large scale of the energy variable and the small scale of MPA.

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

	Percent (number)	
Women with MPA >50%	61	(63)
Women with MPA >60%	46	(47)
Women with MPA >70%	24	(25)
Women with MPA >80%	1	(1)
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% (first cutoff)		
FGI-6	2.0-5.0	0.677	0.003	0.049	0.581-0.773
FGI-6R [e]	2.0-5.0	0.690	0.001	0.046	0.600-0.780
FGI-9	2.0-6.0	0.685	0.002	0.049	0.588-0.782
FGI-9R [e]	2.0-6.0	0.700	0.001	0.047	0.608-0.793
FGI-13	2.0-8.0	0.710	0.000	0.049	0.615-0.805
FGI-13R [e]	2.0-7.0	0.704	0.001	0.048	0.609-0.798
FGI-21	2.0-9.0	0.768	0.000	0.045	0.680-0.855
FGI-21R [e]	2.0-8.0	0.771	0.000	0.044	0.686-0.856
			MPA > 60% (second cutoff)		
FGI-6	2.0-5.0	0.575	0.193	0.052	0.473-0.676
FGI-6R [e]	2.0-5.0	0.631	0.023	0.049	0.534-0.727
FGI-9	2.0-6.0	0.598	0.087	0.052	0.497-0.700
FGI-9R [e]	2.0-6.0	0.648	0.010	0.049	0.553-0.743
FGI-13	2.0-8.0	0.633	0.020	0.053	0.530-0.736
FGI-13R [e]	2.0-7.0	0.667	0.004	0.050	0.569-0.765
FGI-21	2.0-9.0	0.710	0.000	0.050	0.612-0.808
FGI-21R [e]	2.0-8.0	0.743	0.000	0.047	0.651-0.836
			MPA > 70% (third cutoff)		
FGI-6	2.0-5.0	0.541	0.543	0.060	0.423-0.658
FGI-6R [e]	2.0-5.0	0.556	0.397	0.061	0.438-0.675
FGI-9	2.0-6.0	0.579	0.235	0.059	0.465-0.694
FGI-9R [e]	2.0-6.0	0.598	0.142	0.059	0.483-0.713
FGI-13	2.0-8.0	0.588	0.186	0.063	0.464-0.712
FGI-13R [e]	2.0-7.0	0.631	0.050	0.058	0.518-0.743
FGI-21	2.0-9.0	0.663	0.015	0.063	0.539-0.786
FGI-21R [e]	2.0-8.0	0.703	0.002	0.059	0.587-0.819

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

MPA > 50% (first cutoff)									
		FGI-6	**FGI-6R**	**FGI-9**	**FGI-9R**	**FGI-13**	**FGI-13R**	**FGI-21**	**FGI-21R**
	AUC[c]	0.677	0.690	0.685	0.700	0.710	0.704	0.768	0.771
		P-values							
FGI-6	0.677								
FGI-6R [d]	0.690	0.674							
FGI-9	0.685	0.794	0.912						
FGI-9R [d]	0.700	0.588	0.785	0.584					
FGI-13	0.710	0.275	0.648	0.342	0.791				
FGI-13R [d]	0.704	0.548	0.715	0.636	0.901	0.846			
FGI-21	0.768	**0.012**	0.073	**0.018**	0.093	**0.022**	0.090		
FGI-21R [d]	0.771	**0.035**	**0.029**	**0.046**	**0.040**	0.106	**0.012**	0.891	
MPA > 60% (second cutoff)									
		FGI-6	**FGI-6R**	**FGI-9**	**FGI-9R**	**FGI-13**	**FGI-13R**	**FGI-21**	**FGI-21R**
	AUC[c]	0.575	0.631	0.598	0.648	0.633	0.667	0.710	0.743
		P-values							
FGI-6	0.575								
FGI-6R [d]	0.631	0.068							
FGI-9	0.598	0.470	0.492						
FGI-9R [d]	0.648	0.081	0.631	0.070					
FGI-13	0.633	0.069	0.957	0.190	0.693				
FGI-13R [d]	0.667	**0.041**	0.330	0.089	0.491	0.332			
FGI-21	0.710	**0.000**	0.074	**0.001**	0.114	**0.002**	0.290		
FGI-21R [d]	0.743	**0.000**	**0.003**	**0.001**	**0.005**	**0.006**	**0.006**	0.237	
MPA > 70% (third cutoff)									
		FGI-6	**FGI-6R**	**FGI-9**	**FGI-9R**	**FGI-13**	**FGI-13R**	**FGI-21**	**FGI-21R**
	AUC[c]	0.541	0.556	0.579	0.598	0.588	0.631	0.663	0.703
		P-values							
FGI-6	0.541								
FGI-6R [d]	0.556	0.661							
FGI-9	0.579	0.322	0.676						
FGI-9R [d]	0.598	0.263	0.334	0.555					
FGI-13	0.588	0.245	0.591	0.784	0.847				
FGI-13R [d]	0.631	0.059	0.086	0.212	0.344	0.239			
FGI-21	0.663	**0.001**	**0.042**	**0.020**	0.182	**0.003**	0.400		
FGI-21R [d]	0.703	**0.000**	**0.000**	**0.006**	**0.011**	**0.010**	**0.012**	0.158	

[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 AUC 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 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%		
103	≥ 1	100.0	0.0	38.8	0.0	38.8
103	≥ 2	100.0	0.0	38.8	0.0	38.8
94	≥ 3	96.8	17.5	32.0	1.9	34.0
53	≥ 4	61.9	65.0	13.6	23.3	36.9
7	≥ 5	11.1	100.0	0.0	54.4	54.4
0	6	–	–	–	–	–
				MPA > 60%		
103	≥ 1	100.0	0.0	54.4	0.0	54.4
103	≥ 2	100.0	0.0	54.4	0.0	54.4
94	≥ 3	95.7	12.5	47.6	1.9	49.5
53	≥ 4	57.4	53.6	25.2	19.4	44.7
7	≥ 5	8.5	94.6	2.9	41.7	44.7
0	6	–	–	–	–	–
				MPA > 70%		
103	≥ 1	100.0	0.0	75.7	0.0	75.7
103	≥ 2	100.0	0.0	75.7	0.0	75.7
94	≥ 3	92.0	9.0	68.9	1.9	70.9
53	≥ 4	60.0	51.3	36.9	9.7	46.6
7	≥ 5	4.0	92.3	5.8	23.3	29.1
0	6	–	–	–	–	–

[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%		
103	≥ 1	100.0	0.0	38.8	0.0	38.8
103	≥ 2	100.0	0.0	38.8	0.0	38.8
93	≥ 3	96.8	20.0	31.1	1.9	33.0
36	≥ 4	46.0	82.5	6.8	33.0	39.8
5	≥ 5	7.9	100.0	0.0	56.3	56.3
0	6	–	–	–	–	–
				MPA > 60%		
103	≥ 1	100.0	0.0	54.4	0.0	54.4
103	≥ 2	100.0	0.0	54.4	0.0	54.4
93	≥ 3	95.7	14.3	46.6	1.9	48.5
36	≥ 4	46.8	75.0	13.6	24.3	37.9
5	≥ 5	6.4	96.4	1.9	42.7	44.7
0	6	–	–	–	–	–
				MPA > 70%		
103	≥ 1	100.0	0.0	75.7	0.0	75.7
103	≥ 2	100.0	0.0	75.7	0.0	75.7
93	≥ 3	92.0	10.3	68.0	1.9	69.9
36	≥ 4	44.0	67.9	24.3	13.6	37.9
5	≥ 5	4.0	94.9	3.9	23.3	27.2
0	6	–	–	–	–	–

[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%		
103	≥ 1	100.0	0.0	38.8	0.0	38.8
103	≥ 2	100.0	0.0	38.8	0.0	38.8
98	≥ 3	100.0	12.5	34.0	0.0	34.0
68	≥ 4	76.2	50.0	19.4	14.6	34.0
20	≥ 5	27.0	92.5	2.9	44.7	47.6
1	≥ 6	1.6	100.0	0.0	60.2	60.2
0	≥ 7	–	–	–	–	–
0	≥ 8	–	–	–	–	–
0	9	–	–	–	–	–
				MPA > 60%		
103	≥ 1	100.0	0.0	54.4	0.0	54.4
103	≥ 2	100.0	0.0	54.4	0.0	54.4
98	≥ 3	100.0	8.9	49.5	0.0	49.5
68	≥ 4	76.6	42.9	31.1	10.7	41.7
20	≥ 5	21.3	82.1	9.7	35.9	45.6
1	≥ 6	0.0	98.2	1.0	45.6	46.6
0	≥ 7	–	–	–	–	–
0	≥ 8	–	–	–	–	–
0	9	–	–	–	–	–
				MPA > 70%		
103	≥ 1	100.0	0.0	75.7	0.0	75.7
103	≥ 2	100.0	0.0	75.7	0.0	75.7
98	≥ 3	100.0	6.4	70.9	0.0	70.9
68	≥ 4	76.0	37.2	47.6	5.8	53.4
20	≥ 5	24.0	82.1	13.6	18.4	32.0
1	≥ 6	0.0	98.7	1.0	24.3	25.2
0	≥ 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%		
103	≥ 1	100.0	0.0	38.8	0.0	38.8
103	≥ 2	100.0	0.0	38.8	0.0	38.8
97	≥ 3	100.0	15.0	33.0	0.0	33.0
60	≥ 4	69.8	60.0	15.5	18.4	34.0
9	≥ 5	14.3	100.0	0.0	52.4	52.4
1	≥ 6	1.6	100.0	0.0	60.2	60.2
0	≥ 7	–	–	–	–	–
0	≥ 8	–	–	–	–	–
0	9	–	–	–	–	–
				MPA > 60%		
103	≥ 1	100.0	0.0	54.4	0.0	54.4
103	≥ 2	100.0	0.0	54.4	0.0	54.4
97	≥ 3	100.0	10.7	48.5	0.0	48.5
60	≥ 4	70.2	51.8	26.2	13.6	39.8
9	≥ 5	14.9	96.4	1.9	38.8	40.8
1	≥ 6	0.0	98.2	1.0	45.6	46.6
0	≥ 7	–	–	–	–	–
0	≥ 8	–	–	–	–	–
0	9	–	–	–	–	–
				MPA > 70%		
103	≥ 1	100.0	0.0	75.7	0.0	75.7
103	≥ 2	100.0	0.0	75.7	0.0	75.7
97	≥ 3	100.0	7.7	69.9	0.0	69.9
60	≥ 4	68.0	44.9	41.7	7.8	49.5
9	≥ 5	16.0	93.6	4.9	20.4	25.2
1	≥ 6	0.0	98.7	1.0	24.3	25.2
0	≥ 7	–	–	–	–	–
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%		
103	≥ 1	100.0	0.0	38.8	0.0	38.8
103	≥ 2	100.0	0.0	38.8	0.0	38.8
98	≥ 3	100.0	12.5	34.0	0.0	34.0
74	≥ 4	81.0	42.5	22.3	11.7	34.0
42	≥ 5	52.4	77.5	8.7	29.1	37.9
12	≥ 6	19.0	100.0	0.0	49.5	49.5
1	≥ 7	1.6	100.0	0.0	60.2	60.2
1	≥ 8	1.6	100.0	0.0	60.2	60.2
0	≥ 9	–	–	–	–	–
0	≥10	–	–	–	–	–
0	≥ 11	–	–	–	–	–
0	≥ 12	–	–	–	–	–
0	13	–	–	–	–	–
				MPA > 60%		
103	≥ 1	100.0	0.0	54.4	0.0	54.4
103	≥ 2	100.0	0.0	54.4	0.0	54.4
98	≥ 3	100.0	8.9	49.5	0.0	49.5
74	≥ 4	80.9	35.7	35.0	8.7	43.7
42	≥ 5	51.1	67.9	17.5	22.3	39.8
12	≥ 6	17.0	92.9	3.9	37.9	41.7
1	≥ 7	0.0	98.2	1.0	45.6	46.6
1	≥ 8	0.0	98.2	1.0	45.6	46.6
0	≥ 9	–	–	–	–	–
0	≥10	–	–	–	–	–
0	≥ 11	–	–	–	–	–
0	≥ 12	–	–	–	–	–
0	13	–	–	–	–	–
				MPA > 70%		
103	≥ 1	100.0	0.0	75.7	0.0	75.7
103	≥ 2	100.0	0.0	75.7	0.0	75.7
98	≥ 3	100.0	6.4	70.9	0.0	70.9
74	≥ 4	80.0	30.8	52.4	4.9	57.3
42	≥ 5	48.0	61.5	29.1	12.6	41.7
12	≥ 6	20.0	91.0	6.8	19.4	26.2
1	≥ 7	0.0	98.7	1.0	24.3	25.2
1	≥ 8	0.0	98.7	1.0	24.3	25.2
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 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%		
103	≥ 1	100.0	0.0	38.8	0.0	38.8
103	≥ 2	100.0	0.0	38.8	0.0	38.8
96	≥ 3	98.4	15.0	33.0	1.0	34.0
67	≥ 4	76.2	52.5	18.4	14.6	33.0
22	≥ 5	30.2	92.5	2.9	42.7	45.6
6	≥ 6	9.5	100.0	0.0	55.3	55.3
1	≥ 7	1.6	100.0	0.0	60.2	60.2
0	≥ 8	–	–	–	–	–
0	≥ 9	–	–	–	–	–
0	≥ 10	–	–	–	–	–
0	≥ 11	–	–	–	–	–
0	≥ 12	–	–	–	–	–
0	13	–	–	–	–	–
				MPA > 60%		
103	≥ 1	100.0	0.0	54.4	0.0	54.4
103	≥ 2	100.0	0.0	54.4	0.0	54.4
96	≥ 3	97.9	10.7	48.5	1.0	49.5
67	≥ 4	78.7	46.4	29.1	9.7	38.8
22	≥ 5	31.9	87.5	6.8	31.1	37.9
6	≥ 6	8.5	96.4	1.9	41.7	43.7
1	≥ 7	0.0	98.2	1.0	45.6	46.6
0	≥ 8	–	–	–	–	–
0	≥ 9	–	–	–	–	–
0	≥ 10	–	–	–	–	–
0	≥ 11	–	–	–	–	–
0	≥ 12	–	–	–	–	–
0	13	–	–	–	–	–
				MPA > 70%		
103	≥ 1	100.0	0.0	75.7	0.0	75.7
103	≥ 2	100.0	0.0	75.7	0.0	75.7
96	≥ 3	100.0	9.0	68.9	0.0	68.9
67	≥ 4	80.0	39.7	45.6	4.9	50.5
22	≥ 5	32.0	82.1	13.6	16.5	30.1
6	≥ 6	8.0	94.9	3.9	22.3	26.2
1	≥ 7	0.0	98.7	1.0	24.3	25.2
0	≥ 8	–	–	–	–	–
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%		
103	≥ 1	100.0	0.0	38.8	0.0	38.8
103	≥ 2	100.0	0.0	38.8	0.0	38.8
100	≥ 3	100.0	7.5	35.9	0.0	35.9
82	≥ 4	88.9	35.0	25.2	6.8	32.0
55	≥ 5	69.8	72.5	10.7	18.4	29.1
30	≥ 6	42.9	92.5	2.9	35.0	37.9
11	≥ 7	17.5	100.0	0.0	50.5	50.5
3	≥ 8	4.8	100.0	0.0	58.3	58.3
1	≥ 9	1.6	100.0	0.0	60.2	60.2
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%		
103	≥ 1	100.0	0.0	54.4	0.0	54.4
103	≥ 2	100.0	0.0	54.4	0.0	54.4
100	≥ 3	100.0	5.4	51.5	0.0	51.5
82	≥ 4	89.4	28.6	38.8	4.9	43.7
55	≥ 5	72.3	62.5	20.4	12.6	33.0
30	≥ 6	44.7	83.9	8.7	25.2	34.0
11	≥ 7	17.0	94.6	2.9	37.9	40.8
3	≥ 8	4.3	98.2	1.0	43.7	44.7
1	≥ 9	0.0	98.2	1.0	45.6	46.6
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 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 > 50%		
103	≥ 1	100.0	0.0	75.7	0.0	75.7
103	≥ 2	100.0	0.0	75.7	0.0	75.7
100	≥ 3	100.0	3.8	72.8	0.0	72.8
82	≥ 4	88.0	23.1	58.3	2.9	61.2
55	≥ 5	72.0	52.6	35.9	6.8	42.7
30	≥ 6	48.0	76.9	17.5	12.6	30.1
11	≥ 7	20.0	92.3	5.8	19.4	25.2
3	≥ 8	8.0	98.7	1.0	22.3	23.3
1	≥ 9	0.0	98.7	1.0	24.3	25.2
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.

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%		
103	≥ 1	100.0	0.0	38.8	0.0	38.8
103	≥ 2	100.0	0.0	38.8	0.0	38.8
99	≥ 3	100.0	10.0	35.0	0.0	35.0
76	≥ 4	85.7	45.0	21.4	8.7	30.1
45	≥ 5	60.3	82.5	6.8	24.3	31.1
14	≥ 6	22.2	100.0	0.0	47.6	47.6
7	≥ 7	11.1	100.0	0.0	54.4	54.4
1	≥ 8	1.6	100.0	0.0	60.2	60.2
0	≥ 9	–	–	–	–	–
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%		
103	≥ 1	100.0	0.0	54.4	0.0	54.4
103	≥ 2	100.0	0.0	54.4	0.0	54.4
99	≥ 3	100.0	7.1	50.5	0.0	50.5
76	≥ 4	87.2	37.5	34.0	5.8	39.8
45	≥ 5	66.0	75.0	13.6	15.5	29.1
14	≥ 6	25.5	96.4	1.9	34.0	35.9
7	≥ 7	10.6	96.4	1.9	40.8	42.7
1	≥ 8	2.1	100.0	0.0	44.7	44.7
0	≥ 9	–	–	–	–	–
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%		
103	≥ 1	100.0	0.0	75.7	0.0	75.7
103	≥ 2	100.0	0.0	75.7	0.0	75.7
99	≥ 3	100.0	5.1	71.8	0.0	71.8
76	≥ 4	88.0	30.8	52.4	2.9	55.3
45	≥ 5	68.0	64.1	27.2	7.8	35.0
14	≥ 6	32.0	92.3	5.8	16.5	22.3
7	≥ 7	12.0	94.9	3.9	21.4	25.2
1	≥ 8	4.0	100.0	0.0	23.3	23.3
0	≥ 9	–	–	–	–	–
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

Figure N1. Distribution of Thiamin Intakes, NPNL Women

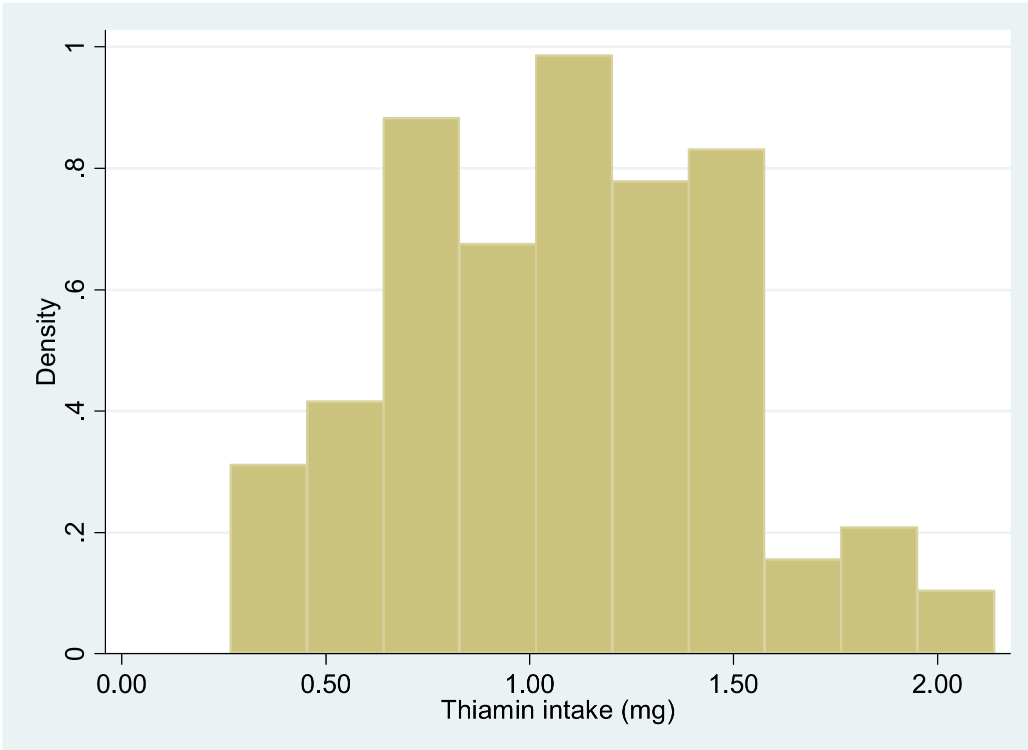


Figure N2. Distribution of Riboflavin Intakes, NPNL Women

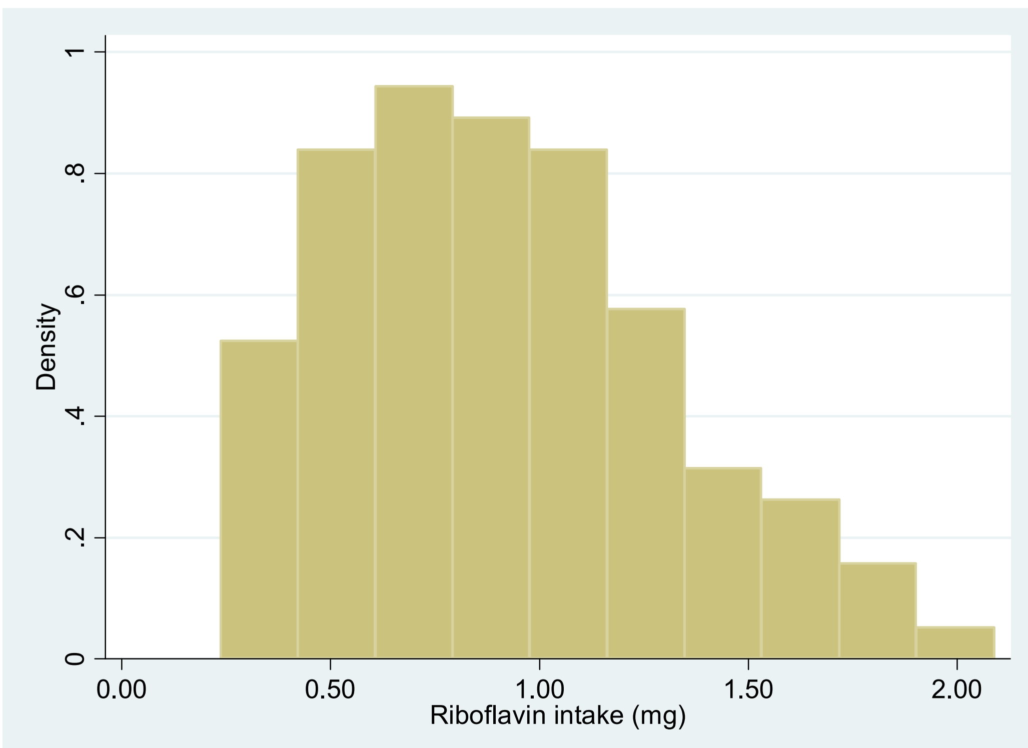


Figure N3. Distribution of Niacin Intakes, NPNL Women

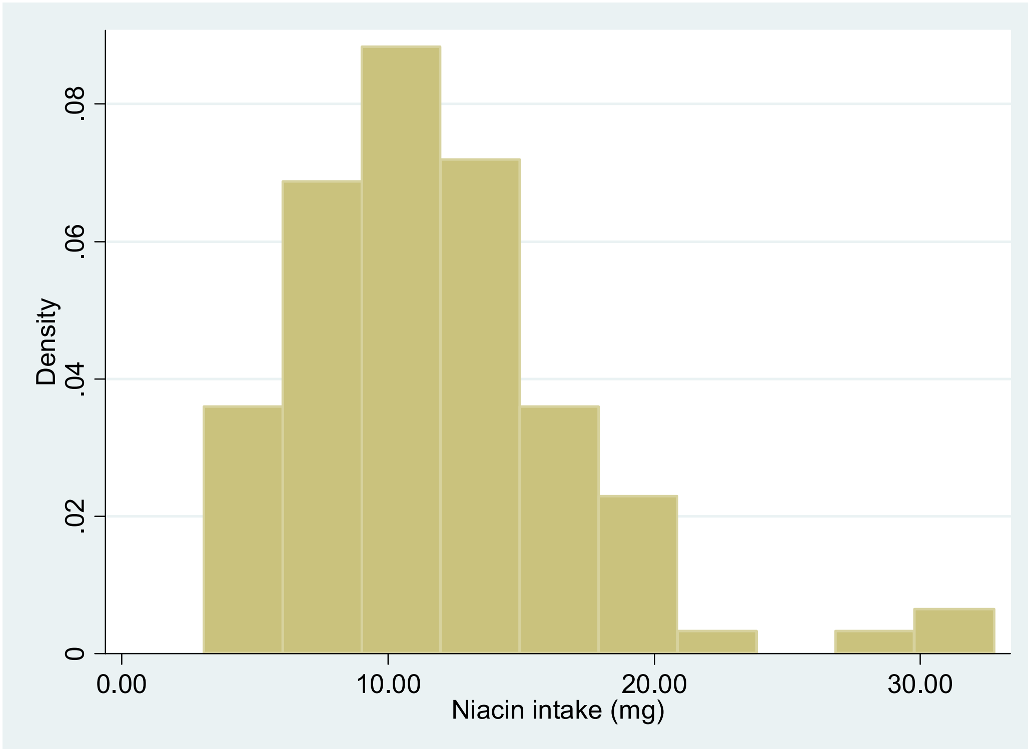


Figure N4. Distribution of Vitamin B6 Intakes, NPNL Women

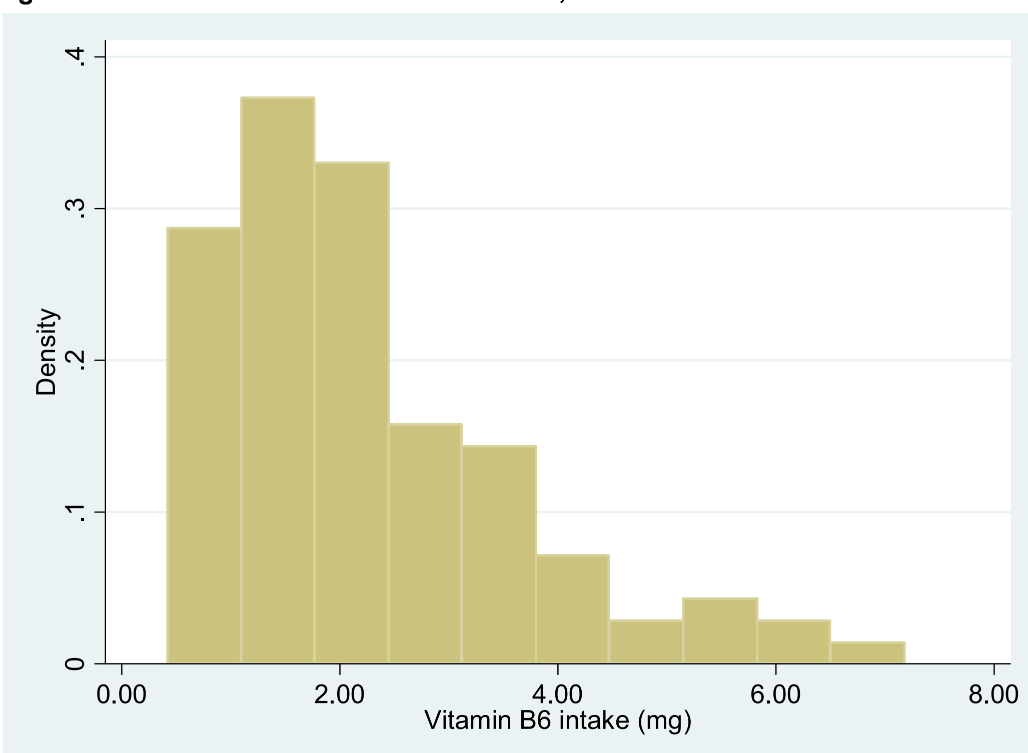


Figure N5. Distribution of Folate Intakes, NPNL Women

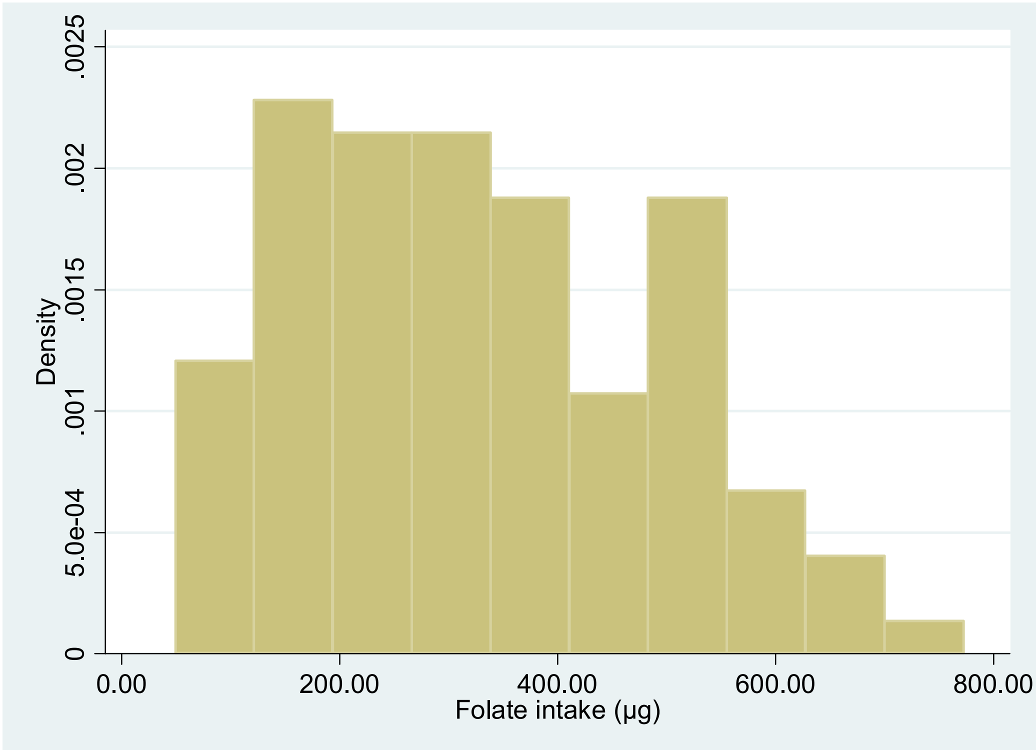


Figure N6. Distribution of Vitamin B12 Intakes, NPNL Women

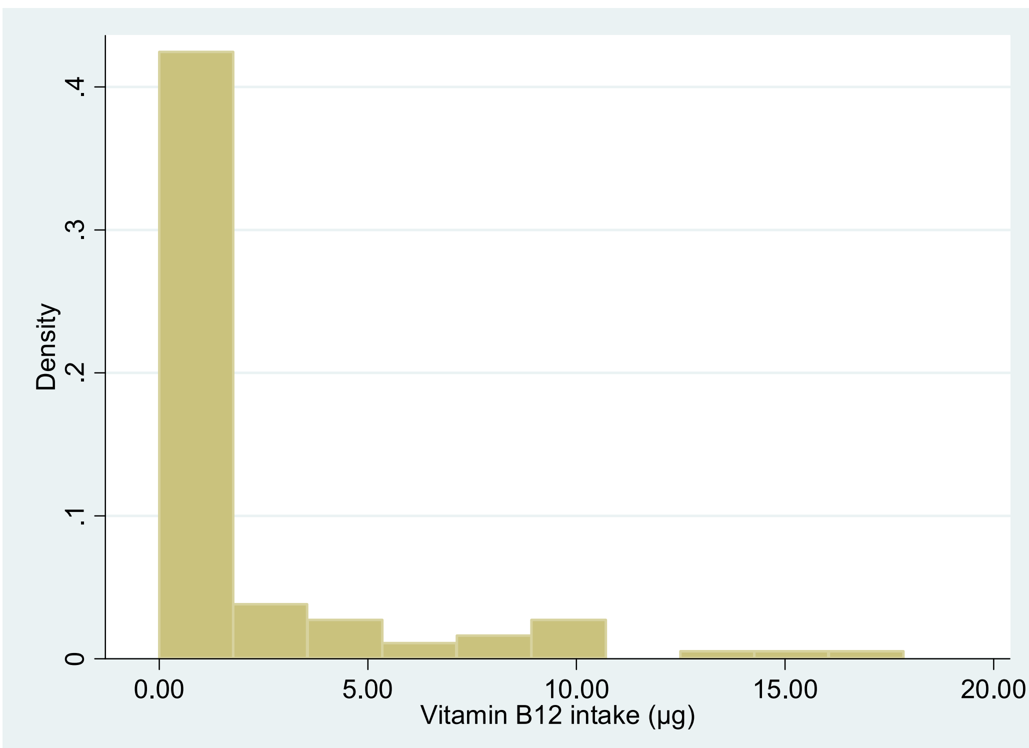


Figure N7. Distribution of Vitamin C Intakes, NPNL Women

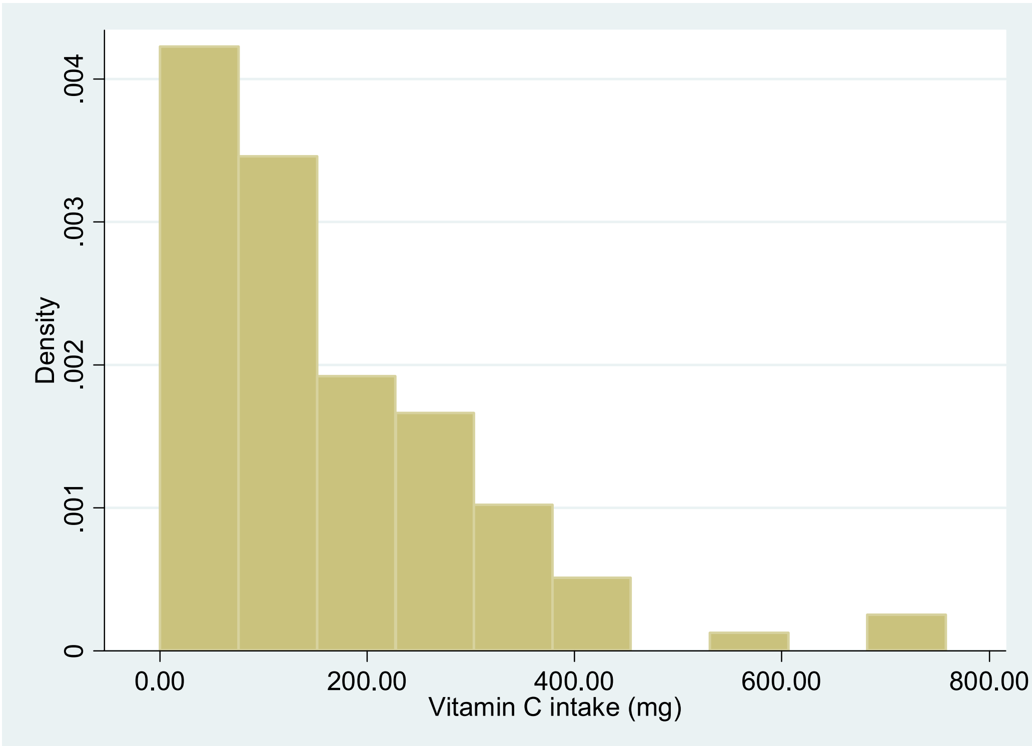


Figure N8. Distribution of Vitamin A Intakes, NPNL Women

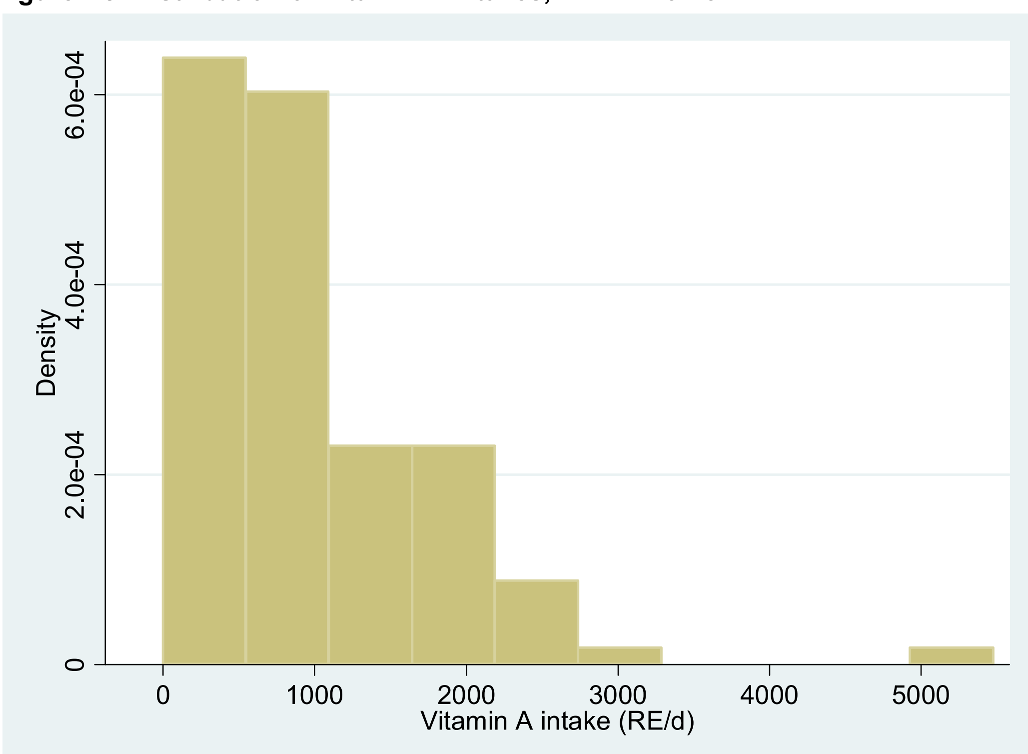


Figure N9. Distribution of Calcium Intakes, NPNL Women

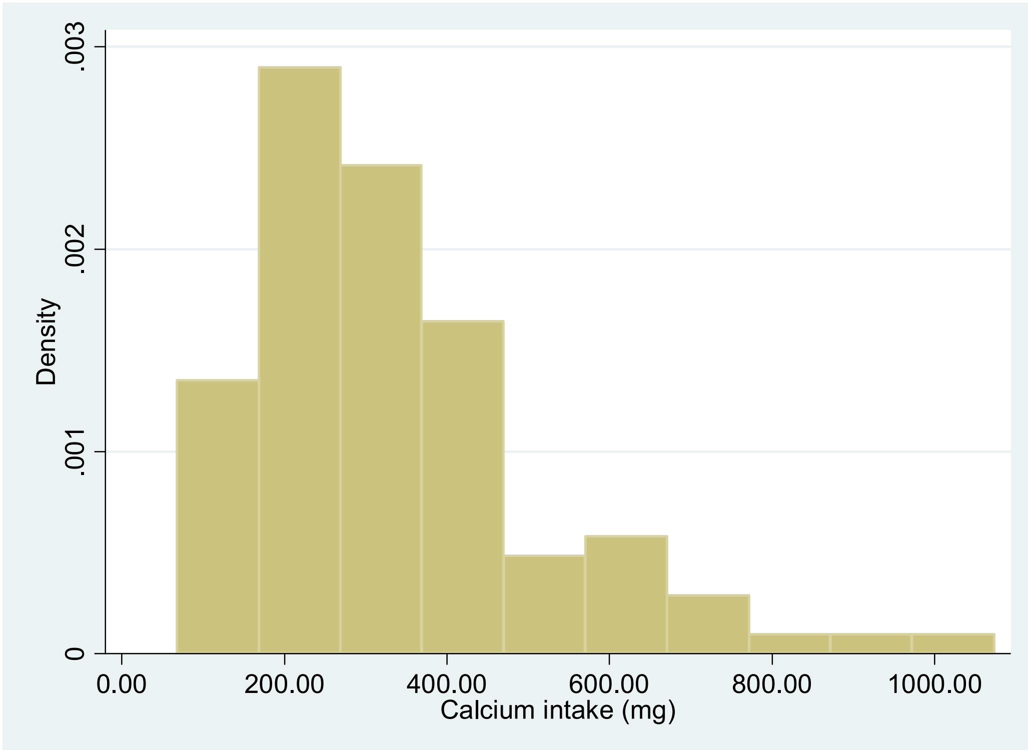


Figure N10. Distribution of Iron Intakes, NPNL Women

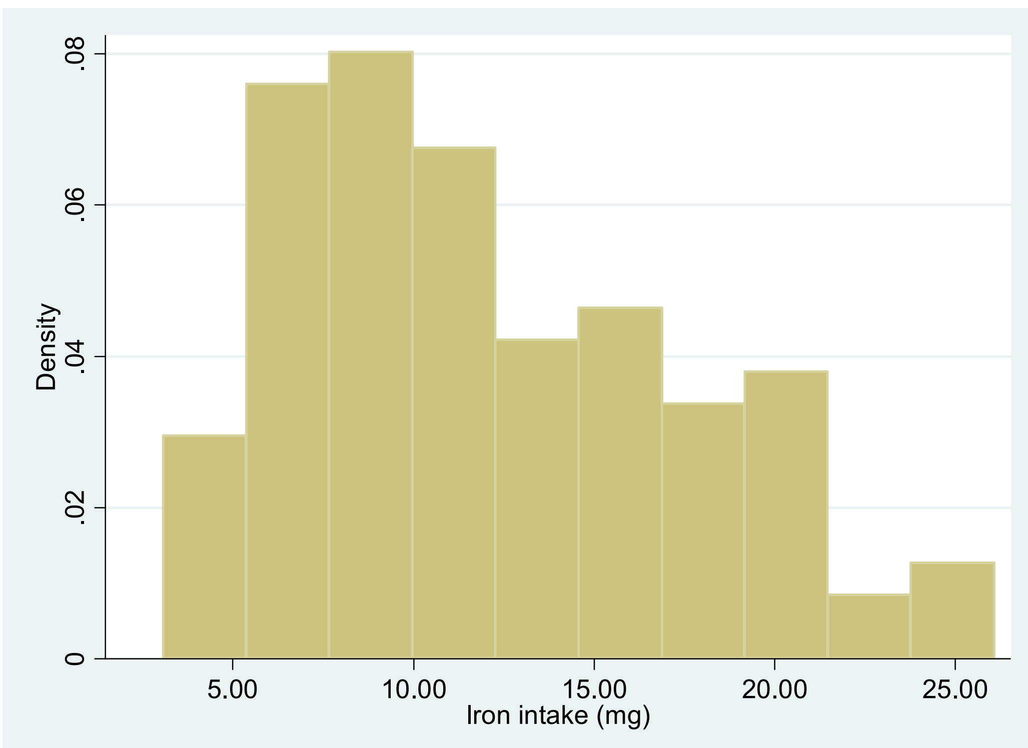


Figure N11. Distribution of Zinc Intakes, NPNL Women

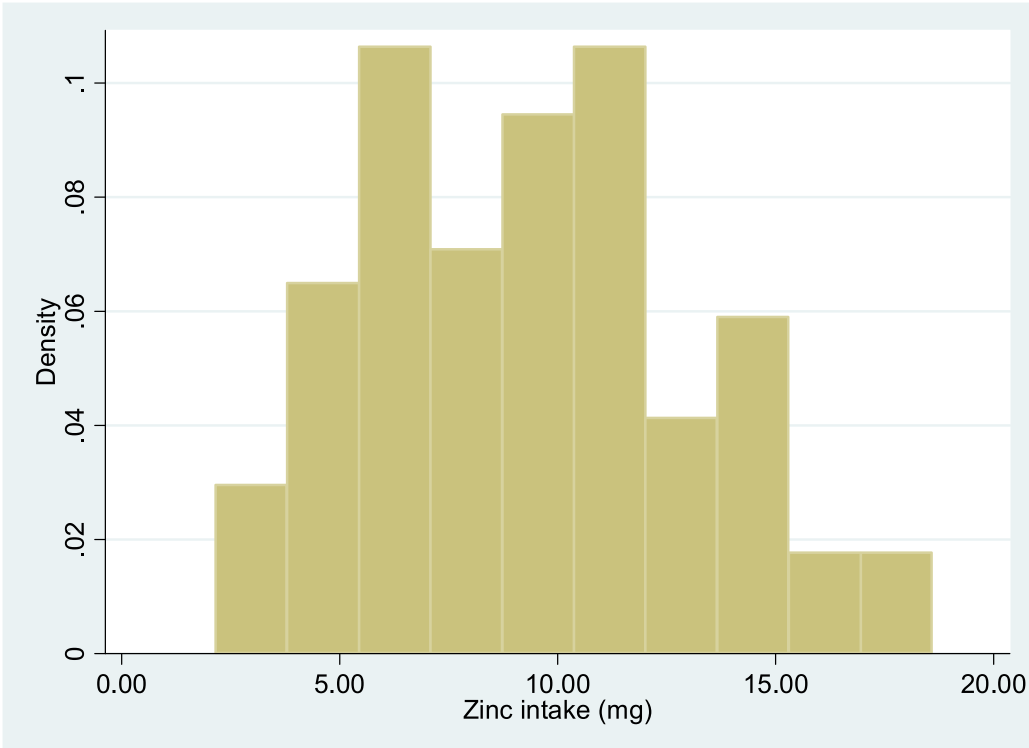


Figure N12. Intra-Individual SD of Thiamin Intakes, NPNL Women

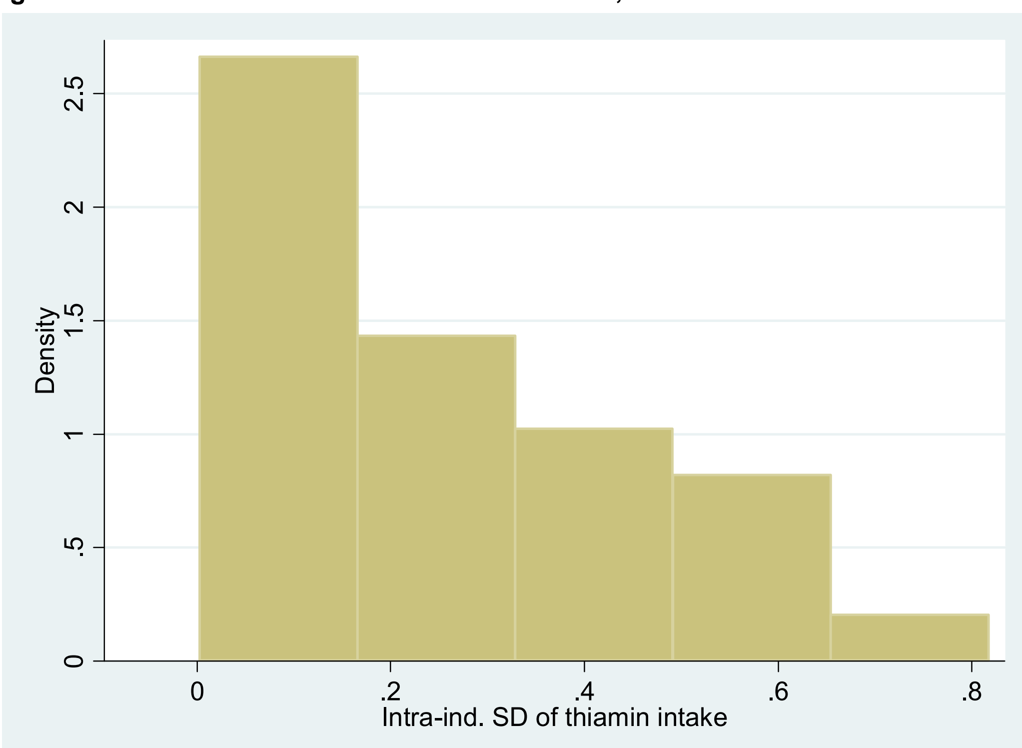


Figure N13. Intra-Individual SD of Riboflavin Intakes, NPNL Women

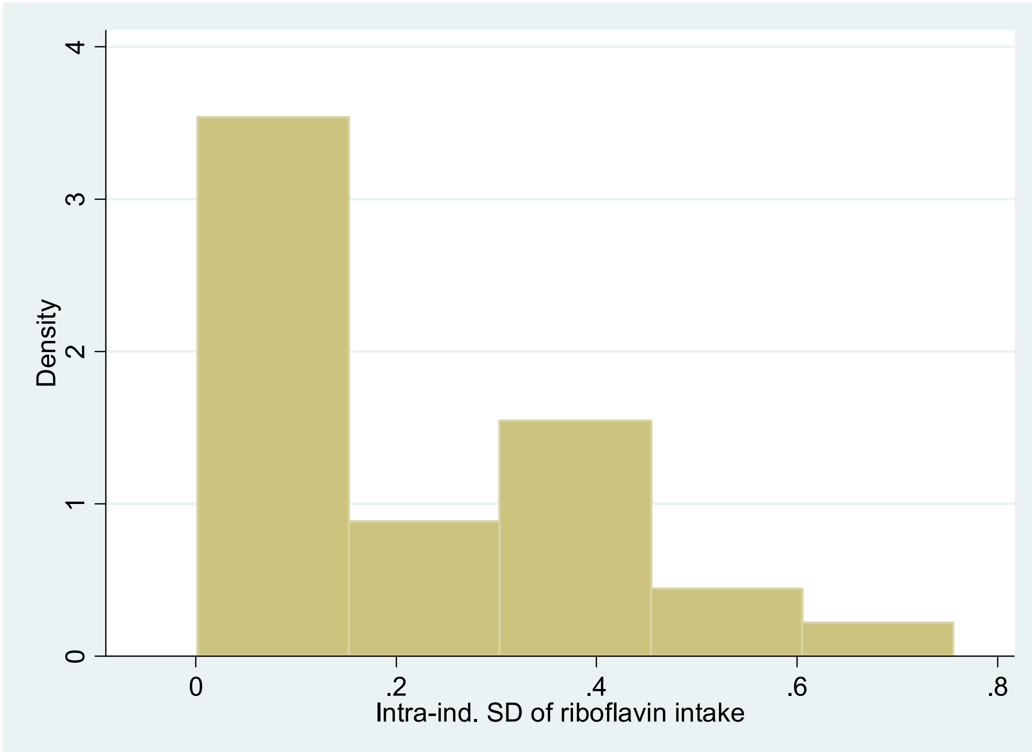


Figure N14. Intra-Individual SD of Niacin Intakes, NPNL Women

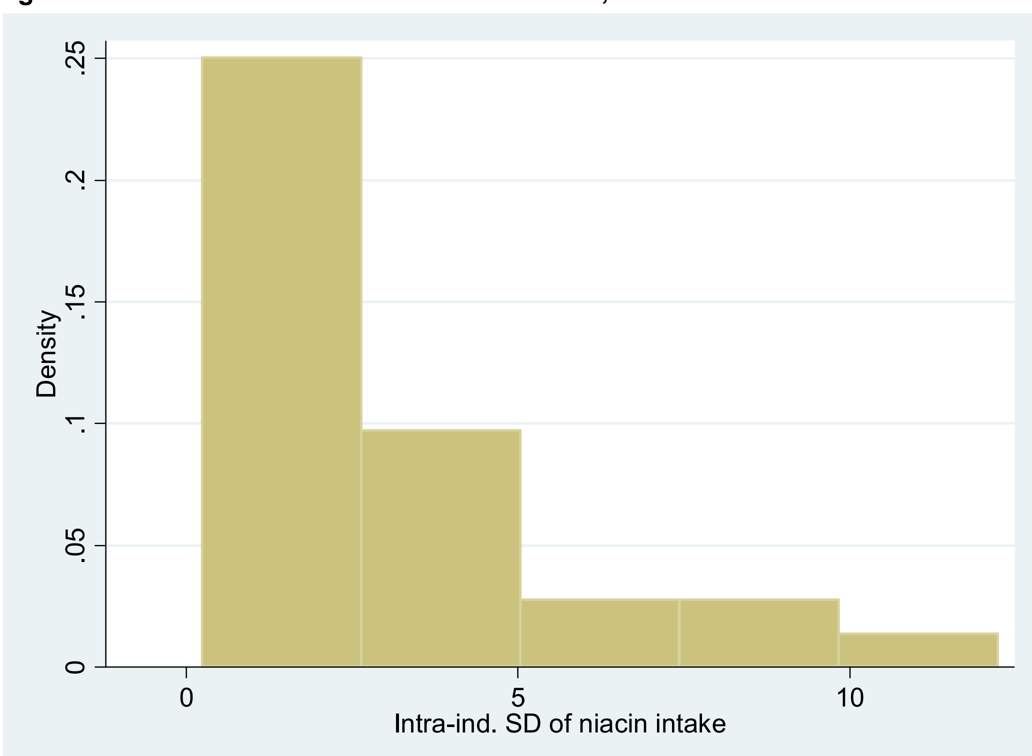


Figure N15. Intra-Individual SD of Vitamin B6 Intakes, NPNL Women

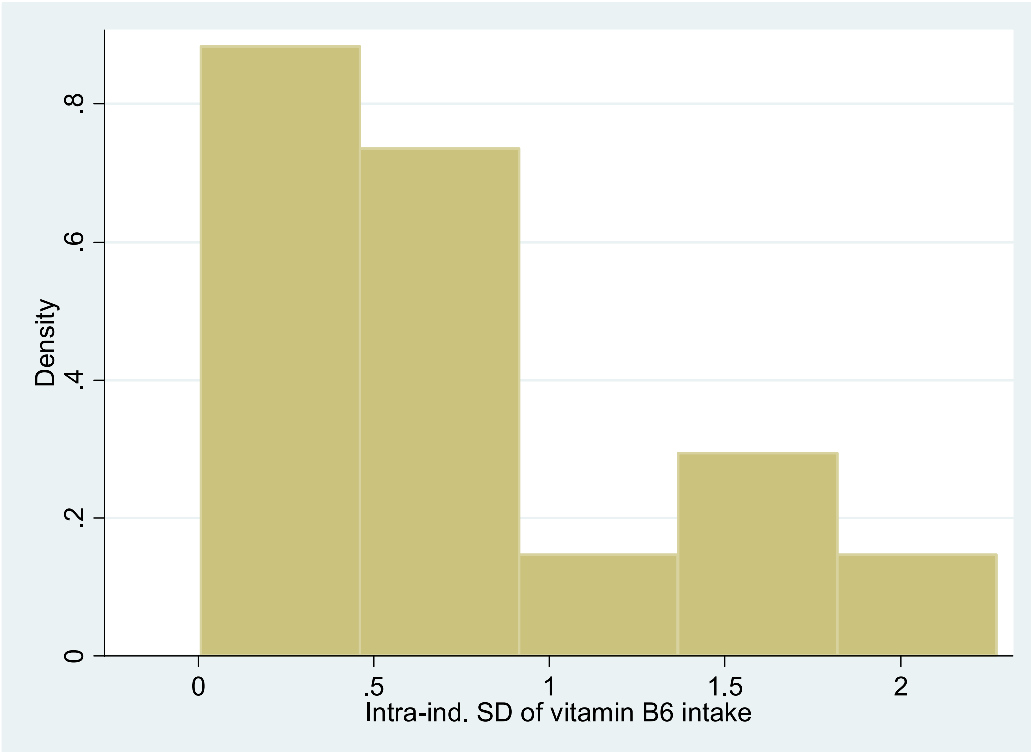


Figure N16. Intra-Individual SD of Folate Intakes, NPNL Women

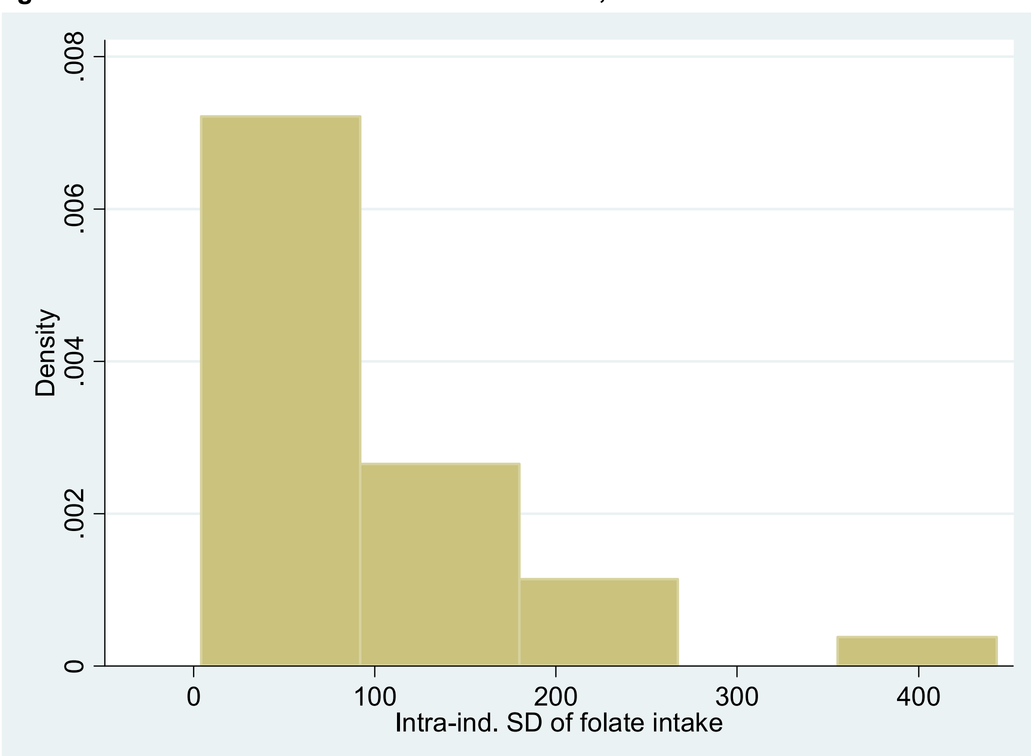


Figure N17. Intra-Individual SD of Vitamin B12 Intakes, NPNL Women

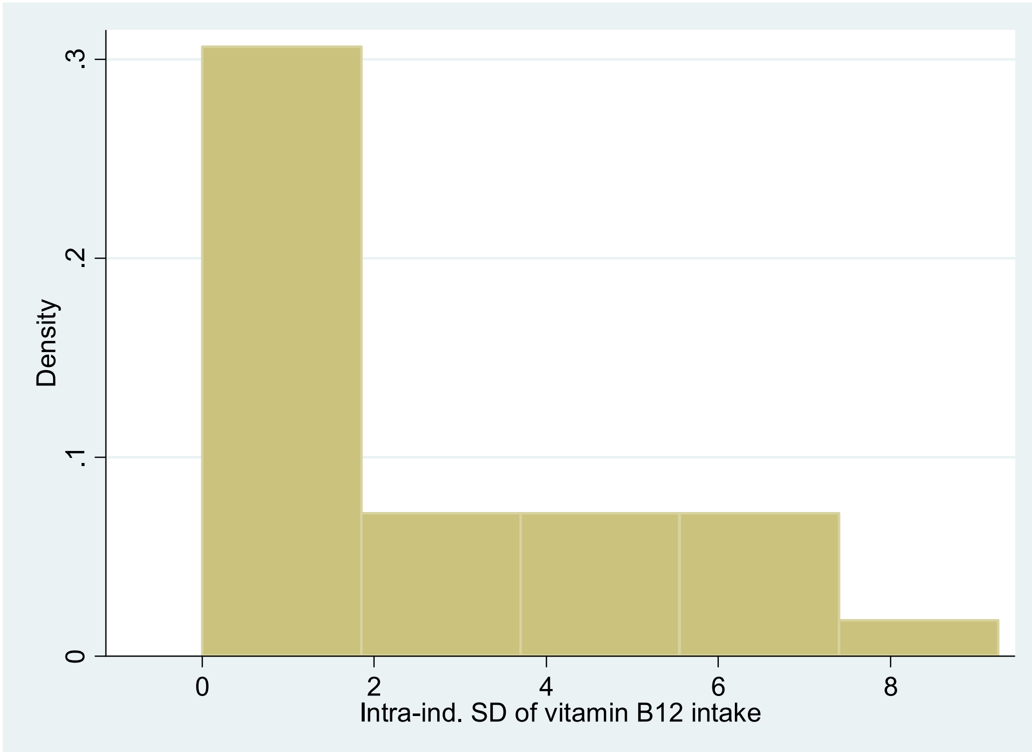


Figure N18. Intra-Individual SD of Vitamin C Intakes, NPNL Women

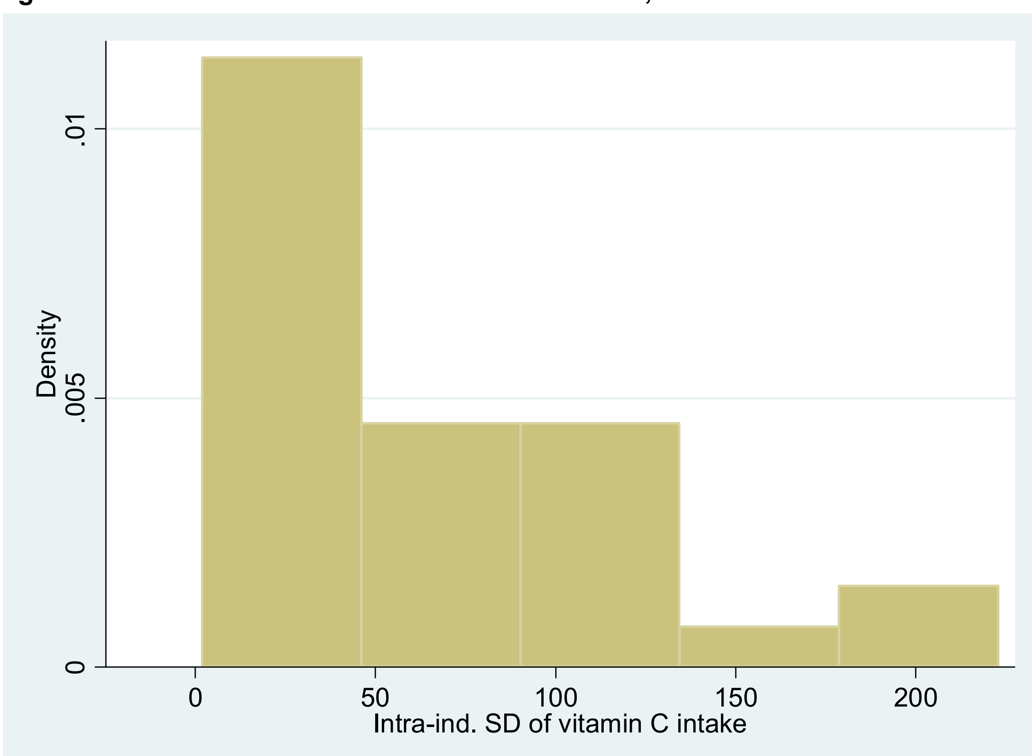


Figure N19. Intra-Individual SD of Vitamin A Intakes, NPNL Women

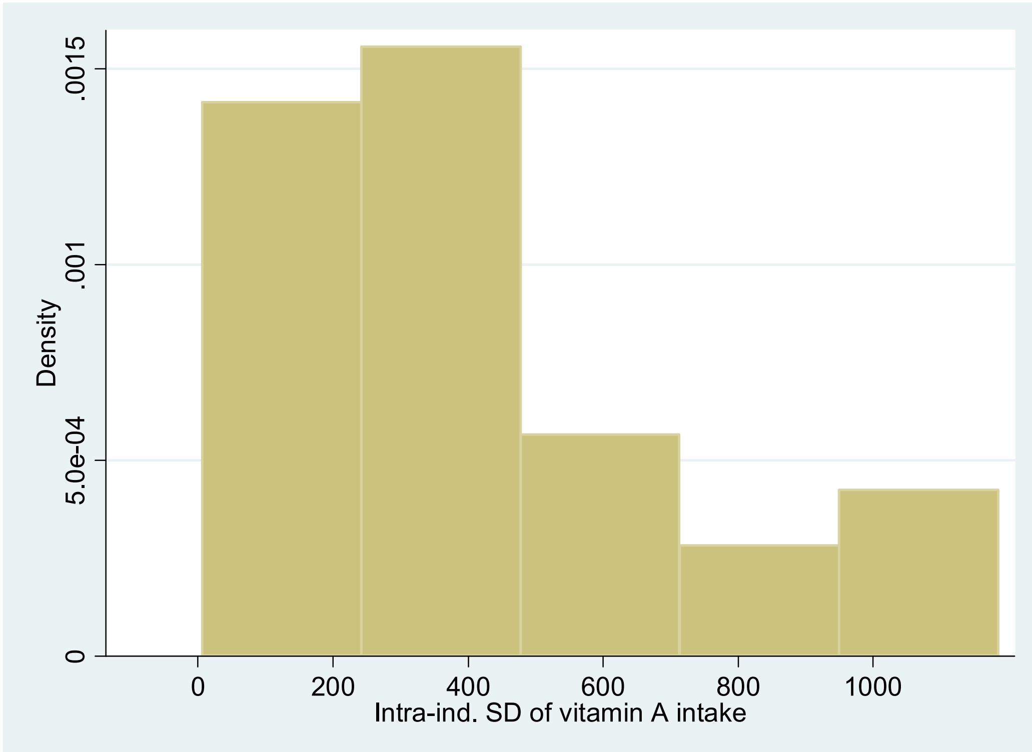


Figure N20. Intra-Individual SD of Calcium Intakes, NPNL Women

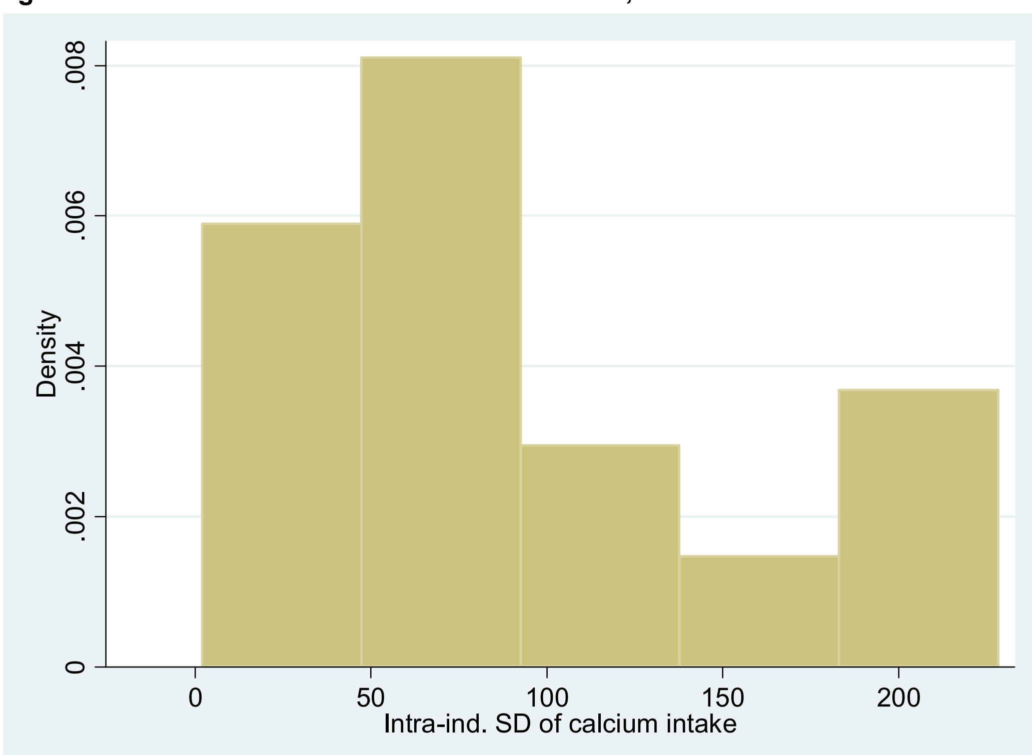


Figure N21. Intra-Individual SD of Iron Intakes, NPNL Women

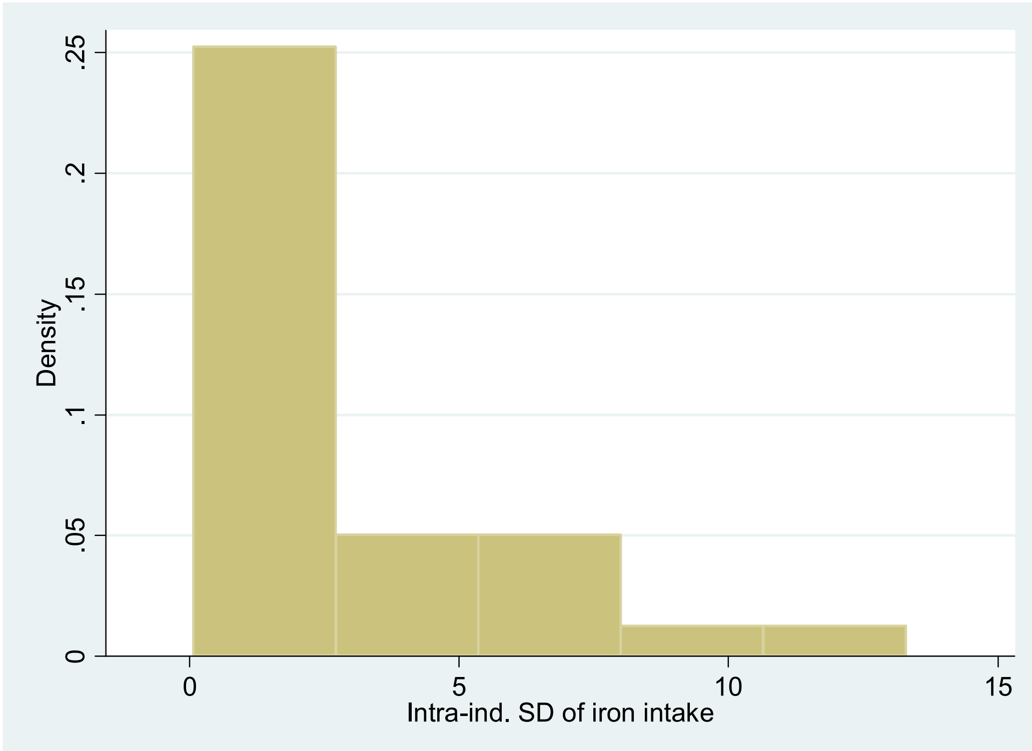


Figure N22. Intra-Individual SD of Zinc Intakes, NPNL Women

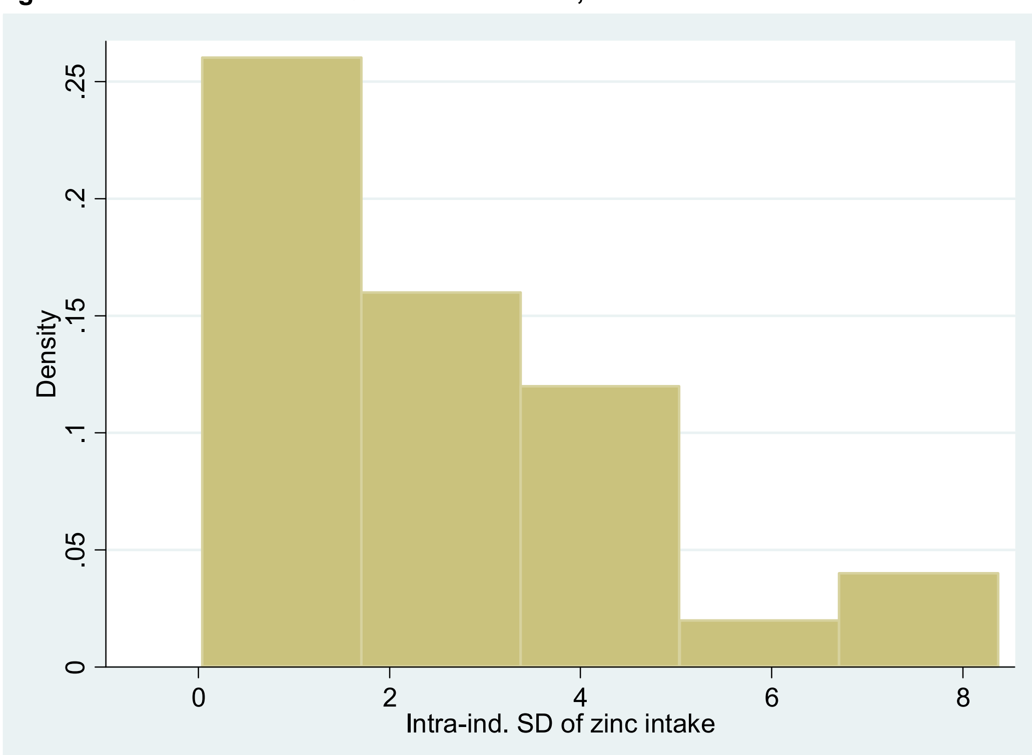


Figure N23. Distribution of Scores for FGI-6, NPNL Women

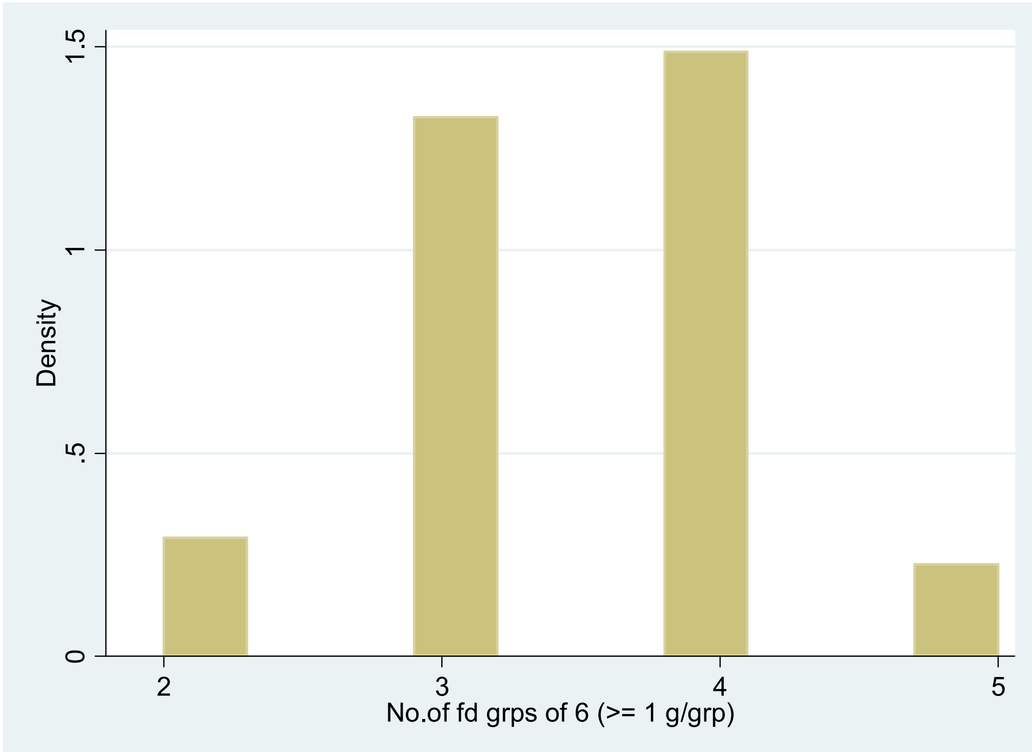


Figure N24. Distribution of Scores for FGI-6R, NPNL Women

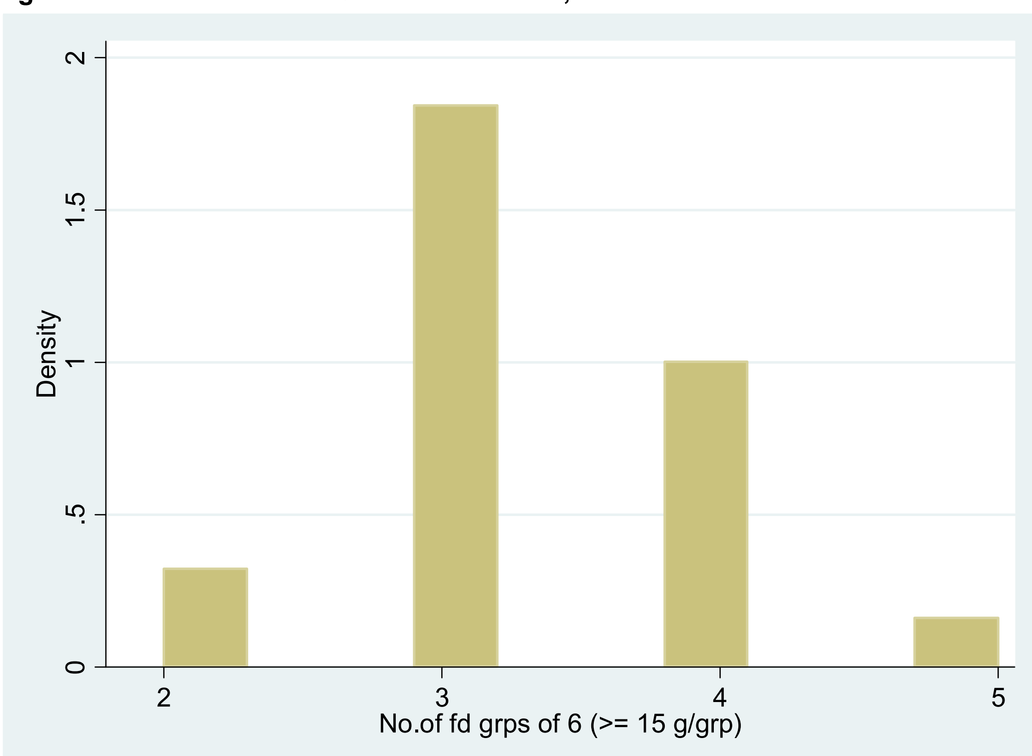


Figure N25. Distribution of Scores for FGI-9, NPNL Women

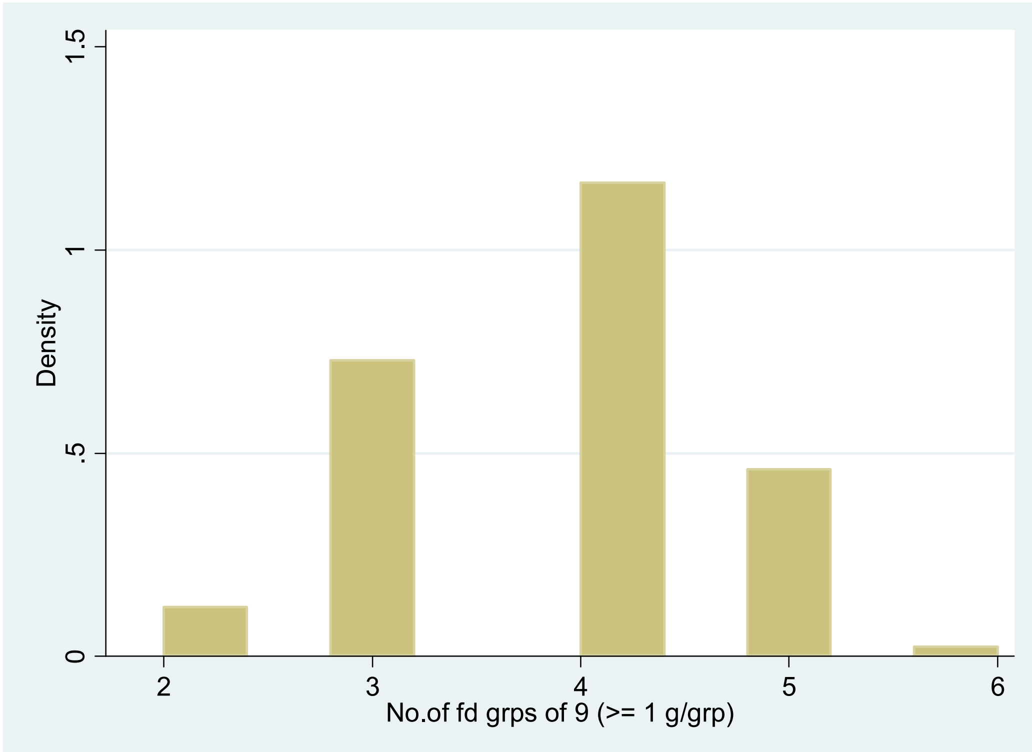


Figure N26. Distribution of Scores for FGI-9R, NPNL Women

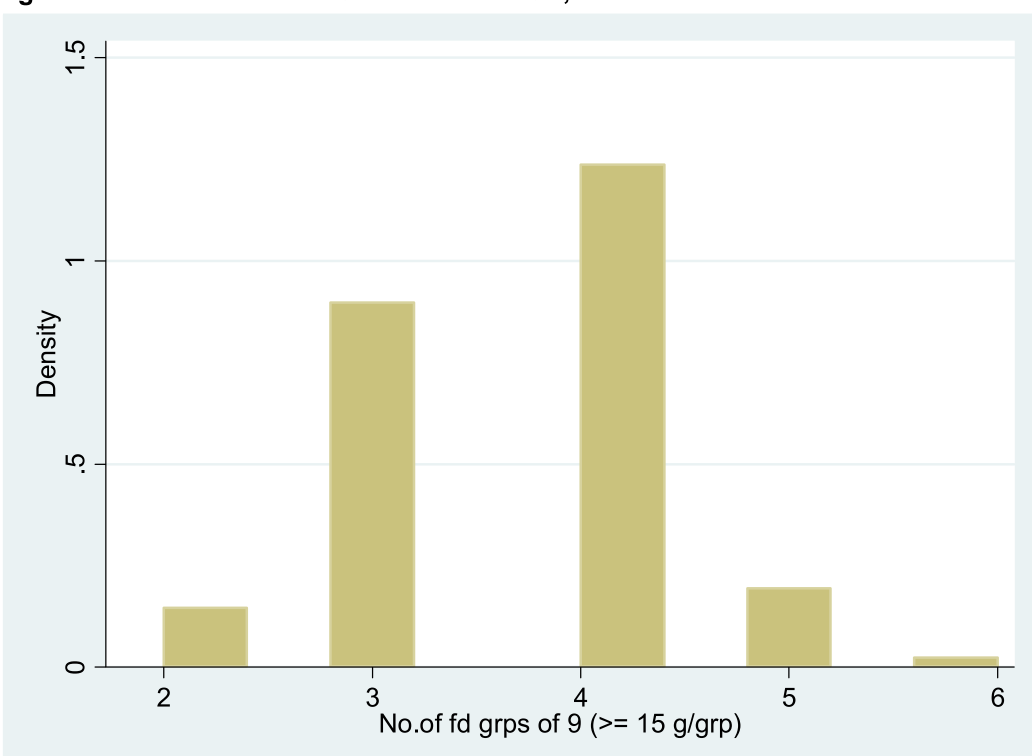


Figure N27. Distribution of Scores for FGI-13, NPNL Women

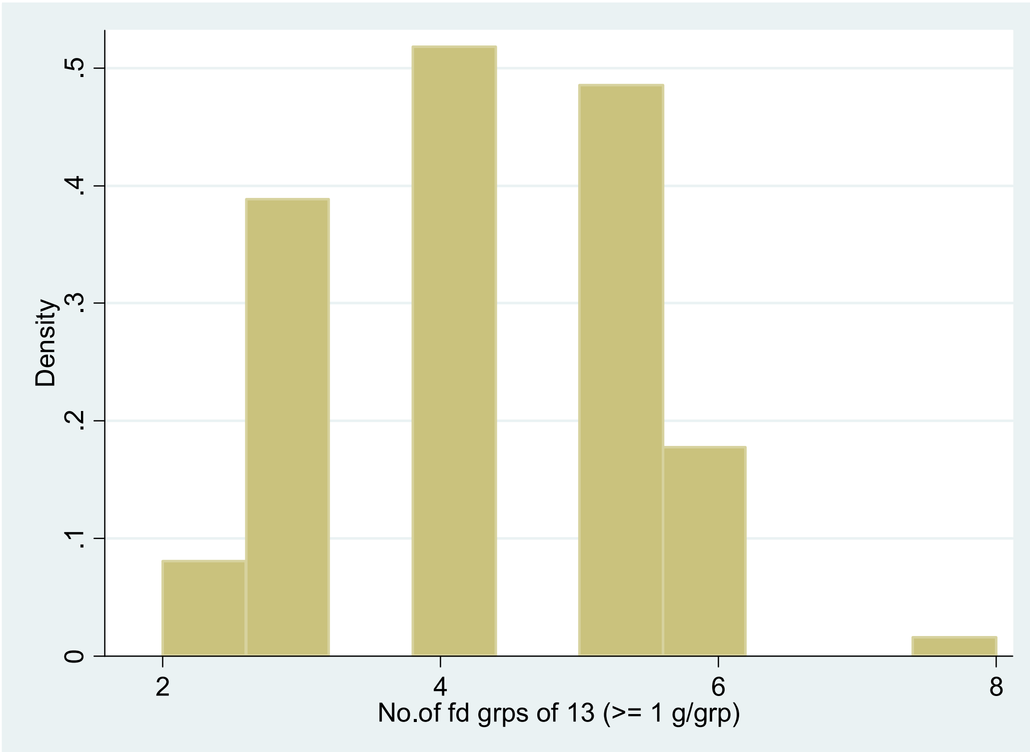


Figure N28. Distribution of Scores for FGI-13R, NPNL Women

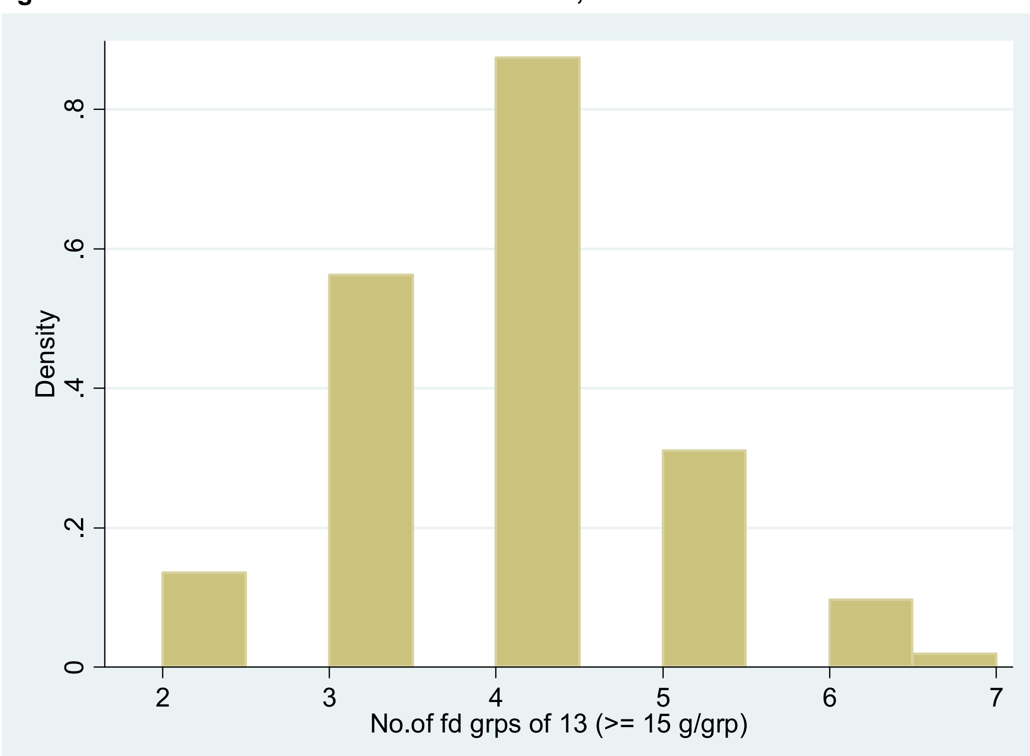


Figure N29. Distribution of Scores for FGI-21, NPNL Women

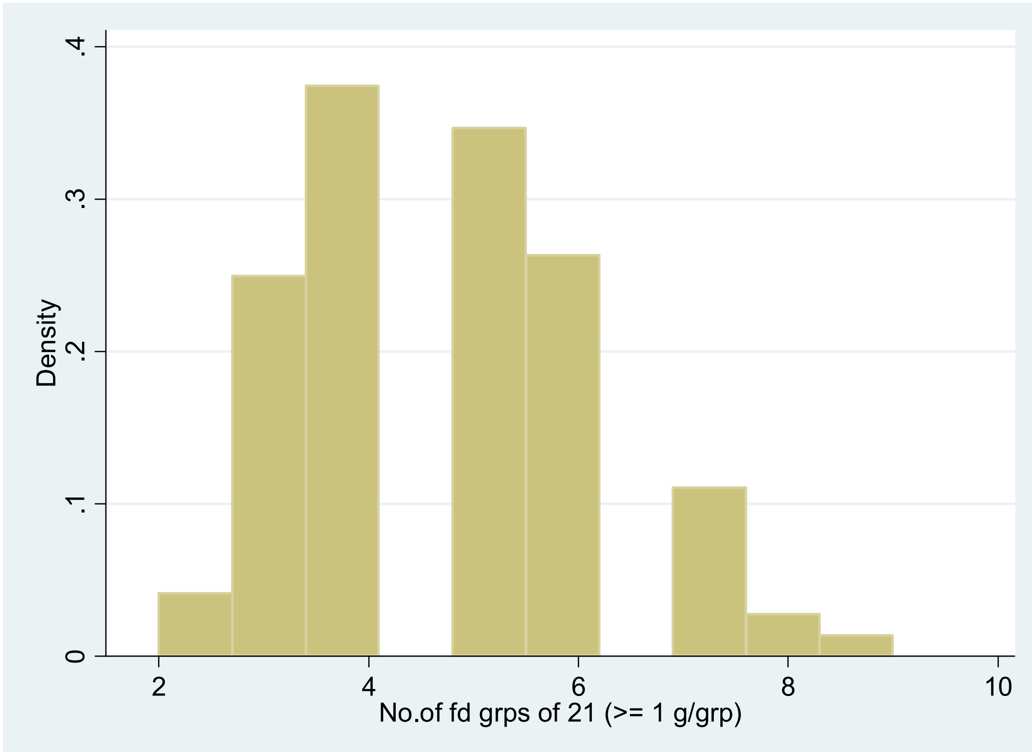


Figure N30. Distribution of Scores for FGI-21R, NPNL Women

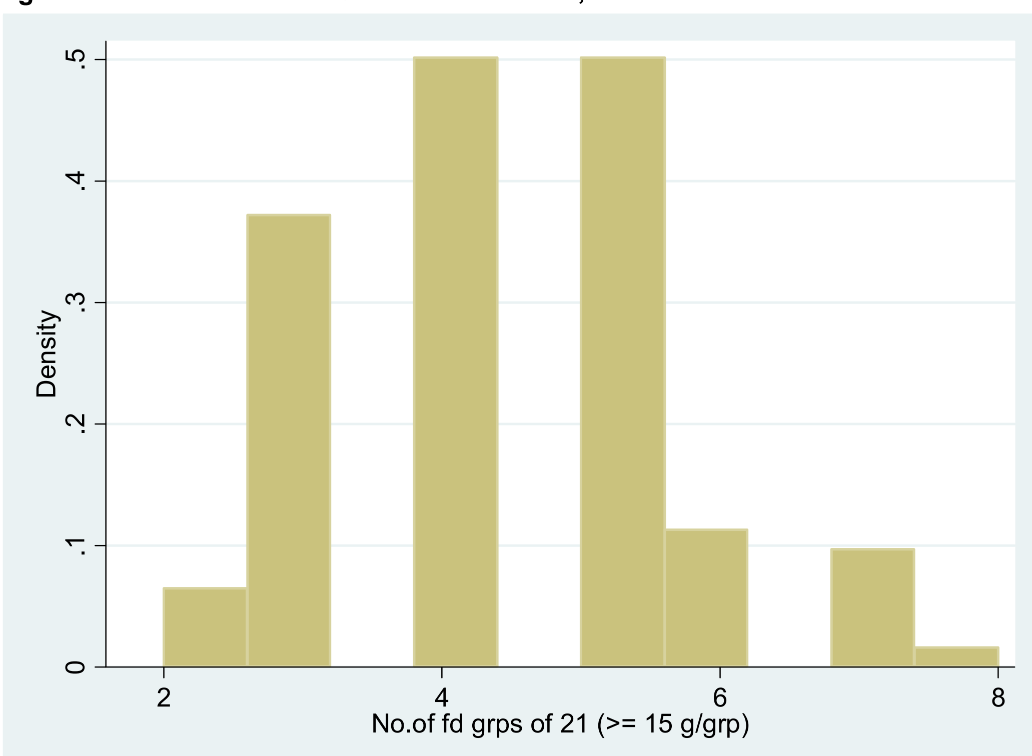


Table N6. Percent of Observation Days at Each Food Group Diversity Score, NPNL Women, R1

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	0	0	0	0	0	0	0
2	9	10	5	6	5	7	3	4
3	40	55	29	36	23	28	18	22
4	45	30	47	50	31	44	26	30
5	7	5	18	8	29	16	24	30
6	0	0	1	1	11	5	18	7
7			0	0	0	1	8	6
8			0	0	1	0	2	1
9			0	0	0	0	1	0
10					0	0	0	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

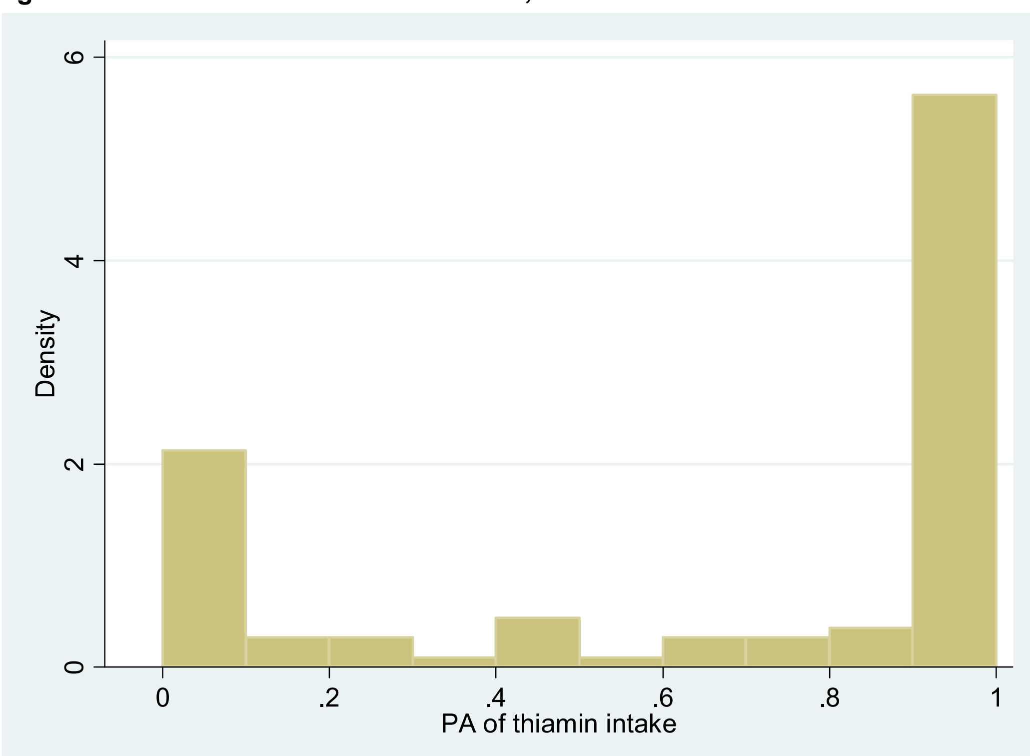


Figure N32. Distribution of PA for Riboflavin, NPNL Women

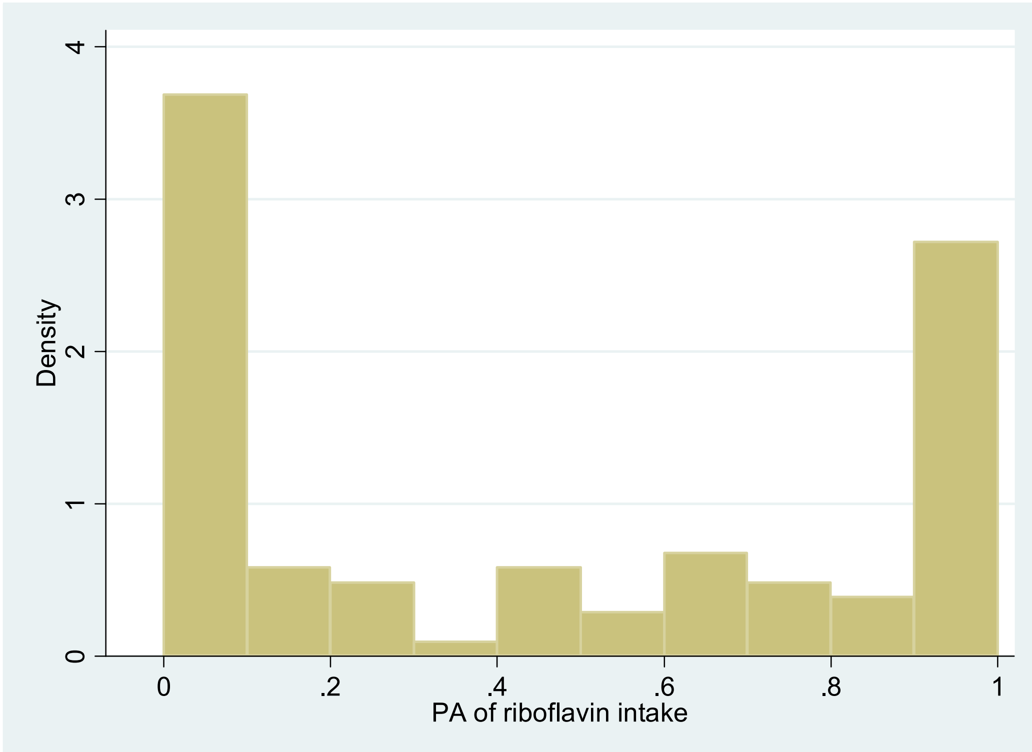


Figure N33. Distribution of PA for Niacin, NPNL Women

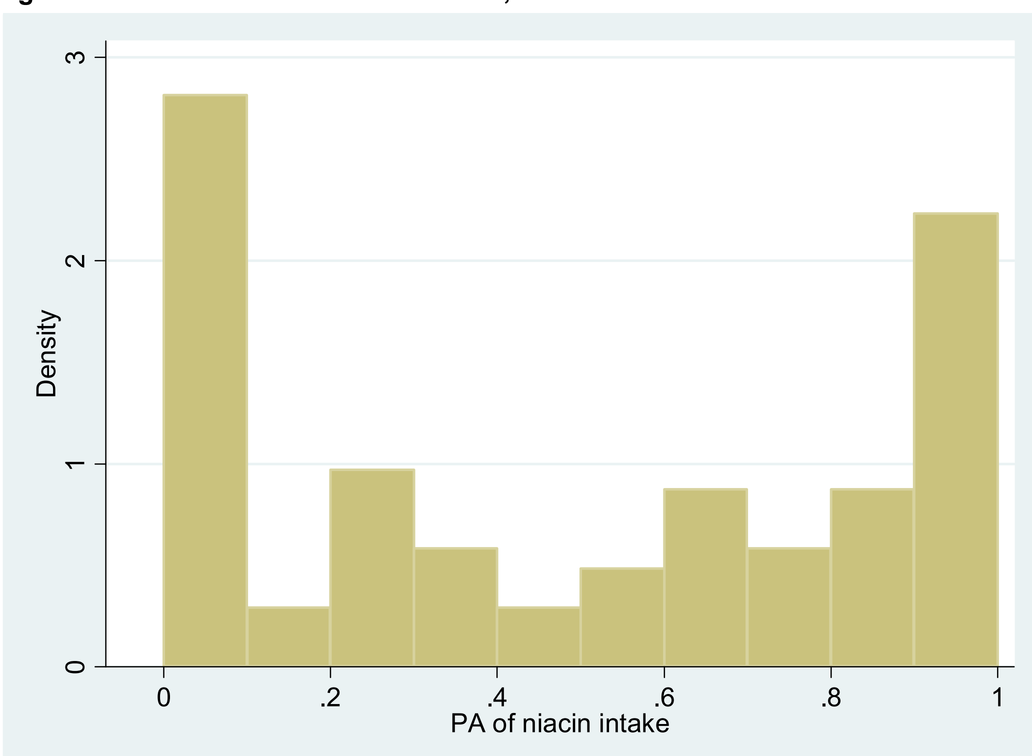


Figure N34. Distribution of PA for Vitamin B6, NPNL Women

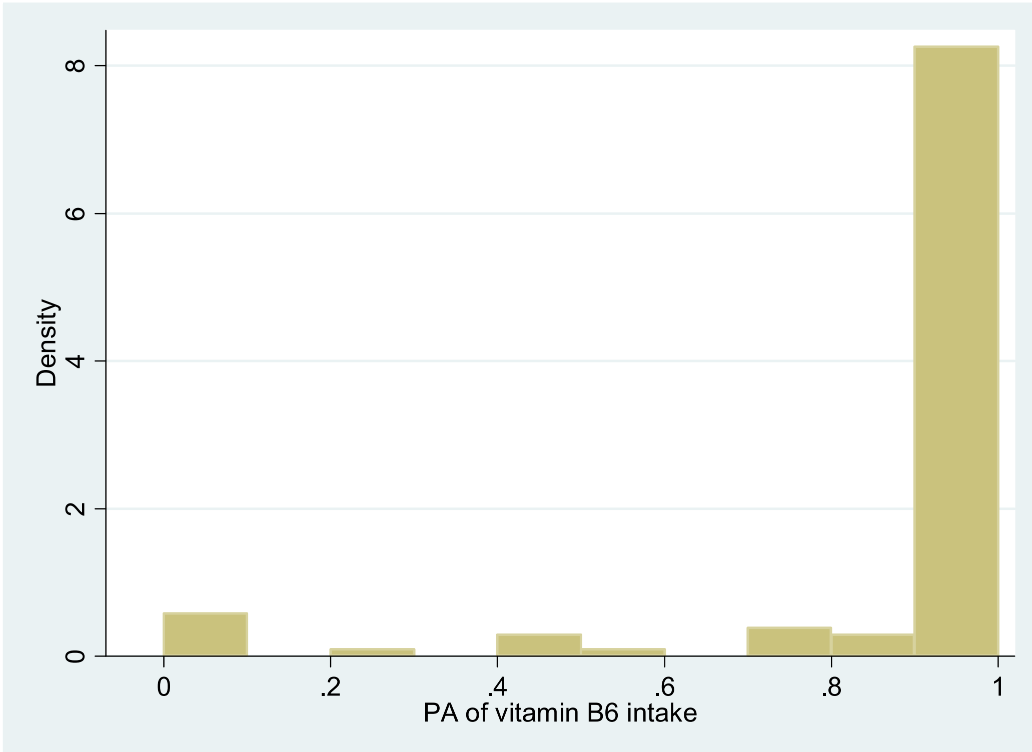


Figure N35. Distribution of PA for Folate, NPNL Women

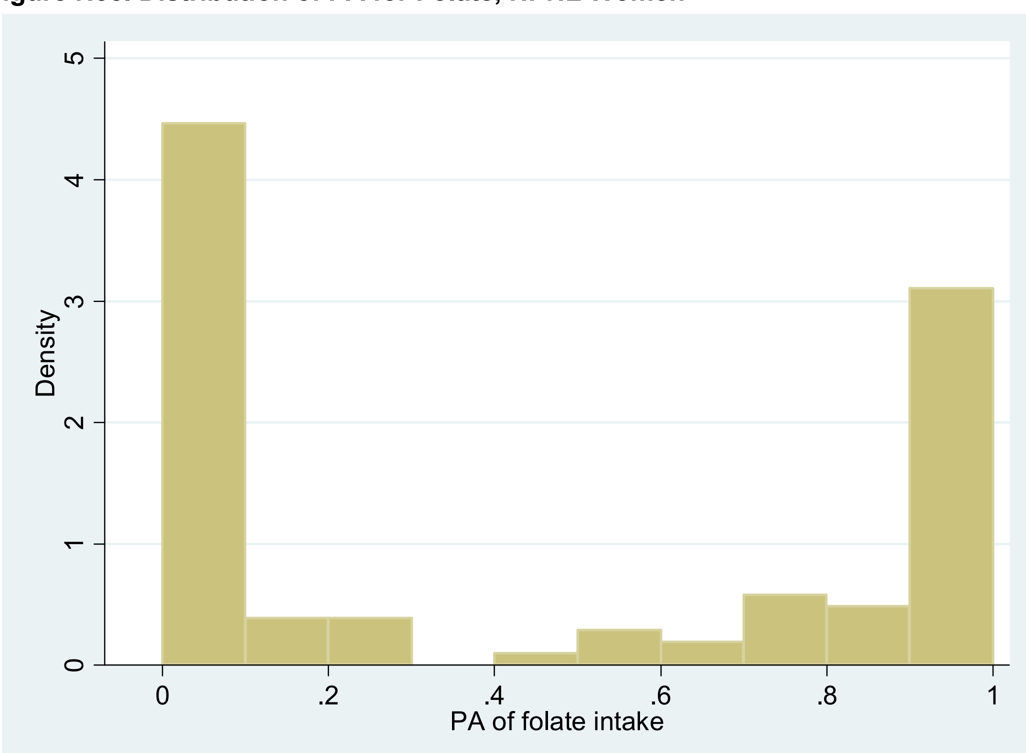


Figure N36. Distribution of PA for Vitamin B12, NPNL Women

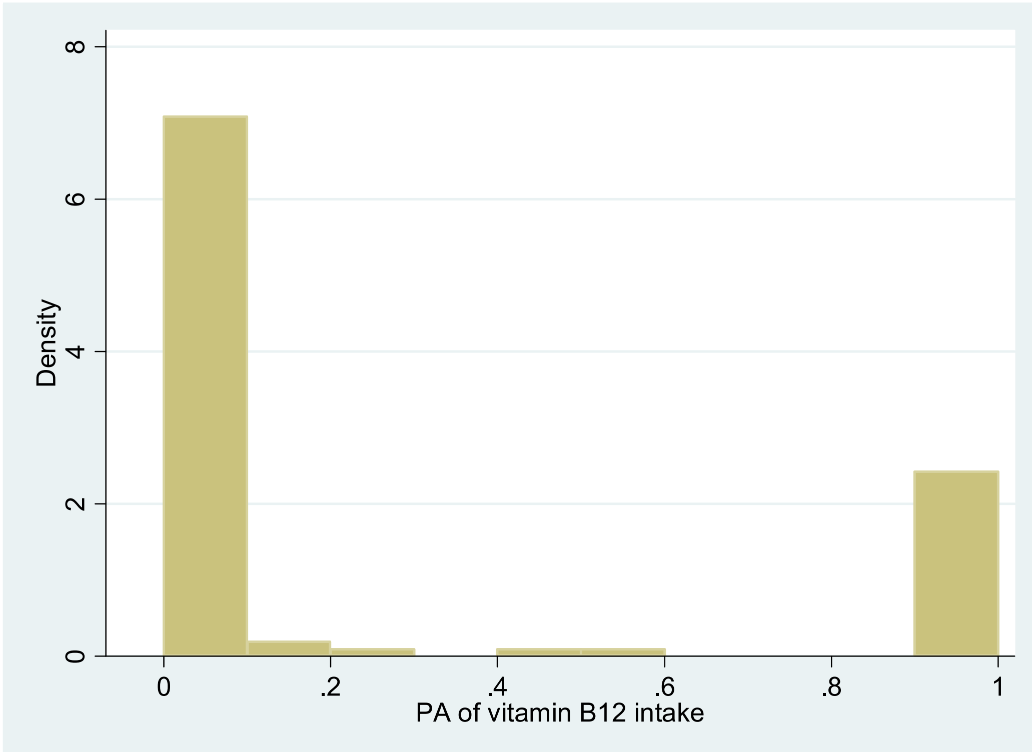


Figure N37. Distribution of PA for Vitamin C, NPNL Women

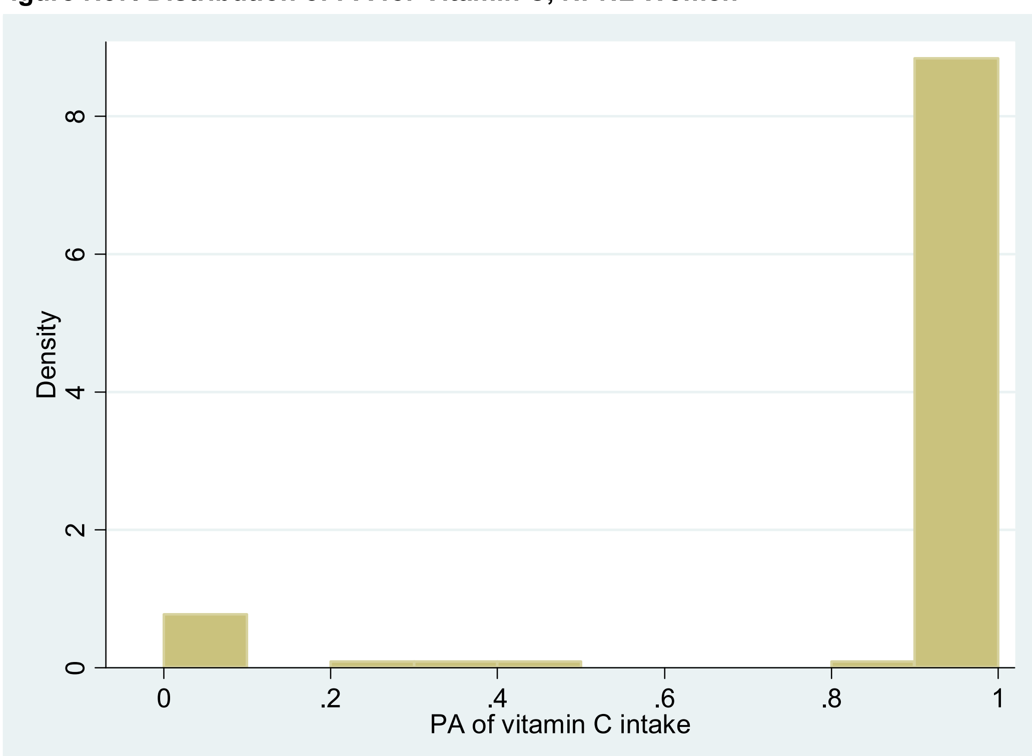


Figure N38. Distribution of PA for Vitamin A, NPNL Women

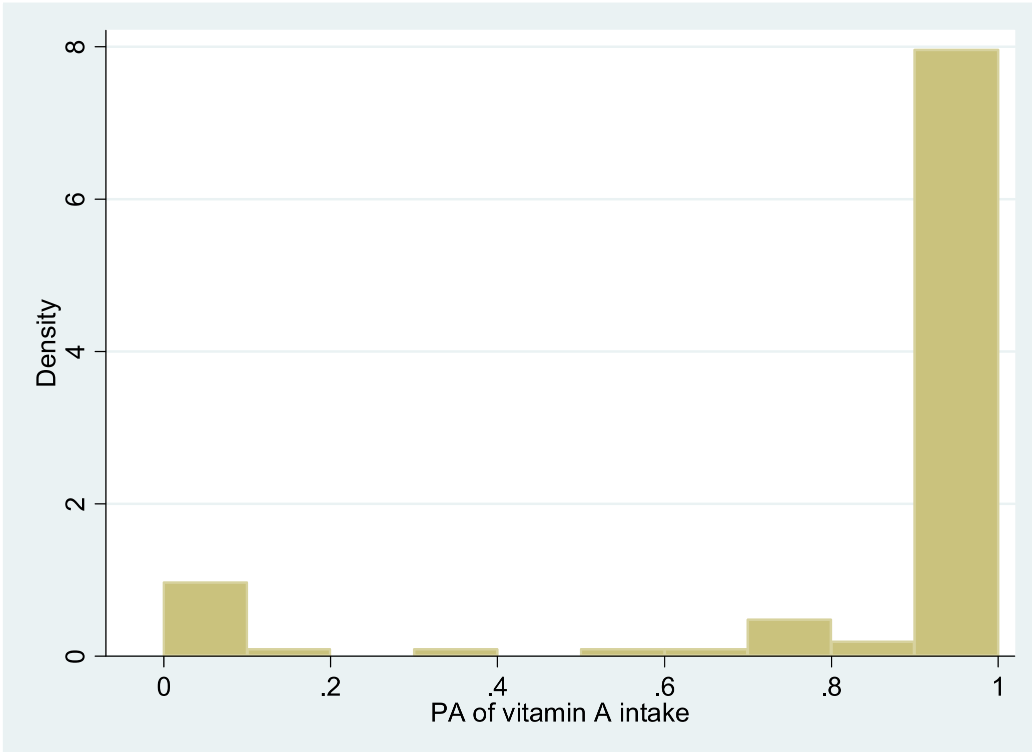


Figure N39. Distribution of PA for Calcium, NPNL Women

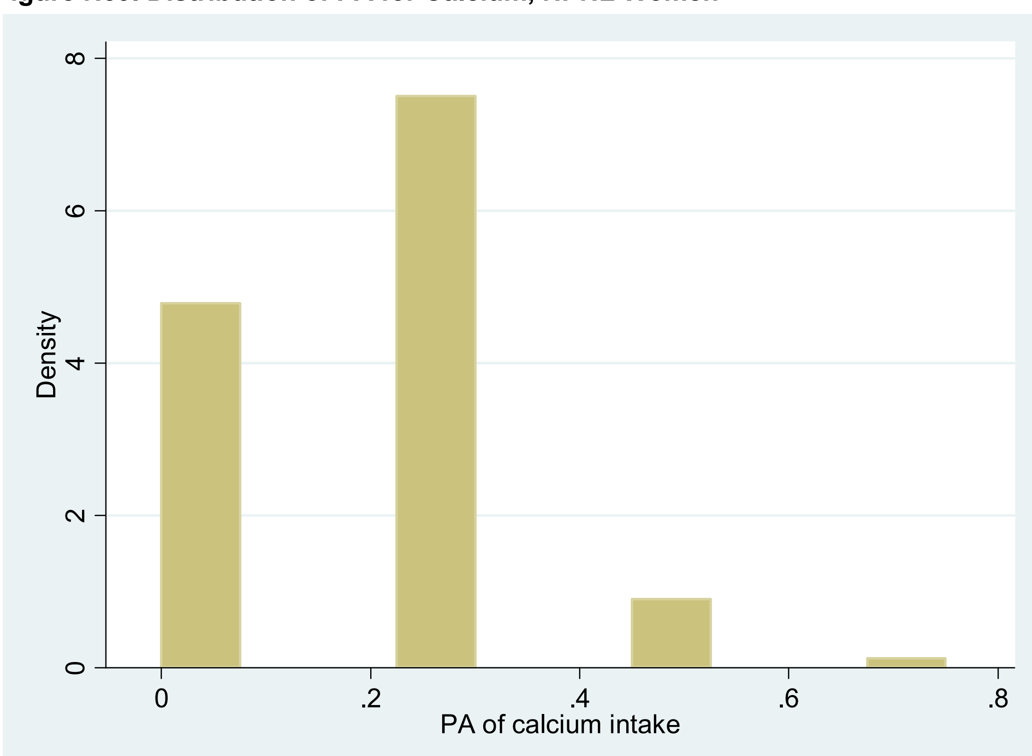


Figure N40. Distribution of PA for Iron, NPNL Women

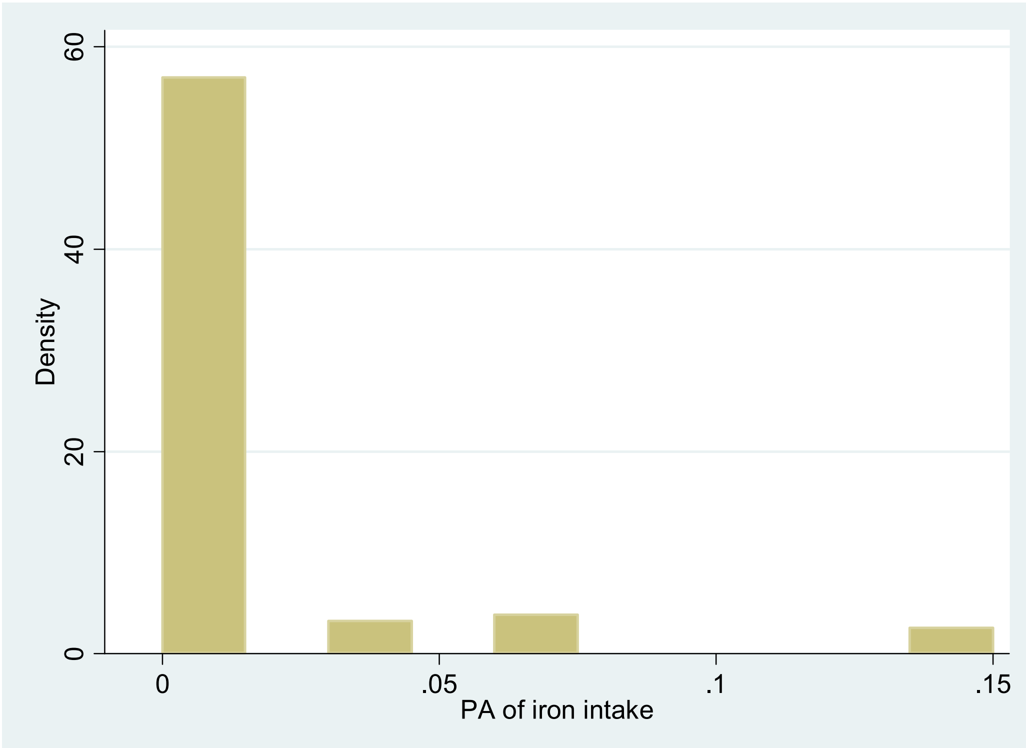


Figure N41. Distribution of PA for Zinc, NPNL Women

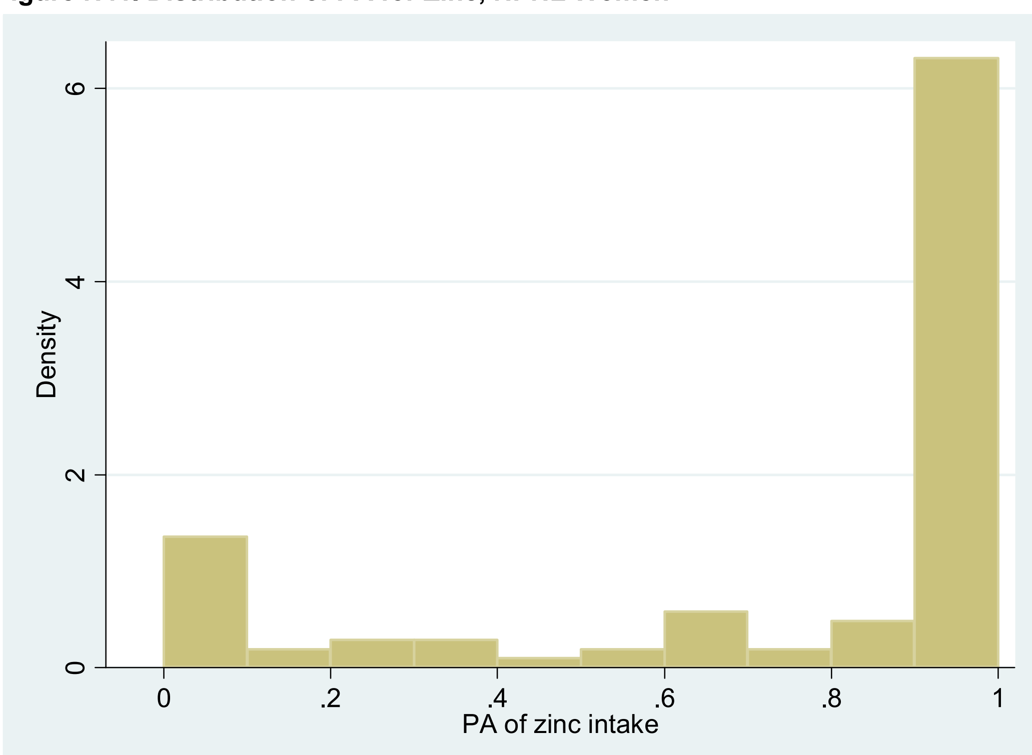
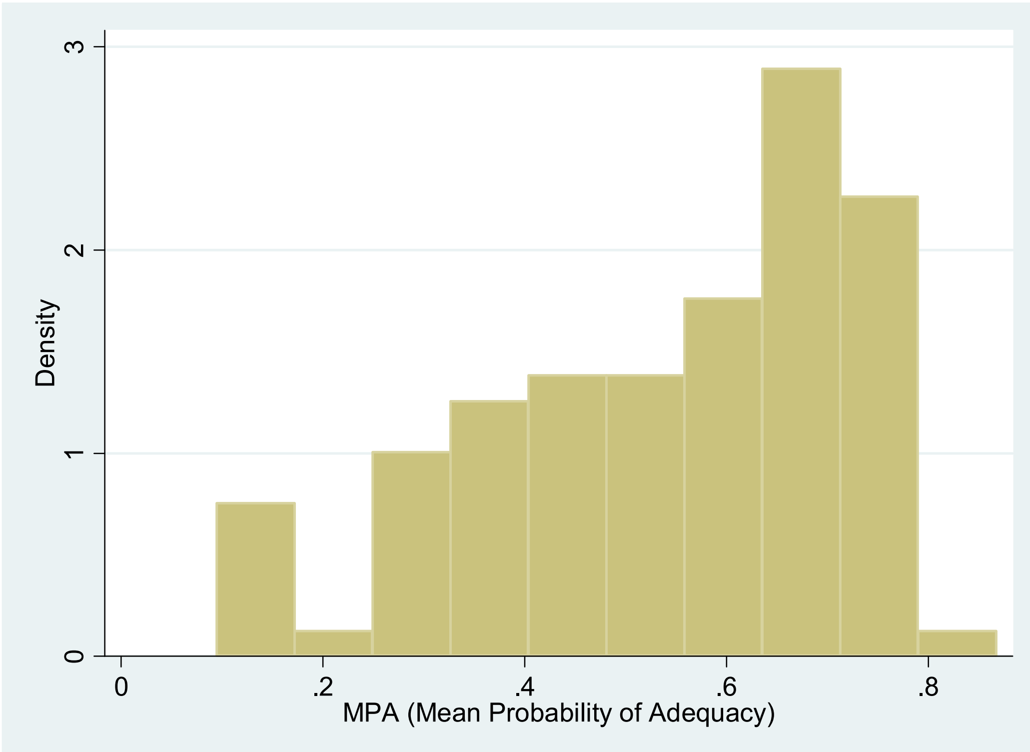


Figure N42. Distribution of MPA across 11 Micronutrients, NPNL Women



Appendix 4: Tables for Second Observation Day

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

	n	Mean	SD	Median	Range
Age (year)	66	29.6	8.1	30.0	19.0-44.0
Height (cm)	94	153.6	6.6	153.8	137.8-165.5
Weight (kg)	94	51.2	7.4	51.6	37.6-70.9
BMI	94	21.7	2.7	21.6	15.8-31.0
% Literate	94	23.4			
% Lactating	94	54.3			
% Pregnant	94	14.9			
	n	**Percent**			
BMI <16	1	1.1			
BMI 16-16.9	1	1.1			
BMI 17-18.49	5	5.3			
BMI 18.5-24.9	79	84.0			
BMI 25-29.9	7	7.4			
BMI ≥ 30	1	1.1			

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

	Mean	SD	Median	Range	Percent of kcal
Energy (kcal)	2,158.9	686.6	2,186.2	928.1-3,457.2	
Protein (g)	61.8	34.6	59.5	13.8-163.6	11
Animal source (g)	11.7	19.4	0.0	0.0-116.2	2
Plant source (g)	50.1	20.8	51.5	9.4-135.7	9
Total carbohydrate (g)	474.7	143.6	472.2	215.5-747.4	84
Total fat (g)	13.5	10.8	9.7	4.2-57.3	5

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

Nutrient	Mean	SD	Median	EAR [a]	SD [a]
Energy	2,159	687	2,186		
Protein (all sources) (% of kcal)	11	4	11		
Protein from animal sources (% of kcal)	2	3	0		
Total carbohydrate (% of kcal)	84	7	83		
Total fat (% of kcal)	5	3	4		
Thiamin (mg/d)	1.13	0.51	1.09	1.2	0.12
Riboflavin (mg/d)	0.87	0.42	0.82	1.3	0.13
Niacin (mg/d)	11.67	5.54	10.86	13	2.0
Vitamin B6 (mg/d)	2.21	1.14	1.95	1.7	0.17
Folate (µg/d)	312.58	140.66	286.73	450	45.0
Vitamin B12 (µg/d)	1.68	2.72	0.00	2.4	0.24
Vitamin C (mg/d)	177.36	179.95	140.39	58	5.8
Vitamin A (RE/d)	1,064.98	1,101.77	802.42	450	90
Calcium (mg/d)	312.60	179.71	282.36	1,000[b]	[b]
Iron (mg/d)	11.86	4.15	11.16	23.40	7.02
Zinc (mg/d)	9.38	4.01	9.27	8	1.00

[a] See Table A6-1 for sources for each EAR and SD. Requirements for lactating women are presented here; see Tables A6-1 and N8 for requirements for NPNL women. There were few pregnant women in the study sample, and over 50 percent of the women were lactating.
[b] There is no EAR and no SD for calcium; 1,000 mg is the Adequate Intake (AI) value for lactating women.

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

	n	Mean	SD	Median	Range
Age (year)	36	28.5	8.0	29.0	19.0-40.0
Height (cm)	51	153.7	7.0	154.1	140.5-165.2
Weight (kg)	51	50.7	6.0	51.4	39.0-66.1
BMI	51	21.4	2.2	21.3	15.8-26.9
% Literate	51	25.5			
% Lactating	51	100.0			
% Pregnant	51	2.0			
	n	**Percent**			
BMI <16	1	2.0			
BMI 16-16.9	0	0.0			
BMI 17-18.49	3	5.9			
BMI 18.5-24.9	43	84.3			
BMI 25-29.9	4	7.8			
BMI ≥ 30	0	0.0			

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

	Mean	SD	Median	Range	Percent of kcal
Energy (kcal)	2,140.6	747.6	2,179.2	928.1-3,457.2	
Protein (g)	63.4	39.1	62.2	13.8-163.6	11
Animal source (g)	10.6	16.6	0.0	0.0-116.2	2
Plant source (g)	52.8	24.3	56.7	9.4-135.7	9
Total carbohydrate (g)	469.9	149.4	470.8	215.5-733.2	84
Total fat (g)	12.7	10.7	9.2	4.2-49.9	5

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

Nutrient	Mean	SD	Median	EAR [a]	SD [a]
Energy	2,141	748	2,179		
Protein (All Sources) (% of kcal)	11	4	11		
Protein from animal sources (% of kcal)	2	2	0		
Total carbohydrate (% of kcal)	84	6	84		
Total fat (% of kcal)	5	3	4		
Thiamin (mg/d)	1.12	0.44	1.10	1.2	0.12
Riboflavin (mg/d)	0.84	0.38	0.79	1.3	0.13
Niacin (mg/d)	11.29	6.16	10.49	13	2.0
Vitamin B6 (mg/d)	2.11	0.87	1.81	1.7	0.17
Folate (µg/d)	329.12	143.02	318.66	450	45.0
Vitamin B12 (µg/d)	1.54	2.10	0.00	2.4	0.24
Vitamin C (mg/d)	168.54	160.36	121.73	58	5.8
Vitamin A (RE/d)	970.79	1,018.94	595.65	450	90
Calcium (mg/d)	311.52	172.08	273.53	1,000[b]	[b]
Iron (mg/d)	12.39	4.80	11.57	23.40	7.02
Zinc (mg/d)	9.61	4.18	9.46	8	1.00

[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 Adequate Intake (AI) value for lactating women.

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

	n	Mean	SD	Median	Range
Age (year)	22	31.9	5.4	33.0	21.0-44.0
Height (cm)	30	152.9	5.4	154.1	137.8-162.9
Weight (kg)	30	50.3	8.5	49.6	37.6-67.0
BMI	30	21.4	2.5	21.5	16.8-27.1
% Literate	30	26.7			
% Lactating	30	0.0			
% Pregnant	30	0.0			
	n	**Percent**			
BMI < 16	0	0.0			
BMI 16-16.9	1	3.3			
BMI 17-18.49	2	6.7			
BMI 18.5-24.9	24	80.0			
BMI 25-29.9	3	10.0			
BMI ≥ 30	0	0.0			

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

	Mean	SD	Median	Range	Percent of kcal
Energy (kcal)	2,188.9	435.2	2,231.8	1,377.0-3,013.3	
Protein (g)	58.4	21.0	57.0	22.7-120.5	10
Animal source (g)	12.6	18.8	1.5	0.0-98.3	2
Plant source (g)	45.8	11.6	46.2	9.8-76.8	8
Total carbohydrate (g)	482.6	107.9	478.8	306.7-695.5	84
Total fat (g)	15.2	9.5	12.8	4.5-34.7	6

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

Nutrient	Mean	SD	Median	EAR [a]	SD [a]
Energy	2,189	435	2,232		
Protein (All Sources) (% of kcal)	10	4	10		
Protein from animal sources (% of kcal)	2	3	0		
Total carbohydrate (% of kcal)	84	7	83		
Total fat (% of kcal)	6	4	5		
Thiamin (mg/d)	1.12	0.36	1.08	0.9	0.09
Riboflavin (mg/d)	0.90	0.28	0.89	0.9	0.09
Niacin (mg/d)	12.14	4.28	11.24	11.0	1.6
Vitamin B6 (mg/d)	2.37	1.13	2.23	1.1	0.11
Folate (µg/d)	286.44	98.62	278.33	320	32
Vitamin B12 (µg/d)	1.92	2.83	0.11	2.0	0.2
Vitamin C (mg/d)	193.80	130.73	175.22	38	3.8
Vitamin A (RE/d)	1,179.93	645.01	1,091.11	270	54
Calcium (mg/d)	314.30	162.58	299.64	1,000[b]	[b]
Iron (mg/d)	10.91	3.48	10.93	See Table A6-2	
Zinc (mg/d)	8.71	1.61	8.88	7	0.88

[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 Adequate Intake (AI) value 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 Demographic and Health Surveys website at:
http://www.measuredhs.com/aboutsurveys/dhs/questionnaires_archive.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, this study 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 US AI value 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 (WHO/FAO 2004).
[g] This is not an EAR, but rather AI from IOM (1997). Following Foote et al. (2004), PA is calculated 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 OF SELECTION OF EAR AND CV

Vitamin A

According to WHO/FAO,[123] 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.,[124] 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.[125] An individual with a usual intake of calcium at or above AI can be assumed to have an AI. Foote et al.[126] 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.[127] 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.[128] 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[129] 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

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[123] 2004.
[124] 2004.
[125] IOM 1997.
[126] 2004.
[127] Table I-6 and I-7; 2000b.
[128] 2000b.
[129] 2004.

requirements – which assume 18 percent absorption in first trimester and 25 percent absorption in second and third 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).[130] 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.[131] It also estimated a CV for the requirement distribution of 12.5 percent, indicating a narrower requirement distribution than implied by the WHO/FAO[132] CV of 25 percent. Hotz[133] 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.[134] 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).

[130] WHO/FAO 2004, page 265.
[131] IZiNCG 2004.
[132] 2004.
[133] 2007.
[134] IZiNCG 2004.

Appendix 7: Nutrient Intakes and Probability of Adequacy When Intermediate 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	2,114	713	2,029				
Protein (All Sources) (% of kcal)	11	4	11				
Protein from animal sources (% of kcal)	2	4	0				
Total carbohydrate (% of kcal)	82	10	79				
Total fat (% of kcal)	7	7	5				
Thiamin (mg/d)	1.09	0.51	1.03	1.2	0.12	0.43	0.26
Riboflavin (mg/d)	0.86	0.48	0.77	1.3	0.13	0.17	0.00
Niacin (mg/d)	11.50	6.70	10.42	13	2.0	0.30	0.13
Vitamin B6 (mg/d)	1.99	1.19	1.65	1.7	0.17	0.60	0.88
Folate (μg/d)	314.81	213.00	288.51	450	45.0	0.19	0.00
Vitamin B12 (μg/d)	1.78	3.90	0.06	2.4	0.24	0.22	0.00
Vitamin C (mg/d)	154.84	159.65	119.00	58	5.8	0.83	1.00
Vitamin A (RE/d)	905.05	1,112.11	694.68	450	90	0.74	1.00
Calcium (mg/d)	324.26	205.64	284.64	1,000 [c]	[c]	0.17	0.25
Iron (mg/d)	11.82	6.56	10.75	11.7	3.51	0.34	0.25
Zinc (mg/d)	9.48	4.34	8.97	8	1.00	0.64	0.85
MPA across 11 micronutrients	0.42	0.24	0.40				

[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 are presented here; see Tables A6-1 and A7-2 for requirements for NPNL women. There were few pregnant women in the study sample, and over 50 percent of the women were lactating.
[c] There is no EAR and no SD for calcium; 1,000 mg is the Adequate Intake (AI) value for lactating 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	2,105	768	2,012				
Protein (All Sources) (% of kcal)	11	4	10				
Protein from animal sources (% of kcal)	2	3	0				
Total carbohydrate (% of kcal)	82	8	79				
Total fat (% of kcal)	7	7	5				
Thiamin (mg/d)	1.08	0.49	1.00	1.2	0.12	0.35	0.07
Riboflavin (mg/d)	0.83	0.46	0.74	1.3	0.13	0.06	0.00
Niacin (mg/d)	11.10	6.80	10.02	13	2.0	0.23	0.08
Vitamin B6 (mg/d)	1.90	1.09	1.57	1.7	0.17	0.47	0.26
Folate (µg/d)	310.71	193.18	289.33	450	45.0	0.12	0.00
Vitamin B12 (µg/d)	1.72	3.26	0.06	2.4	0.24	0.20	0.00
Vitamin C (mg/d)	151.32	152.37	112.44	58	5.8	0.78	1.00
Vitamin A (RE/d)	875.27	966.03	652.42	450	90	0.67	1.00
Calcium (mg/d)	315.13	198.87	278.59	1,000 [c]	[c]	0.17	0.25
Iron (mg/d)	11.73	6.55	10.70	11.7	3.51	0.44	0.37
Zinc (mg/d)	9.51	4.04	8.90	8	1.00	0.65	0.83
MPA across 11 micronutrients	0.38	0.22	0.36				

[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; see Tables A6-1 and A7-2 for requirements for NPNL women.
[c] There is no EAR and no SD for calcium; 1,000 mg is the Adequate Intake (AI) value 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	2,118	558	2,086				
Protein (All Sources) (% of kcal)	11	4	11				
Protein from animal sources (% of kcal)	2	4	0				
Total carbohydrate (% of kcal)	82	10	81				
Total fat (% of kcal)	7	6	5				
Thiamin (mg/d)	1.08	0.42	1.10	0.9	0.09	0.68	0.97
Riboflavin (mg/d)	0.92	0.41	0.92	0.9	0.09	0.45	0.43
Niacin (mg/d)	11.73	4.43	10.79	11.0	1.6	0.49	0.54
Vitamin B6 (mg/d)	2.23	1.29	1.90	1.1	0.11	0.90	1.00
Folate (µg/d)	326.65	175.88	309.96	320	32	0.45	0.23
Vitamin B12 (µg/d)	1.87	3.55	0.02	2.0	0.2	0.26	0.00
Vitamin C (mg/d)	162.05	173.24	128.51	38	3.8	0.90	1.00
Vitamin A (RE/d)	945.24	1,048.58	792.48	270	54	0.86	1.00
Calcium (mg/d)	336.62	185.48	304.94	1,000 [c]	[c]	0.18	0.25
Iron (mg/d)	12.16	5.48	10.83	See Table A6-2		0.27	0.15
Zinc (mg/d)	9.31	3.72	9.35	7	0.88	0.76	1.00
MPA across 11 micronutrients	0.56	0.18	0.60				

[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 A7-1 for requirements for lactating women.

[c] There is no EAR and no SD for calcium; 1,000 mg is the Adequate Intake (AI) value for NPNL women.