

February 17, 2017 Fellows' Seminar

Importance of Country-specific Databases for Micronutrient Analyses: the Vitamin D Example

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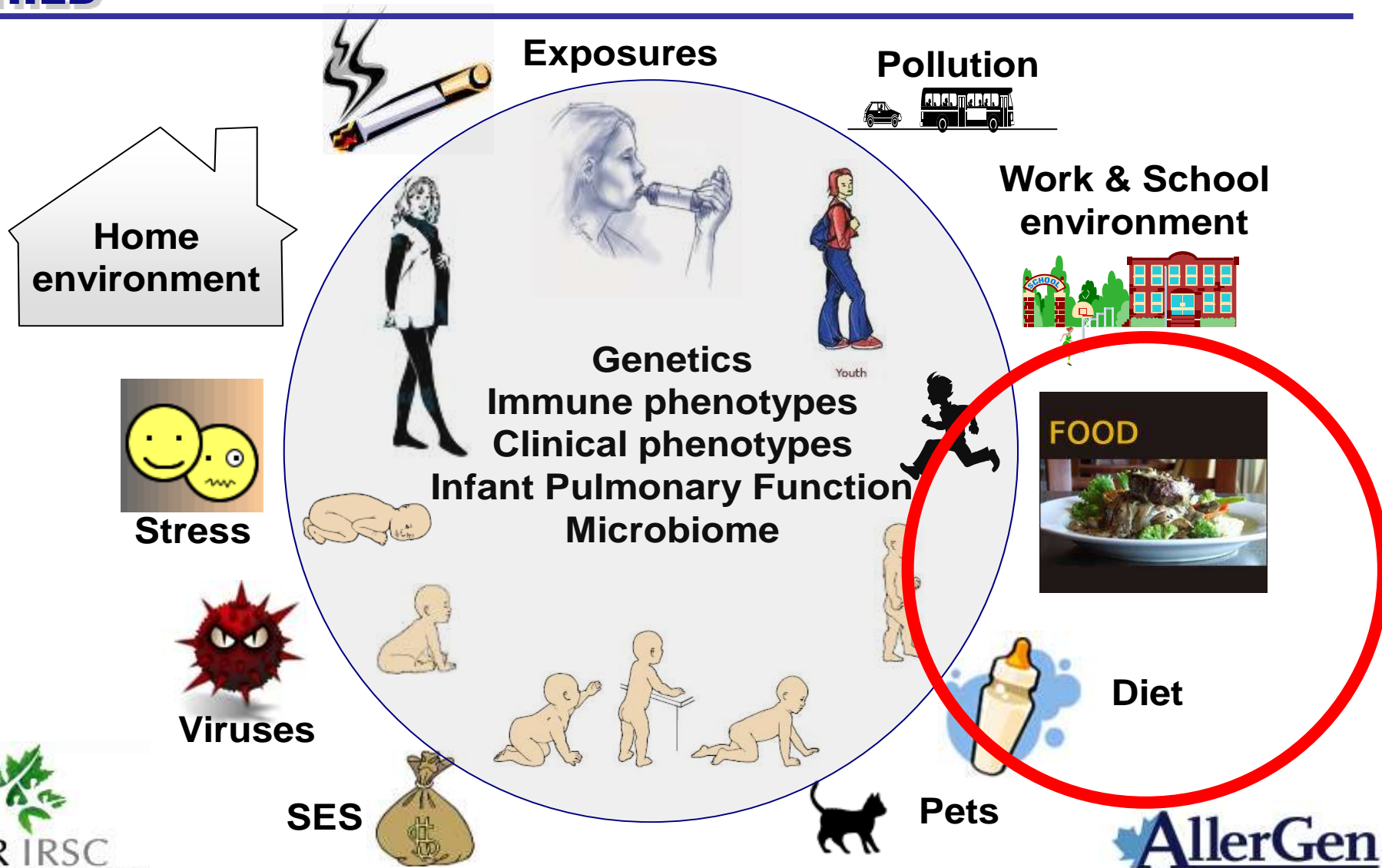
Today's Presentation

1. Introduction to Project/Research Question
2. Concerns about CHILD Nutrient Database/Rationale
3. Projects Timeline
4. Profiling the CHILD FFQ/Fortification Summary
5. Database Validity Assessment
6. Vitamin D Intake – Some Descriptive Statistics
7. Future Analysis Steps
8. Conclusion
9. References

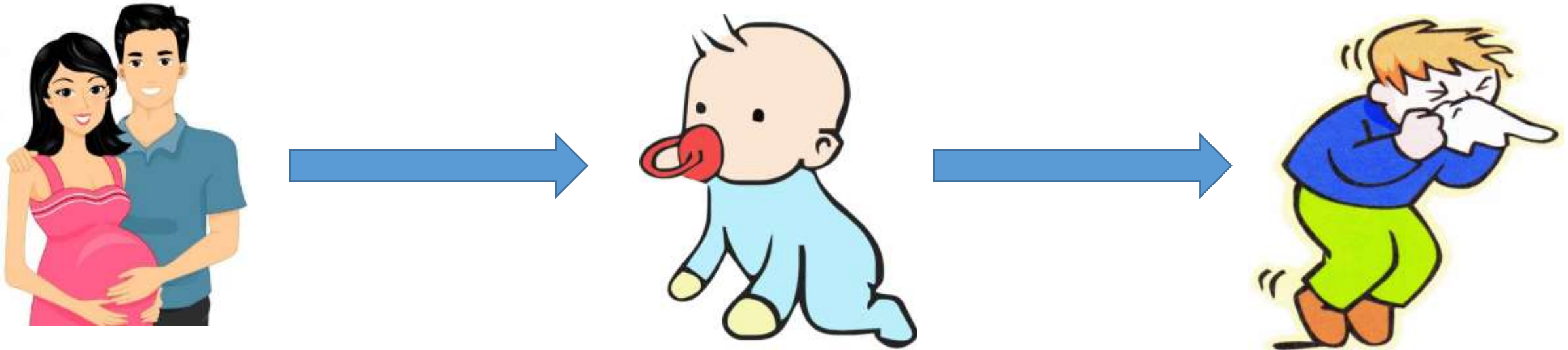




Canadian Healthy Infant Longitudinal Development Study



Project Outline²⁻⁴



- Exposure: maternal intake of vitamin D during pregnancy
- Outcomes: infant wheezing and colds during the first year of life
- Analysis: longitudinal

Project Outline Cont.

Hypothesis

- Maternal consumption of vitamin D will be inversely associated with infant wheezing and colds throughout the first year of life.

Project Aims

- To quantify the intake of vitamin D from dietary and supplemental sources in mothers enrolled in the CHILD study.
- To quantify the association of maternal total, food-derived, and supplemental vitamin D, with incident infant wheezing and colds during the first year of life using appropriate multivariable regression approaches.

Aim #1: Describing Vitamin D Intake in Mothers^{5,6}

- Assess maternal vitamin D intake, from dietary and supplemental sources
- Dietary data collected in the CHLD cohort, using the Fred Hutchinson Cancer Research Center FFQ
- Conventional descriptive statistics such as means, medians, and proportions will be used to assess vitamin D intake in mothers, which will be used as a predictor variable to achieve Aim #2

Aim #2: Assessment of the Association of Vitamin D with Infant Wheezing and Colds during the First Year of Life⁷

- Vitamin D will be assessed as:
 - A continuous variable
 - A categorical variable (meeting/not meeting recommended daily requirements)
 - Quintiles of intake (1-5)
- Colds and wheeze will be assessed as either:
 - Counts
 - A binary variable (at least one vs. none)
- Model fit assessment will employ:
 - Akaike Information Criterion (AIC)
 - Deviance
 - Residual standard deviation
- Use residual method to adjust vitamin D for total energy intake if appropriate

Questions about CHILD Nutrient Database

- CHILD Nutrient Database was “Canadianized” – what does this mean?
 - Modified to reflect Canadian ethnic food choices – Yes!
 - **Modified to reflect Canadian fortification practices – ?**

Current Research Question: How was the CHILD Nutrient Database constructed and modified with regard to vitamin D and other micronutrient levels?

Rationale⁷

- The Fred Hutchinson Cancer Research Center FFQ was based on questionnaires used in US studies and was modified to reflect Canadian ethnic food choices.
- The database developed by the University of Minnesota Nutrition Data Systems for Research for data entry and nutrient analysis was “Canadianized” for use in CHILD.

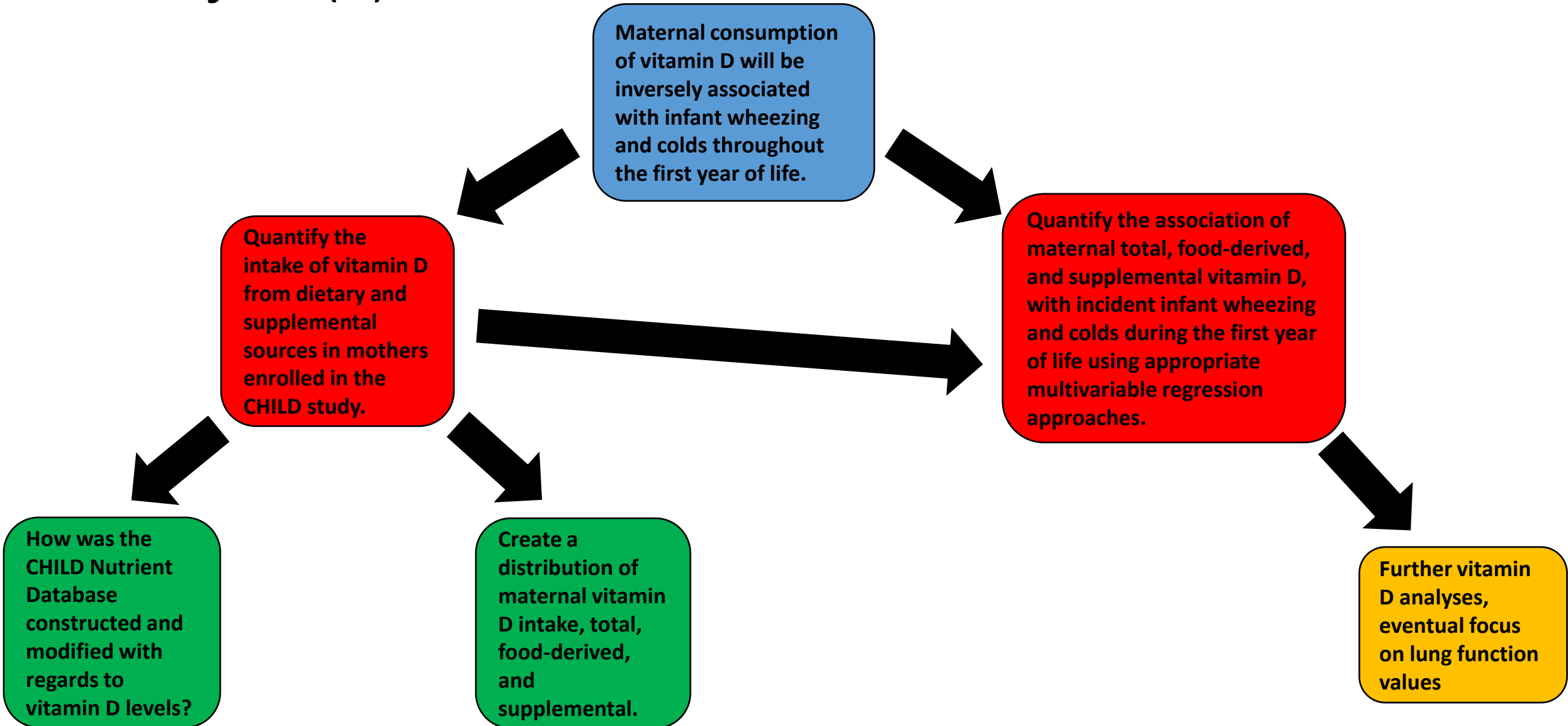
Rationale Cont.⁷

- Nutrient databases have attempted to provide increasingly specific information.
- However, a high degree of specificity is often not obtainable in epidemiologic applications in which food intake data represents extended periods of time.

Rationale Cont.⁷

- Beyond validation studies, most epidemiologic studies use FFQs of 100 to 200 food items.
- To compute nutrient intakes based on information from such an FFQ, a *customized* nutrient database must be created to provide values for each food on the FFQ.

Project(s) Timeline



Profiling the CHILD FFQ/Fortification Summary

So, we asked:

- What FFQ was used?
- Was this FFQ modified from another instrument?
- What nutrients are fortified in Canada? To what level? As of what year?
- Same for U.S
- For each fortified nutrient, which foods are the most common contributors in the U.S. and Canada?

Database Validity Assessment⁸⁻¹¹

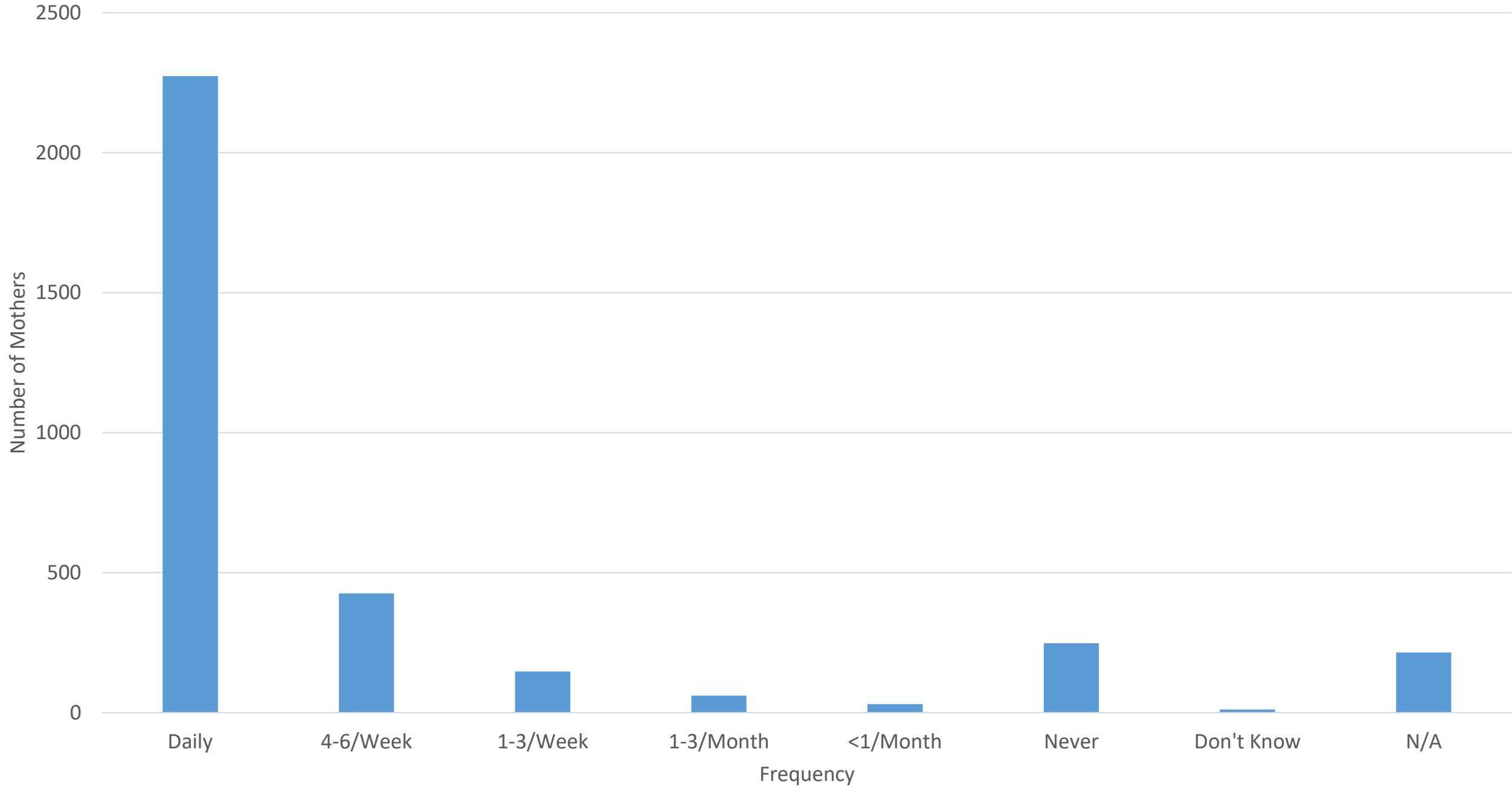
- Using information obtained previously with Vanessa Ha and Zahra Sohani we sought to compare CNF and USDA values for CHILD FFQ foods
- Eventually the FHCRC team sent the list of FFQ items and corresponding nutrient values for a subset of the nutrients we originally investigated
- And so, these values were compared to those of the CNF and USDA for comparable food items

Vitamin D per approx. 100g (IU)*

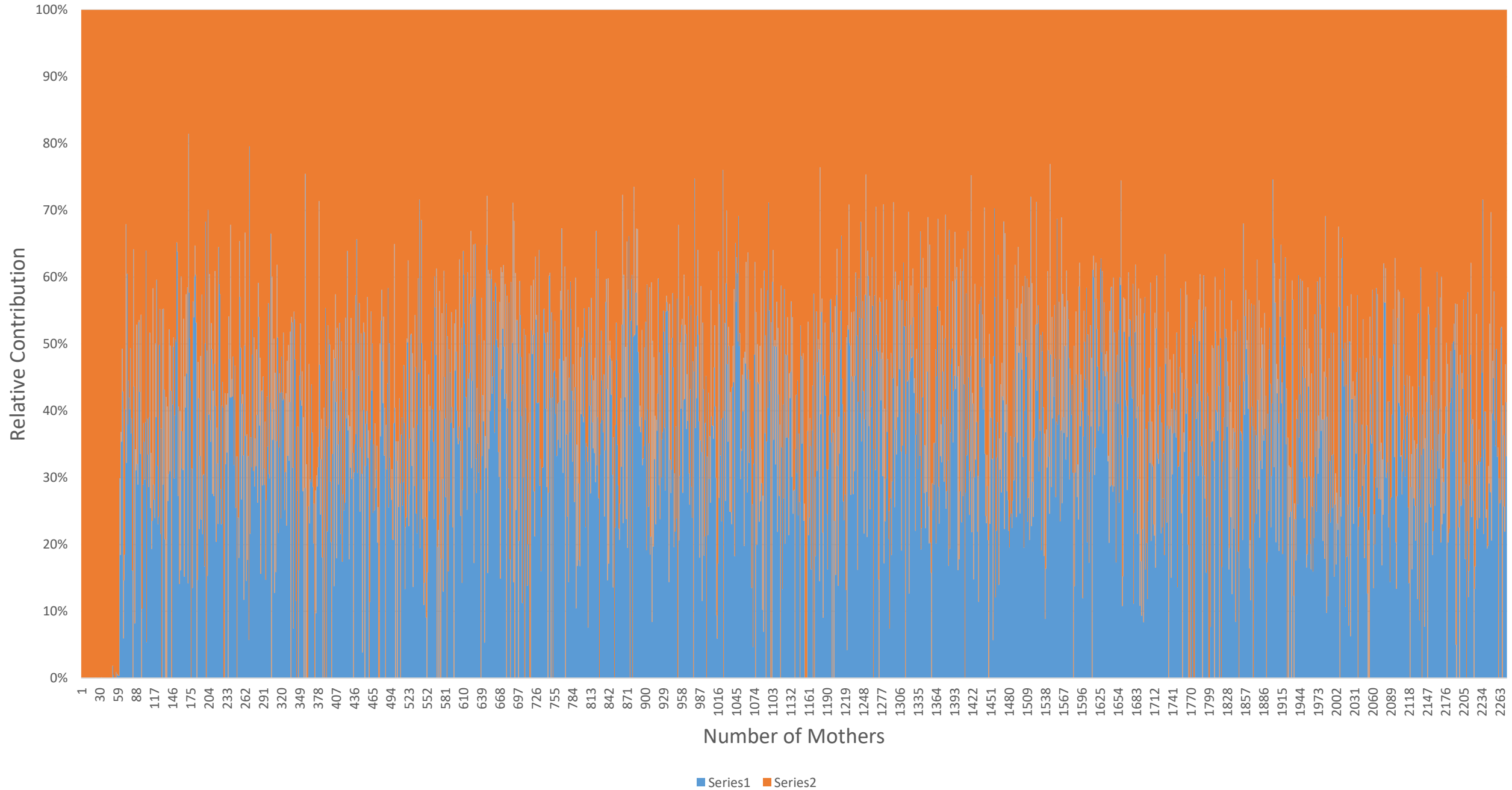
CHILD		CNF		USDA	
Dark fish (broiled or baked) such as salmon, mackerel and bluefish #3308	444.01	Fish, salmon, Atlantic, farmed, baked or broiled #3183	274 (176.33)	Fish, salmon, Atlantic, farmed, cooked, dry heat #15237	526
Orange juice and grapefruit juice #3496	0	Orange juice, chilled, includes from concentrate, fortified with added calcium and vitamin D #6203	38	Orange juice, chilled, includes from concentrate, with added calcium and vitamin D #09210	40
Whole milk (as a beverage) #3451	50.34	Milk, fluid, whole, pasteurized, homogenized, 3.25% M.F #113	40	Milk, whole, 3.25% milkfat, with added vitamin D #01077	51
Whole eggs (without fortification) #3283	92.0864	Egg, chicken, whole, fresh or frozen, raw #125	58	Egg, whole, raw, fresh #01123	82
Highly fortified cereals (100% of Daily Values) such as Total, Smart Start and Product 19) #3234	96.22	Meal replacement (cereal), ready to eat, Vector, Kellogg's #6303	18	Cereals ready-to-eat, KELLOGG, KELLOGG'S PRODUCT 19 #08058	133

*Portions from CHILD FFQ converted to 100g, µg converted to IU

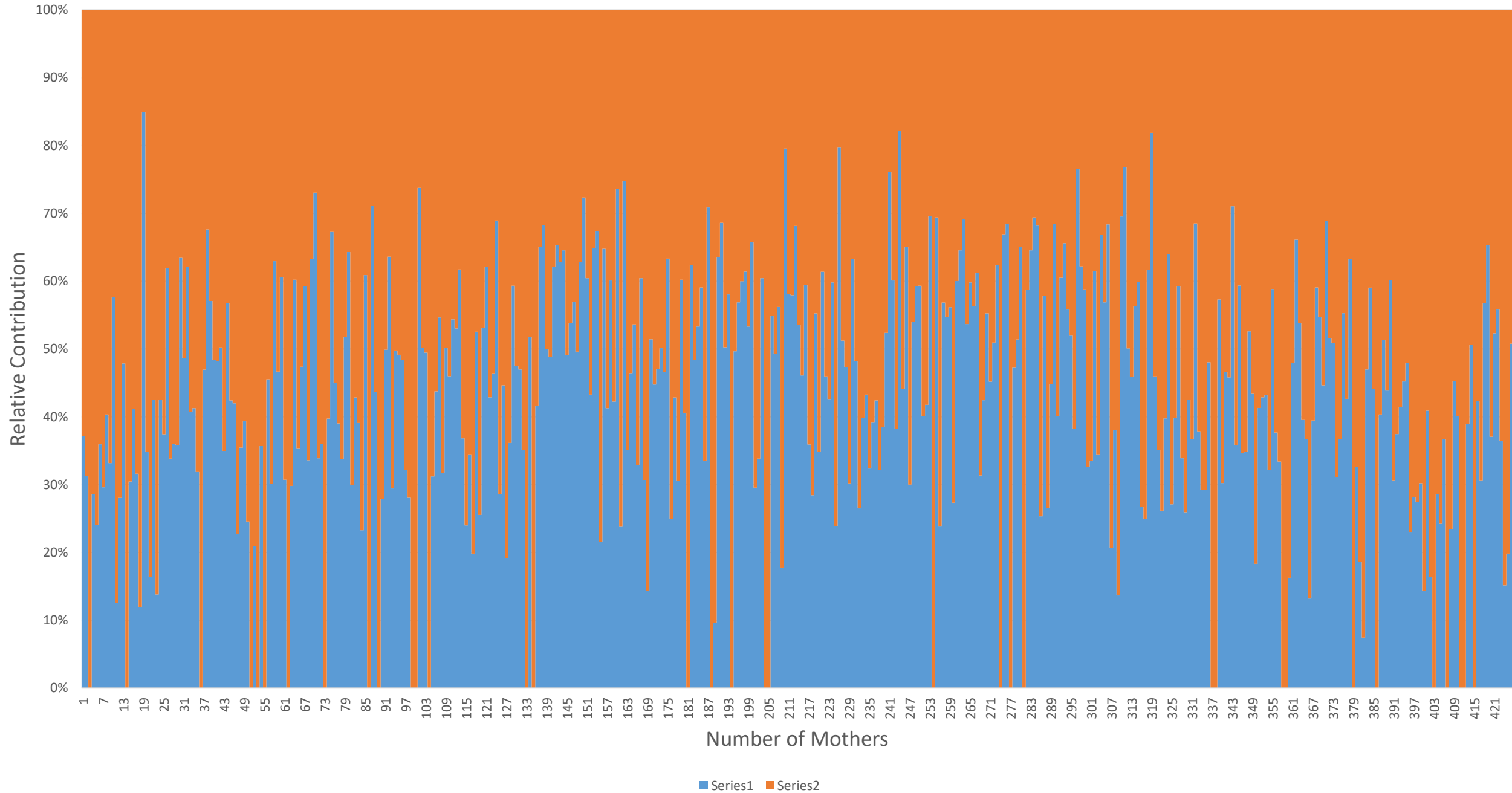
Frequency of MV Use Since Mother Knew She was Pregnant



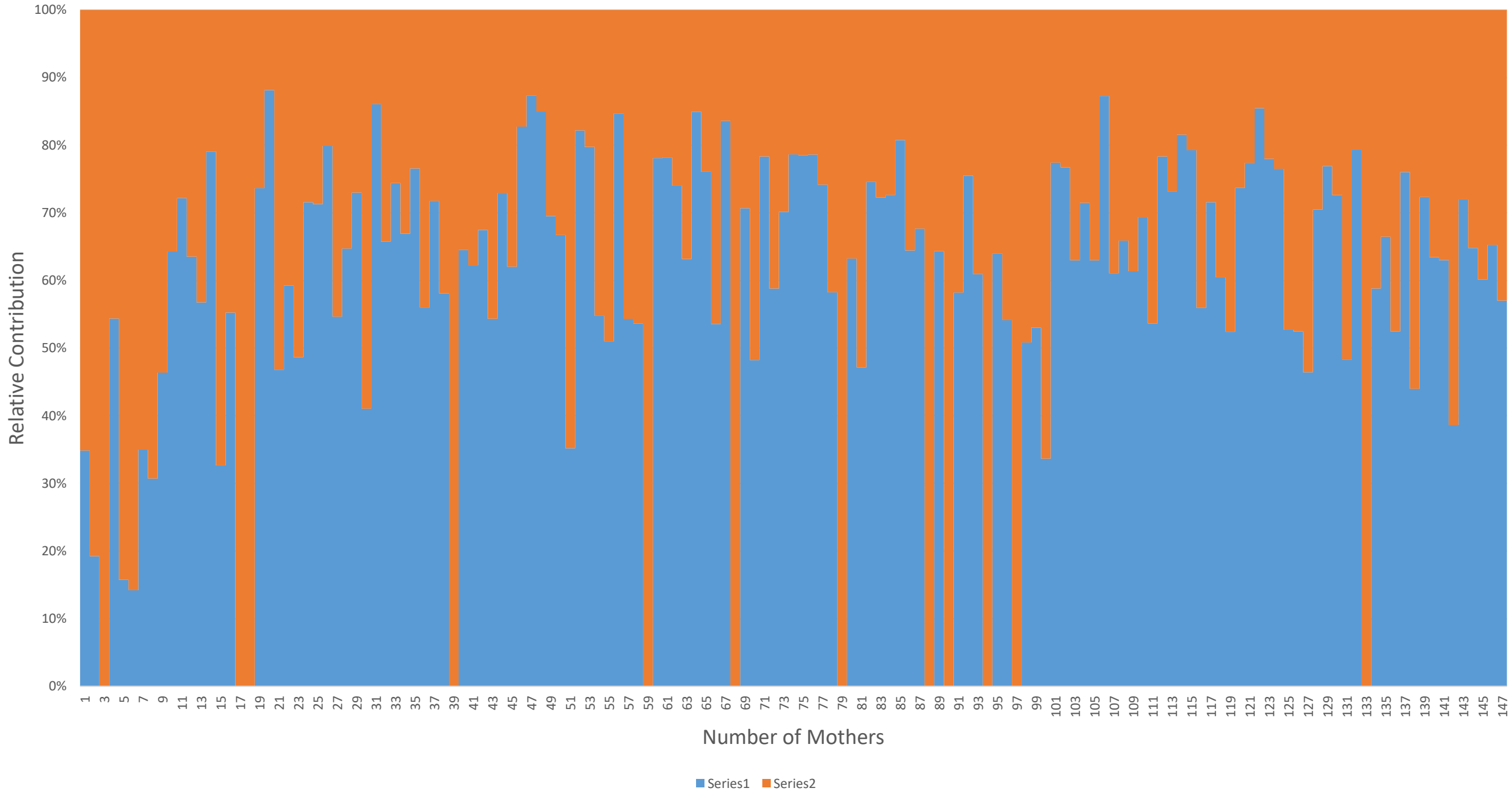
Contributions of Dietary and Supplemental Vitamin D for Mothers Taking MV Daily¹⁷



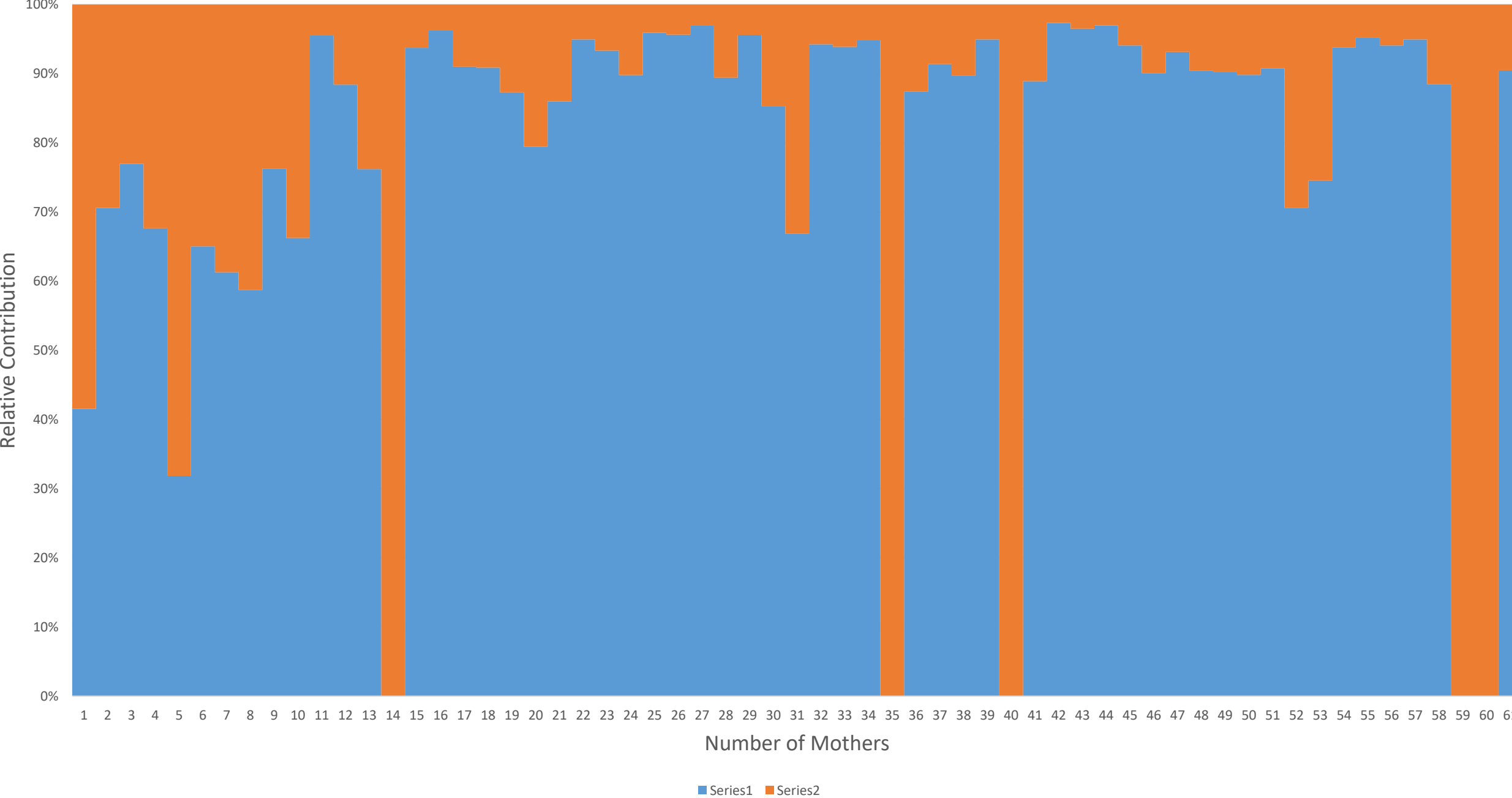
Contributions of Dietary and Supplemental Vitamin D for Mothers Taking 4-6 MV/Week



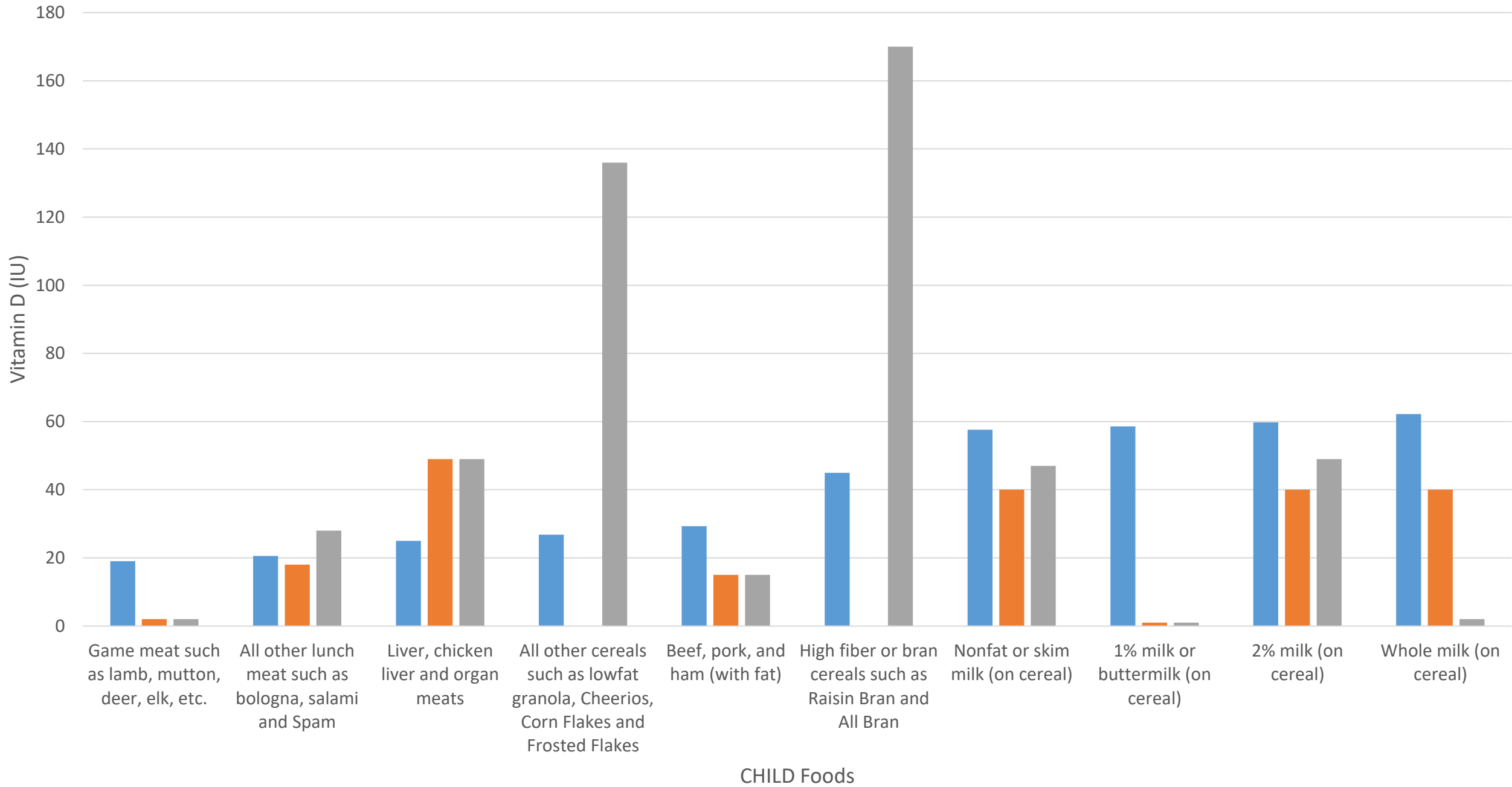
Contributions of Dietary and Supplemental Vitamin D for Mothers taking 2-3 MV/Week



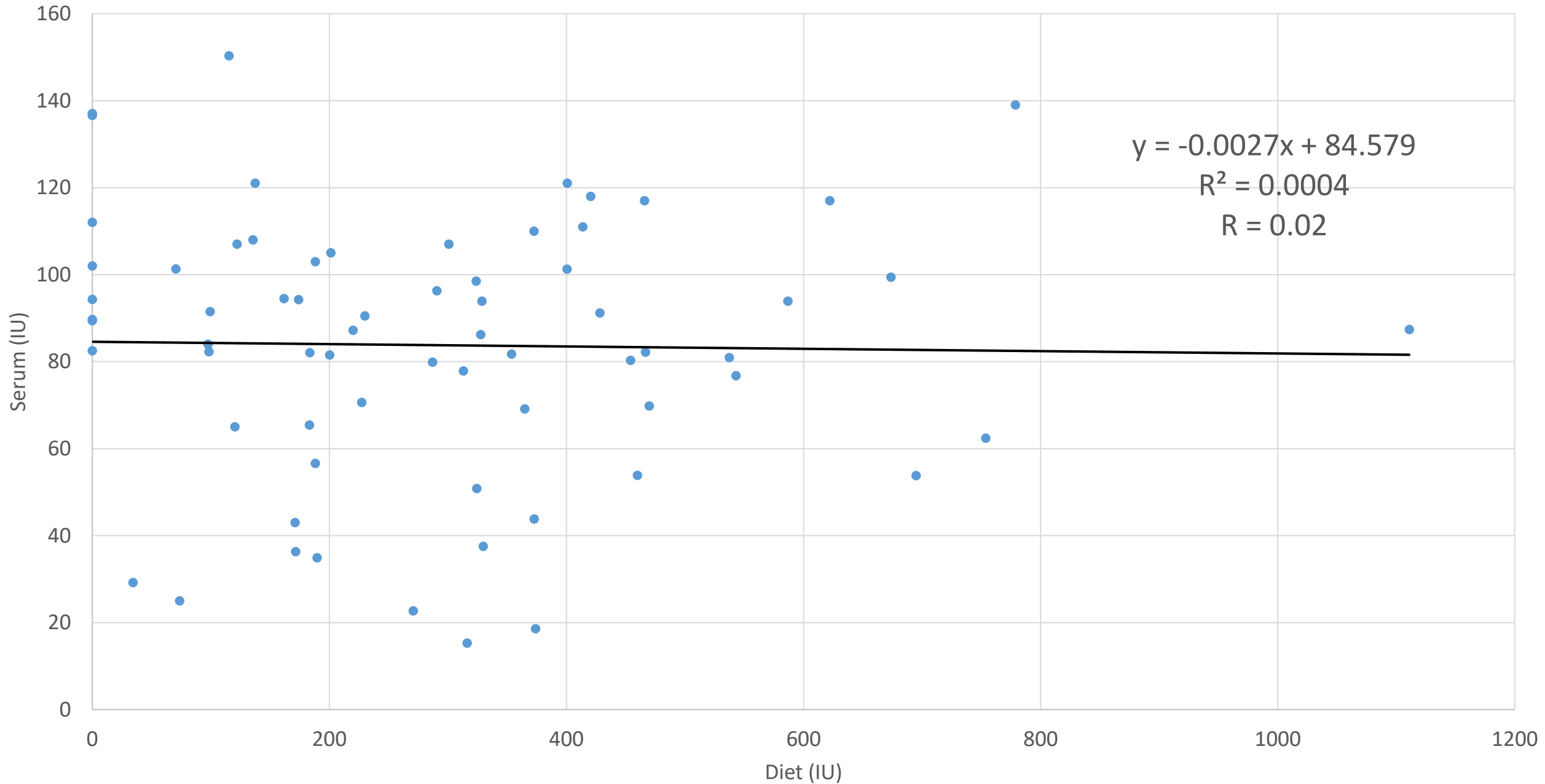
Contributions of Dietary and Supplemental Vitamin D for Mothers Taking 1-3 MV/Month



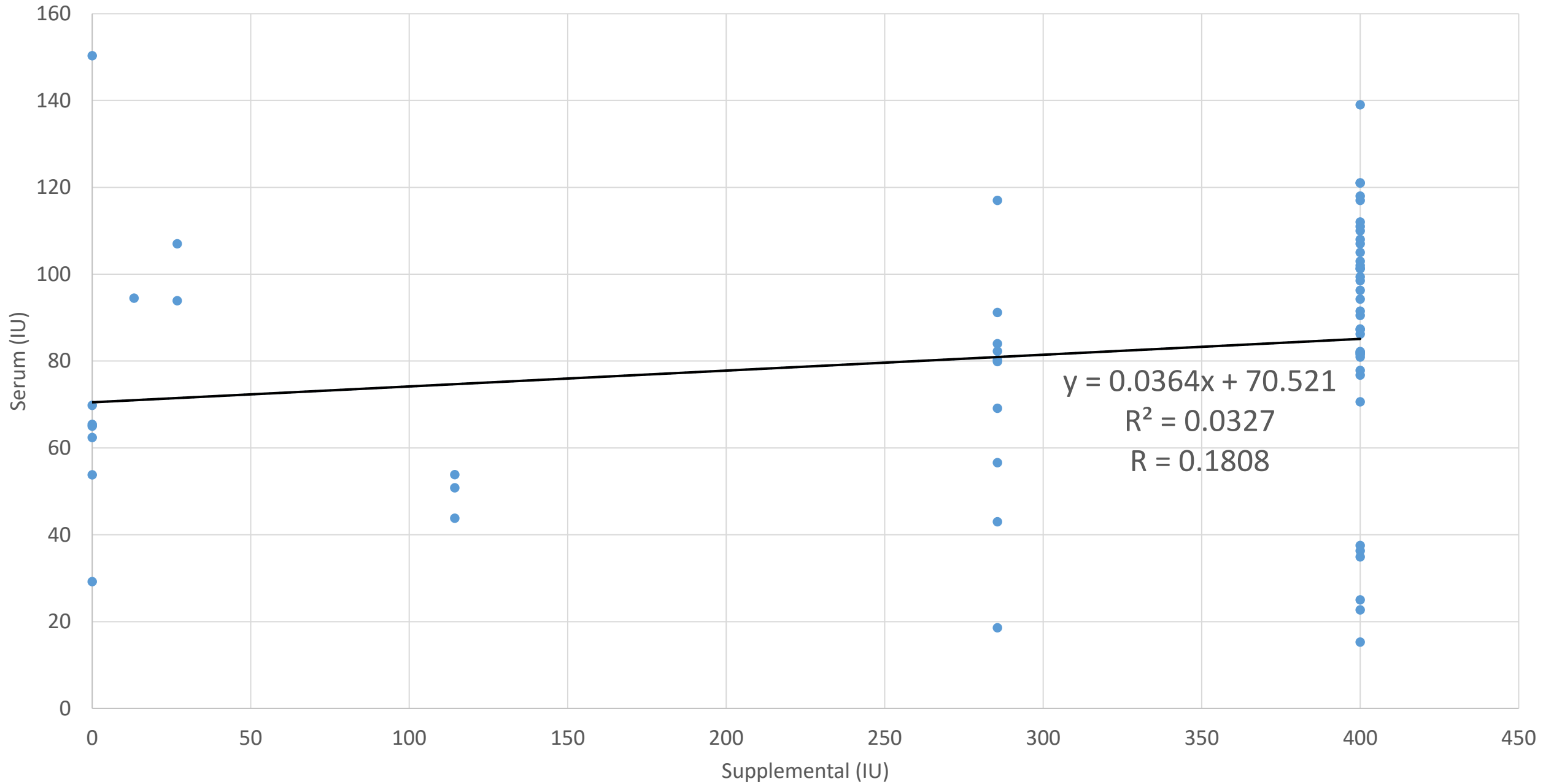
Vitamin D Content of Selected Foods by Database



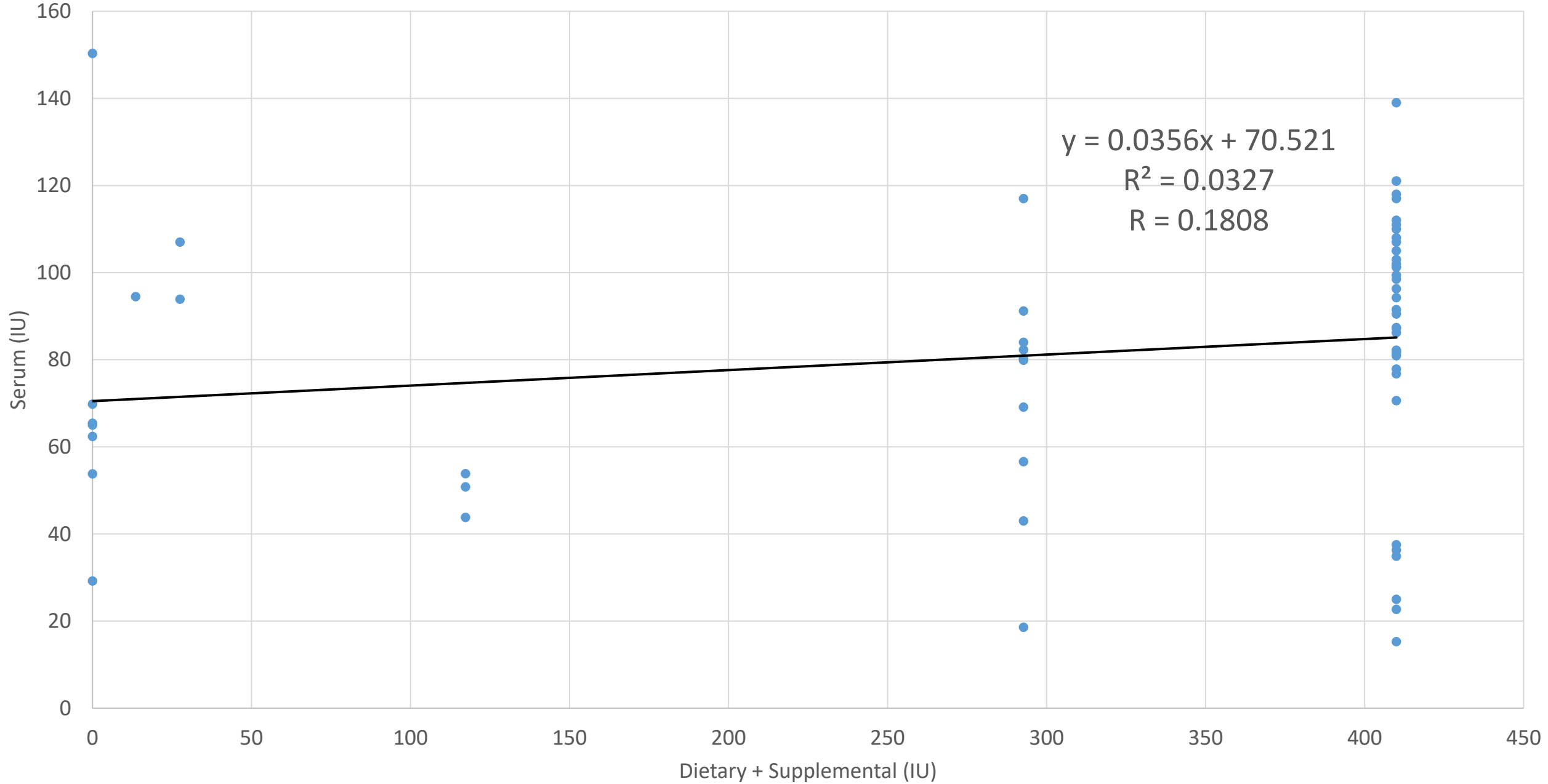
Dietary vs Cord Blood Vitamin D



Supplemental vs Cord Blood Vitamin D



Dietary + Supplemental vs Cord Blood Vitamin D



Future Analysis Steps

- **Finished** coding all CHILD FFQ food items in terms of micronutrient content
- Want to compare the CHILD FFQ food items by:
 - Absolute nutrient values (Pearson's Correlation)
 - Ranks (Spearman's Rank Correlation)
- Compare vitamin D intakes (among supplement users, non-supplement users, and all mothers)
 - FFQ
 - Supplemental
 - Total
- Utilizing such descriptive statistics as:
 - Mean
 - Range
 - % supplement users
 - % total vitamin D from supplements and % total vitamin D from food
 - **Individual misclassification grid**

Additional Considerations¹²⁻¹⁶

- Fred Hutchinson FFQ not validated for vitamin D
- However, it is similar to Harvard Nurses Health Study FFQ, which *has* been used as an adequate measure of vitamin D intake (CVD, RA, skin cancer, etc.)

Conclusion

- Do we have enough confidence in the vitamin D data to justify looking for associations between this nutrient and disease?
- Once this question is answered satisfactorily, we will be ready to resume our original analysis of vitamin D and infant colds/wheeze in the first year of life – all of the necessary data is assembled

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