# A meal-based approach to the classification of individuals as low, adequate, or high nutrient consumers

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Dietary advice can be personalised based on an individual's existing dietary intakes, with the advice provided determined by their classification according to nutrient-based dietary guidelines, i.e., classified as being high, adequate, or low consumers of various nutrients[1]. Existing methods of dietary intake assessment used to classify people in this manner are food-based rather than meal-based. However, meal-based approaches are likely to be more intuitive and less burdensome to complete[2,3]. The objectives of this study were to apply a meal-based approach to analysing dietary intake data and determine its accuracy in classifying individuals according to nutrient-based dietary guidelines. This preliminary analysis examined dietary intake data from the 2017–2018 US National Health and Nutrition Examination Survey (NHANES) gathered from 4339 adults (≥18 years old) using 2 separate 24-hour recalls. Food groups were identified using $k$-means clustering and used to describe participants' meals. Partitioning around the medoids clustering was used to categorise similar meals into groups (generic meals) based on their Nutrient Rich Foods Index (NRF9.3) score and the food groups that they contained. The nutrient content for each generic meal was defined as the mean nutrient content of the grouped meals. 7 standard portion sizes were defined for each generic meal. These were the median weights in each septile of the grouped meals. Population and individual mean daily nutrient intakes were estimated using the generic meal data and the original data. These were then used to classify individuals as low, adequate, or high consumers of 14 nutrients according to nutrient-based dietary guidelines. The proportion of individuals classified into the same group was then assessed for each of the nutrients. The 21,933 meals consumed by men were aggregated to 42 generic meals. The 23817 meals consumed by women were aggregated to 41 generic meals. When participants were classified according to nutrient-based guidelines (low, adequate, or high), the proportion of individuals who were classified into the same category ranged from 59.7% for polyunsaturated fats as percentage energy to 93.8% for sodium as milligrams. The mean agreement for all 14 nutrients assessed was 75.5%. A generic meal-based method can estimate nutrient intakes based on meal rather than food intakes and be used to classify individuals according nutrient- based guidelines. There is variability in the accuracy of these classifications between nutrients, and this warrants further investigation. Future work will focus on incorporating this concept to a meal-based dietary intake assessment and personalised feedback tool.

## References

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3. Gibney MJ & Walsh MC (2013) *Proc Nutr Soc* **72**, 219–225.