Comparison of Known Food Weights with Image-Based Portion-Size Automated Estimation and Adolescents' Self-Reported Portion Size

Christina D. Lee,[1] Junghoon Chae, B.S.,[2] TusaRebecca E. Schap, M.Sc., R.D.,[3]
Deborah A. Kerr, Ph.D.,[4] Edward J. Delp, Ph.D.,[2] David S. Ebert, Ph.D.,[2]
and Carol J. Boushey, Ph.D., M.P.H., R.D.[3,5]

Abstract

Background:

Diet is a critical element of diabetes self-management. An emerging area of research is the use of images for dietary records using mobile telephones with embedded cameras. These tools are being designed to reduce user burden and to improve accuracy of portion-size estimation through automation. The objectives of this study were to (1) assess the error of automatically determined portion weights compared to known portion weights of foods and (2) to compare the error between automation and human.

Methods:

Adolescents (n = 15) captured images of their eating occasions over a 24 h period. All foods and beverages served were weighed. Adolescents self-reported portion sizes for one meal. Image analysis was used to estimate portion weights. Data analysis compared known weights, automated weights, and self-reported portions.

Results:

For the 19 foods, the mean ratio of automated weight estimate to known weight ranged from 0.89 to 4.61, and 9 foods were within 0.80 to 1.20. The largest error was for lettuce and the most accurate was strawberry jam. The children were fairly accurate with portion estimates for two foods (sausage links, toast) using one type of estimation aid and two foods (sausage links, scrambled eggs) using another aid. The automated method was fairly accurate for two foods (sausage links, jam); however, the 95% confidence intervals for the automated estimates were consistently narrower than human estimates.

Conclusions:

The ability of humans to estimate portion sizes of foods remains a problem and a perceived burden. Errors in automated portion-size estimation can be systematically addressed while minimizing the burden on people. Future applications that take over the burden of these processes may translate to better diabetes self-management.

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Author Affiliations: [1]College of Liberal Arts, Purdue University, West Lafayette, Indiana; [2]College of Electrical and Computer Engineering, Purdue University, West Lafayette, Indiana; [3]Department of Nutrition Science, Purdue University, West Lafayette, Indiana; [4]School of Public Health, Curtin University, Perth, Western Australia; [5]Epidemiology Program, University of Hawaii Cancer Center, Honolulu, Hawaii

Corresponding Author: Carol J. Boushey, Ph.D., M.P.H., R.D., Epidemiology Program, University of Hawaii Cancer Center, 1236 Lauhala Street, Suite 407G, Honolulu, HI 96813; email address *cjboushey@cc.hawaii.edu*