Published in final edited form as:

Epidemiology. 2012 November ; 23(6): 934. doi:10.1097/EDE.0b013e31826d08c7.

Lasagna Plots Can Be Made in Different (Statistical) Ovens

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To The Editor

Interpreting repeated measures in longitudinal data analysis can be a challenge, especially in large studies and studies with long follow-up periods. Our research team from the Breast cancer in Older Women (BOW) study^{1,2} was struggling to figure out how to visually depict data on surveillance mammograms received among a cohort of breast cancer survivors—with the overall goal of trying to determine whether surveillance mammography in older women is associated with decreased breast cancer mortality. We have long-term follow-up data on surveillance mammography receipt among a cohort of 1859 breast cancer survivors. To make things more challenging, our outcome (breast cancer mortality) is dichotomous and follow-up is censored by other events (i.e., breast cancer recurrence, other cause mortality, and disenrollment). With over 1800 women and 15 years of follow-up, spaghetti plots were incomprehensible.

It was with great interest and fortune that we came across the commentary by Dr. Swihart and his colleagues in *Epidemiology*. They proposed a new type of graph—lasagna plot, and nicely explained the advantages of using lasagna plots instead of spaghetti plots to display longitudinal data.³ Lasagna plots incorporate time (horizontal axis), values for repeated measures (colors or shadings), and space for displaying each subject (vertical axis) without overlapping data. Moreover, through various sorting and clustering strategies, lasagna plots make it significantly easier to visually detect patterns of repeated measures in data.

In the article,³ R code was provided to produce lasagna plots.⁴ However, our research team was not well enough versed in R to sufficiently manipulate the code for our purposes. We contacted Dr. Swihart to find out if code existed to create lasagna plots in other statistical packages—and it did not, so we set out to recreate these plots using SAS® software.⁵ The GMAP procedure in SAS/GRAPH® software regards a lasagna plot as a non-geographic map: a grid is created as a “map”; values of repeated measures for each subject, as

represented by colors, are filled in for each corresponding unit on the grid; labels and reference lines are added in the last step by annotations.

We duplicated the lasagna plots in Dr. Swihart's commentary and Dr. Swihart was able to replicate the plots from their previously published data using our SAS code. The SAS code and the corresponding lasagna plots are available at <http://www.grouphealthresearch.org/surveillanceproject/programmingresources.html>. We wanted to provide different baking options for lasagna plots for people who have different kitchens.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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