Final Progress Report for Research Projects Funded by Health Research Grants

Instructions: Please complete all of the items as instructed. Do not delete instructions. Do not leave any items blank; responses must be provided for all items. If your response to an item is "None", please specify "None" as your response. "Not applicable" is not an acceptable response for any of the items. There is no limit to the length of your response to any question. Responses should be single-spaced, no smaller than 12-point type. The report **must be completed using MS Word**. Submitted reports must be Word documents; they should not be converted to pdf format. Questions? Contact Health Research Program staff at 717-783-2548.

1. **Grantee Institution:** The Trustees of the University of Pennsylvania

2. **Reporting Period(start and end date of grant award period):** 1/1/2009-12/31/2012

3. **Grant Contact Person(First Name, M.I., Last Name, Degrees):** Gearline R. Robinson-Hall, BSF

4. **Grant Contact Person's Telephone Number:** 215-746-6821

5. **Grant SAP Number:** 4100047654

6. **Project Number and Title of Research Project:** 11 - Development and Validation of a Tool to Assess Perceived Nutrition Environments

7. **Start and End Date of Research Project:** 10/1/2009-10/14/2012

8. **Name of Principal Investigator for the Research Project:** Karen Glanz, PhD, MPH

9. **Research Project Expenses**.

   9(A) Please provide the total amount of health research grant funds spent on this project for the entire duration of the grant, including indirect costs and any interest earned that was spent:

   $ 158,290.68

   9(B) Provide the last names (include first initial if multiple individuals with the same last name are listed) of **all** persons who worked on this research project and were supported with health research funds. Include position titles (Principal Investigator, Graduate Assistant, Post-doctoral Fellow, etc.), percent of effort on project and total health research funds expended for the position. For multiple year projects, if percent of effort varied from year to year, report in the % of Effort column the effort by year 1, 2, 3, etc. of the project (x% Yr 1; z% Yr 2-3).

Last Name	Position Title	% of Effort on Project	Cost
HANLON	RES.ASSOC.PROF	5%	$7,601.28
DAVIS	RES.COORDINATOR	5% YR1;11%YR2	$5,820.27
PATTERSON	TEMP.EX.PERSON	3%YRl; 10% YR2	$5,496.79
POTASHNIK	MGR.RES.PROF	4%YR2	$635.91
CAVANAUGH	MGR.RES.PROF	10%YR2&3;2%YR4	$10,791.11
GREEN	RES.COORDINATOR	25%YR3;29%YR4	$18,692.92
CHEUNG	SFS INT.WORK STUDY	47%YR1;31%YR2;8%YR3	$1,622.40
PYARALI	STUDENT WORKER	40%YR!;10%YR2	$1,042.80
LEE	REG. P/T EMP.	25%YR1;26%YR2	$3,413.07
ROBY	TEMP.EX.PERSON	20%YR2	$3,180.00
DALTON	TEMP.EX.PERSON	20%YR2;39%YR3	$3,363.70
ZIMA	STUDENT WORKER A	16%YR2;28%YR3	$1,746.60
SCHOCKEMOEHL	WORK STUDY	63%YR3	$948.00
ARAPI	WORK STUDY	38%YR1;39%YR2	$986.40
WANG	STUDENT WORKER	36%YR2;6%YR3	$878.40

9(C) Provide the names of **all** persons who worked on this research project, but who *were not* supported with health research funds. Include position titles (Research Assistant, Administrative Assistant, etc.) and percent of effort on project. For multiple year projects, if percent of effort varied from year to year, report in the % of Effort column the effort by year 1, 2, 3, etc. of the project (x% Yr 1; z% Yr 2-3).

Last Name	Position Title	% of Effort on Project
GLANZ	PI	5%

9(D) Provide a list of **all** scientific equipment purchased as part of this research grant, a short description of the value (benefit) derived by the institution from this equipment, and the cost of the equipment.

Type of Scientific Equipment	Value Derived	Cost
None		

10. Co-funding of Research Project during Health Research Grant Award Period. Did this research project receive funding from any other source during the project period when it was supported by the health research grant?

Yes____X_____ No_____

If yes, please indicate the source and amount of other funds:

Dr. Glanz's effort on the project was supported by her Professor Integrates Knowledge professorship. The data collection specialists were University of Pennsylvania work study students employed through the student employment office; 60% of their salary was paid for by the University.

11. Leveraging of Additional Funds

11(A) As a result of the health research funds provided for this research project, were you able to apply for and/or obtain funding from other sources to continue or expand the research?

Yes_____ No_____X_____

If yes, please list the applications submitted (column A), the funding agency (National Institutes of Health—NIH, or other source in column B), the month and year when the application was submitted (column C), and the amount of funds requested (column D). If you have received a notice that the grant will be funded, please indicate the amount of funds to be awarded (column E). If the grant was not funded, insert "not funded" in column E.

Do not include funding from your own institution or from CURE (tobacco settlement funds). Do not include grants submitted prior to the start date of the grant as shown in Question 2. If you list grants submitted within 1-6 months of the start date of this grant, add a statement below the table indicating how the data/results from this project were used to secure that grant.

A. Title of research project on grant application	B. Funding agency (check those that apply)	C. Month and Year Submitted	D. Amount of funds requested:	E. Amount of funds to be awarded:
None	☐NIH ☐ Other federal (specify:_____) ☐ Nonfederal source (specify:_)		$	$

11(B) Are you planning to apply for additional funding in the future to continue or expand the research?

Yes____X_____ No_____

If yes, please describe your plans:

There are plans to apply for future funding to continue the research on the perceived food environment. Previous research has focused on developing a tool to measure the perceived food environment, evaluating the relationship between the observed and the perceived food environment, and exploring the association between the perceived food environment with eating behaviors and weight. Future research would refine and further test the measure and application of the tool. Plans for future research involve collaborating with other research institutions using the NEMS-P tool to predict eating behaviors and weight.

12. Future of Research Project. What are the future plans for this research project?

Future plans for this research project include publishing both method (including survey development and pilot testing) and main research results (for both store and restaurant nutrition environments). Refining and streamlining the measure would be beneficial for future research projects. Plans are also being made to collaborate on projects that would incorporate the NEMS-P tool.

13. New Investigator Training and Development. Did students participate in project supported internships or graduate or post-graduate training for at least one semester or one summer?

Yes____X_____ No_____

If yes, how many students? Please specify in the tables below:

	Undergraduate	Masters	Pre-doc	Post-doc
Male	1			
Female	5	2		
Unknown				
Total	**6**	**2**		

	Undergraduate	Masters	Pre-doc	Post-doc
Hispanic				
Non-Hispanic				
Unknown	6	2		
Total	**6**	**2**		

	Undergraduate	Masters	Pre-doc	Post-doc
White				
Black				
Asian				
Other				
Unknown	6	2		
Total	**6**	**2**		

14. Recruitment of Out-of–State Researchers. Did you bring researchers into Pennsylvania to carry out this research project?

Yes_____ No____X_____

If yes, please list the name and degree of each researcher and his/her previous affiliation:

15. Impact on Research Capacity and Quality. Did the health research project enhance the quality and/or capacity of research at your institution?

Yes____X_____ No_____

If yes, describe how improvements in infrastructure, the addition of new investigators, and other resources have led to more and better research.

Through this research project, we have developed relationships with community organizations that have been beneficial to recruitment efforts for other projects and researchers. Also, this research has helped to establish new relationships with other researchers at University of Pennsylvania.

16. Collaboration, business and community involvement.

16(A) Did the health research funds lead to collaboration with research partners outside of your institution (e.g., entire university, entire hospital system)?

Yes___X_____ No_____

If yes, please describe the collaborations:

During the development of the measure, twelve experienced investigators working in obesity prevention and nutrition were invited to assess the face and content validity of the items. This was an important piece of determining which items to include in the measure.

16(B) Did the research project result in commercial development of any research products?

Yes_____ No_____X_____

If yes, please describe commercial development activities that resulted from the research project:

16(C) Did the research lead to new involvement with the community?

Yes____X_____ No_____

If yes, please describe involvement with community groups that resulted from the research project:

Relationships with community groups were established to assist with recruitment.

17. Progress in Achieving Research Goals, Objectives and Aims.

List the project goals, objectives and specific aims (as contained in the grant agreement). Summarize the progress made in achieving these goals, objectives and aims for the period that the project was funded (i.e., from project start date through end date). Indicate whether or not each goal/objective/aim was achieved; if something was not achieved, note the reasons why. Describe the methods used. If changes were made to the research goals/objectives/aims, methods, design or timeline since the original grant application was submitted, please describe the changes. Provide detailed results of the project. Include evidence of the data that was generated and analyzed, and provide tables, graphs, and figures of the data. List published abstracts, poster presentations and scientific meeting presentations at the end of the summary of progress; peer-reviewed publications should be listed under item 20.

This response should be a DETAILED report of the methods and findings. It is not sufficient to state that the work was completed. Insufficient information may result in an unfavorable performance review, which may jeopardize future funding. If research findings are pending publication you must still include enough detail for the expert peer reviewers to evaluate the progress during the course of the project.

Health research grants funded under the Tobacco Settlement Act will be evaluated via a performance review by an expert panel of researchers and clinicians who will assess project work using this Final Progress Report, all project Annual Reports and the project's strategic plan. After the final performance review of each project is complete, approximately 12-16 months after the end of the grant, this Final Progress Report, as well as the Final Performance Review Report containing the comments of the expert review panel, and the grantee's written response to the Final Performance Review Report, will be posted on the CURE Web site.

There is no limit to the length of your response. Responses must be single-spaced below, no smaller than 12-point type. If you cut and paste text from a publication, be sure symbols print properly, e.g., the Greek symbol for alpha (α) and beta (ß) should not print as boxes (□) and include the appropriate citation(s). DO NOT DELETE THESE INSTRUCTIONS.

Development and Validation of a Tool to Assess Perceived Nutrition Environments - Obesity prevalence has reached pandemic proportions in the United States. The availability and distribution of food within a neighborhood has been related to the food intake and obesity prevalence of people living in that neighborhood. To improve our understanding of the relationship between neighborhood food environment and food intake, we need to know more about how people living in the neighborhood perceive what foods are available to them. To address this gap in the literature, the purpose of the current study is to develop a standardized measure of perceived food environment. Development of such a measure will go toward fulfilling one of the research priorities recently identified by a panel of experts for this area of work.

Research Objective: The study objective is to develop and validate a standardized measure of perceived nutrition environment.

Specific Research Aims:

1) To pilot-test an instrument designed to evaluate perceived nutrition environment in a convenience sample of 16 individuals.
2) To determine the psychometric properties of the instrument developed to measure perceived nutrition environment in a sample of 200 adults: 100 residing in an area of high socioeconomic status and 100 from an area of low socioeconomic status.
3) To explore whether observed nutrition environment and perceived nutrition environment are independent and additive mediators of the relationship between Self-Reported Nutrition Environment and eating behaviors.

Research Design and Methods

*Overview and context.*This research involved five steps: (1) development of a conceptual model and inventory of items, (2) expert review; (3) pilot testing and cognitive interviews of the initial version of the survey; and (4) revising the survey; and (5) administering the revised survey to participants in four neighborhoods, of high and low socioeconomic status, on two occasions to evaluate neighborhood differences and test-retest reliability. Primary data collection for the study took place in four different neighborhoods in the greater Philadelphia area. Each neighborhood was defined to include between 2 and 4 zip codes. Based on census data, two of the neighborhoods for the study were areas of low socioeconomic status and two were of higher socioeconomic status.

*Conceptual model and inventory of items.*The conceptual model for this research is an extension of the Model of Community Nutrition Environments described by Glanz and others in 2005 (Glanz et al., 2005, see figure 1). Similarly to the original Model of Community Nutrition Environments, this model suggests that nutrition environments such as community and consumer environments influence eating behaviors and that these effects are moderated by individual characteristicsincluding sociodemographic factors, health status and other health behaviors, and psychosocial factors. In this model, psychosocial factors are defined as the perceived importance of nutrition, food insecurity, and food motivations (Glanz et al. 1998). The background characteristics can be categorized as health behaviors, socio-demographic variables, self-reported health status, BMI, and dieting history/current status.

Using the conceptual model as a guide, we conducted an extensive search for published questionnaire items in published reports and government sources that could be used to measure concepts related to perceptions of individuals' nutrition environments. The search yielded an inventory of 278 items, which were classified into categories and constructs based on agreement across three study staff.

*Expert review.*The inventory of items was reviewed by twelveexperienced investigators working in obesity prevention and nutrition were invited to assess the face and content validity of the items. Based on their feedback, 117 items were selected to be included in the pilot version of the survey. Duplicate items and near-duplicates were removed, and some items were

modified to improve consistency of wording and response choices.

*Pilot testing and cognitive interviews.*After the pilot version of the survey was created, participants were recruited to complete the survey and a cognitive interview with trained research staff, between July and September 2010. Eligible participants, for pilot testing and for later testing, lived in one of the designated neighborhoods (determined by ZIP code); lived in the neighborhood for at least six months and planned to live there for the next month; were between the ages of 18 and 65; were able to read and speak English fluently; and did some of all of the food shopping for the household. The study design involved quota samples to balance participation across neighborhoods (with a target of 4 per neighborhood and 16 total for the pilot test and cognitive interviews). Study personnel identified community groups in each neighborhood to advise on and assist with participant recruitment. Respondents were recruited through flyers posted in community centers, libraries, train stations, and other high traffic areas. Additional strategies including on-site recruitment visits were used as necessary. Informed consent was obtained for all participants. The Institutional Review Board of the University of Pennsylvania approved the study protocol.

All written surveys and cognitive interviews were completed in-person, at a location that was convenient for the participant. Cognitive interviews (Willis 2005) were conducted in person and audio-taped. Before completing survey items, participants were told by interviewers that they would be asked to "think aloud" about how they answered particular questions. After the participants completed all of the survey items, they were queried about each individual survey item (e.g., how they came up with the answer, whether the items were difficult to answer, etc.). Participants were also asked to define certain words or phrases throughout the survey. For example, participants were asked how they would define "neighborhood" in the context of the statement "It is easy to buy fresh fruits and vegetables in my neighborhood."Specific probes were used to help prompt them to discuss their thought processes in deriving their answers. Each person's participation lasted an average of 62 minutes, 22 minutes to complete the survey (ranging from 9 to 34 minutes) and 40 minutes to complete the cognitive interview (ranging from 25 to 55 minutes). Each participant received a gift card to thank them for their time and participation. Fifteen participants completed the pilot test and cognitive interview because the fourth person in one of the four neighborhoods was unable to attend the data collection session or reschedule it within the month.

Revised survey based on pilot testing and cognitive interviews. Descriptive data from the 15 pilot test surveys were compiled to examine response distributions, in particular the possible lack of variation across respondents. Cognitive interviews were transcribed and comments were entered into a spreadsheet to align comments with items in the draft survey. The responses were reviewed and discussed by the study team and additional research staff with experience in survey development, in order to identify and recommend revisions to the survey.

Most participants thought the survey was easy to read and understand.Participants defined "neighborhood" differently across the four neighborhoods, so a definition of how to think about one's "neighborhood" when answering questions was added to the survey to improve consistency. Several questions referred to the store where one shops most often. Some participants mentioned that the store where they shop most often and the store where they buy

the most food are not necessarily the same. Thus, for greater clarity,the question was reworded to refer to the store *where the respondent buys the most food.* A few response options were added or expanded throughout the survey to ensure that items could capture the actual shopping or eating behavior in question.

Table 1 lists the survey questions in the revised survey, classified by constructs in Figure 1; the response options and ranges, and internal consistency reliability for multiple-item measures (from the larger survey described below), where applicable. The core construct of "perceived nutrition environment"was defined by the community and consumer nutrition environment constructs for stores and restaurants, which constitute most of the survey items. The **community nutrition environment** describes access to stores and restaurants within the neighborhood (Glanz et al. 2005), defined as the area within about a 20-minute walk or 10-15 minute drive from one's home. Survey items include store/restaurant mode of travel, the distance traveled to a store/restaurant from home, and store/restaurant motivation. The importance of store proximity to home and other places where time is spent are aspects of store motivation. The importance of convenience when eating out at a restaurant is included in restaurant motivation.

The **store consumer nutrition environment** includes items on availability and affordability, as well as food promotions, nutrition information, food placement, and food motivation (Glanz et al., 2005). Store availability included six items about the availability and selection of fresh produce and low-fat products (such as low-fat milk and lean meats) in one's neighborhood. All items were asked on a five point scale of strongly disagree to strongly agree. Food motivation includes the importance of selection, quality, and price of foods in one's decision to shop at a particular store and all items were asked on a four point scale of not at all important to very important. Affordability in stores was evaluated by asking "At the store where you buy most of your food, how would you rate the price of fresh fruits and vegetables?" and response choices ranged from very inexpensive to very expensive. Food placement and promotion in stores included items about signs and displays promoting healthy and unhealthy items and the location of food items in the store (i.e. near the cash register, end of the aisle, and eye level on the shelf). All food placement and promotion items were asked on a five point scale, ranging from strongly disagree to strongly agree.

The **restaurant consumer nutrition environment** included items on availability of healthy options at the restaurant, restaurant promotions, and the cost of healthy options. Participants were asked about the availability of healthy options and healthy fruit and vegetable choices when eating at a restaurant. Restaurant promotions included items about signs and displays encouraging both healthy and unhealthy food choices. The item "It costs more to buy the health options," was included in reference to restaurant costs. All items were asked on a five point scale, ranging from strongly disagree to strongly agree.

Administering the Revised Survey: Main Measurement Study. The main measurement study was conducted between November, 2010 and June, 2011. This study involved respondents completing the revised survey twice, with approximately 2-3 weeks between surveys (average of 19.7 days, SD=8.3). 233 participants were recruited to complete both surveys. Half of the participants lived in the two lower socioeconomic status neighborhoods and half living in the higher socioeconomic status neighborhoods. The response rate for the first survey was 94.8%

(n=221), and 97.3% of those who completed a first survey also completing a second survey (n=215).

Participants were invited to either complete the survey in-person at a convenient time and location or to receive the survey in the mail to complete and return. The majority of respondents completed mailed surveys at both time points (survey 1: 85.1%, n=188; survey 2: 94.9%, n=204). All participants received a gift card after completing each survey to thank them for their time and participation.

Measuring the observed nutrition environment. Observational data collection was completed using the Nutrition Environment Measures Survey (NEMS; Glanz et al. 2007). NEMS data provides objective assessments for environmental attributes of both neighborhood food stores (e.g., food availability, food quality and freshness, food price and shelf space, store type, and neighborhood) and restaurants (e.g., food availability, price, and promotion).

From October 2010 through January 2011, stores and restaurants in the designated areas were enumerated, for a total of 762 stores and 769 restaurants. NEMS data was collected on a sample of those stores (n=166) and restaurants (n=121). A portion of the stores and restaurants were rated by two different raters to assess inter-rater reliability.

NEMS *store* (NEMS-S) data collection began in mid-July 2011. Between July 2011 and November 2011, 158 stores were rated - 8 stores were either closed or refused to participate. Eighteen stores were double rated for reliability purposes. All NEMS-S data collection was done electronically, using a PDA version of the survey. After syncing and uploading the data from the PDA, the data were cleaned and prepared for analysis.

NEMS *restaurant* (NEMS-R) data collection began in February 2011. Between February 2011 and July 2011, 105 restaurants were rated - 16 restaurants were either closed or excluded (e.g., the location only sold alcohol). Sixteen restaurants were double rated for reliability purposes. All NEMS-R data collection was done using a paper survey and all surveys were cleaned and entered upon completion.

*Analysis methods.*All data analysis was completed using PASW Statistics 18 (formerly SPSS Statistics). Descriptive statistics and neighborhood comparisons were computed with chi-square and one-way ANOVA tests for all participants completing the first survey (n=221). Similar comparisons were computed for the NEMS-S and NEMS-R data. For all participants who completed the survey at both time points (n=215), test-retest reliability was assessed on key constructs, using interclass coefficients, kappa statistics, and percent agreement as applicable.

Results

Final survey and composite items. The survey included 117 items which were categorized into several constructs based on prior use and the conceptual model for the study (Figure 1): community nutrition environment (8 items); consumer nutrition environment (32 items); psychosocial factors (9 items); background characteristics (25 items) - which can be further defined as health behaviors (5 items) and sociodemographic factors (20 items); home food

environment (22 items); shopping behaviors (11 items); and eating behaviors (10 items).

Composite scores were calculated for key constructs when possible, and Cronbach alpha statistics were used to assess internal consistency and guide the inclusion and exclusion of items. Table 1 shows the Cronbach's alpha values for all composite indexes. Most Cronbach's alpha coefficients were good to very good, in the range from 0.6 to 0.7. However, there was some variability with range from 0.41 (placement/promotion of healthy items and nutrition information) to 0.94 (store availability).

Neighborhood Characteristics. Following the study design, 221 participants from four different neighborhoods of lower SES and higher SES (2 neighborhoods each) completed the survey. Table 2 summarizes the demographic characteristics of the participants, by neighborhood. Participants had an average age of 45.1 years (SD=11.1), with no significant differences in age across neighborhoods. More participants in the higher SES neighborhoods were white, had more formal education, were employed full time, were married or living with a partner, and had an annual household income above $50,000 ($p \leq 0.01$ for all differences).

*Perceptions of the community and consumer nutrition environment.*Table 3 summarizes perceptions of the community and consumer nutrition environment by neighborhood. The store *community nutrition environment* captures perceived store and restaurant access and the importance of having food stores and restaurants close to home. Most respondents answered that it is important for the most-often used store or restaurant to be close by and that it was close.

The store *consumer nutrition environment* construct measured perceptions of availability of healthful food choices, store motivation, prices of fruits and vegetables, placement/promotion of unhealthy items, and the placement/promotion of healthy items and nutrition information. There were significant differences in healthy food availability between neighborhoods, with residents of the higher SES status neighborhoods reporting higher availability scores ($p<0.001$).

The restaurant *consumer nutrition environment* construct measured perceived availability of healthy options, promotion of healthy options and nutrition information, and the costs of buying the healthier option. Respondents in the higher SES neighborhoods reported stronger agreement that healthy options were available options in nearby restaurants ($p=0.005$) and greater disagreement that it costs more to buy the healthy options ($p=0.017$). Participants from the lower SES neighborhoods reported that they observed more promotion of healthy options and more nutrition information in the restaurants ($p<0.001$).

Home Food Environment. Participants were asked about the availability and accessibility of various healthy and unhealthy food items within the home. Participants were asked whether commonly consumed fruits and vegetables were available in the home in the past week. There were significant differences across the neighborhoods in the availability of other healthy and unhealthy food in the home, with the higher SES neighborhood residents having more healthy items ($p=0.001$) and fewer unhealthy items ($p \leq 0.001$) available compared to those in the lower SES neighborhoods.

There were no significant differences across the neighborhoods related to the convenient

accessibility of *unhealthy* food in the home (e.g., foods in refrigerator or on the counter). However, residents of the more affluent neighborhoods reported significantly higher scores related to the accessibility of *healthy* foods in their homes ($p \leq 0.001$).

Observed Nutrition Environment. Table 4 summarizes the NEMS scores for both stores and restaurants by neighborhood. The NEMS-S scores had a potential range of -9-61, with an average score of 17.4 (SD=9.8). The higher SES neighborhoods had significantly higher scores for availability, produce quality, and the total combined score compared to the lower SES neighborhoods. Total NEMS-R scores had a potential range of -5-21, with an average score of 3.0 (SD=3.7). The higher SES neighborhoods had significantly higher NEMS-R scores, as well as higher scores on the availability of healthier options at the restaurant.

Several publications are currently in-progress that both describe the development of the NEMS-P measure as well as the association between the observed and perceived nutrition environments in stores and restaurants. Additional analyses include the relationship between the perceived nutrition environment and diet/weight status as well as predictors of the home food environment (i.e. accessibility and availability of healthy and unhealthy food within the home).

Figure 1. Nutrition Environment Measures Survey – Perceived (NEMS-P): Conceptual Model

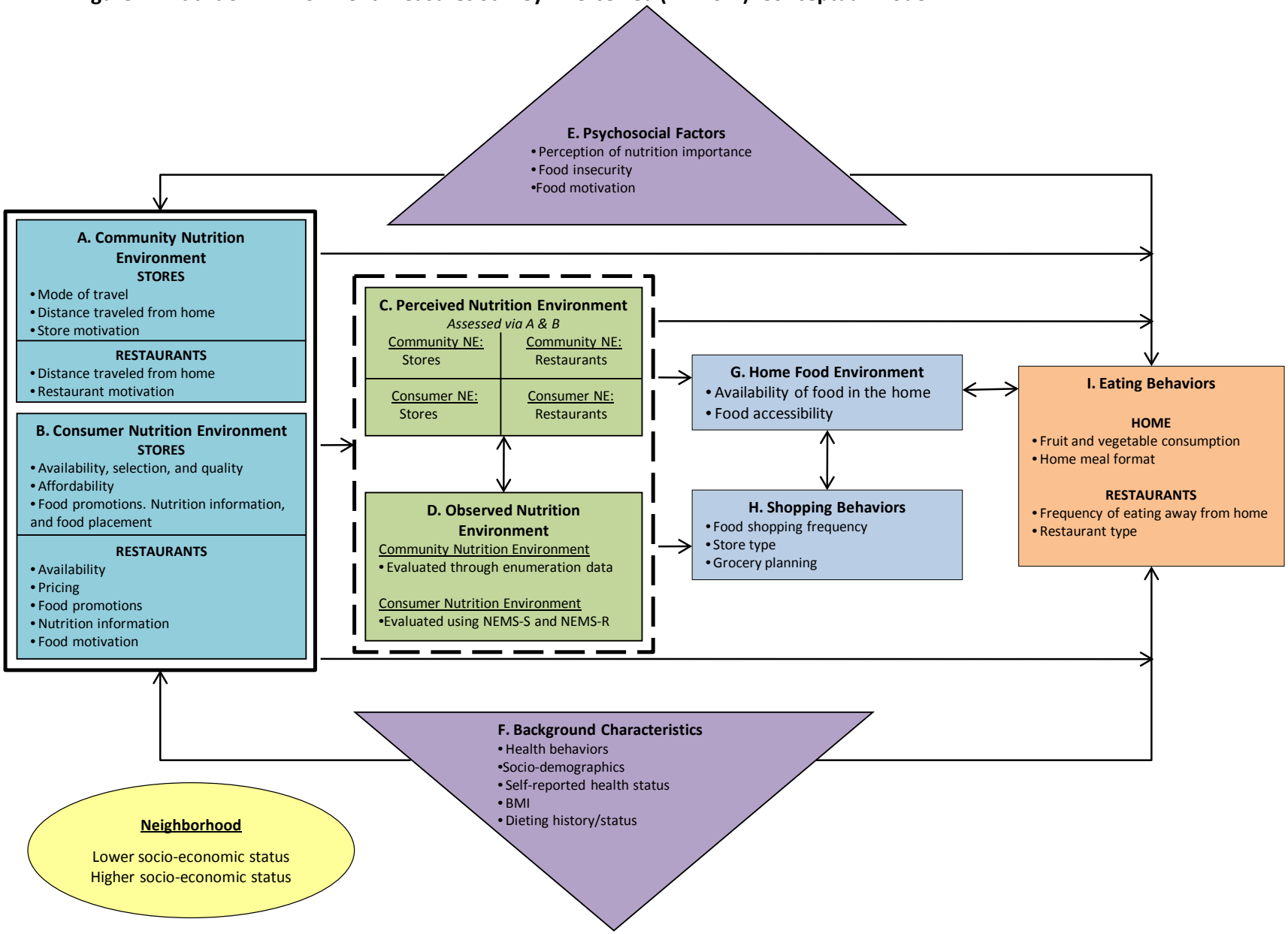

Table 1. Survey items, cronbach alpha values, and possible ranges for composite items

Composite Item	Survey Item(s)	Item Range	No. of Items	Total Possible Range	*α*
Community Nutrition Environment					
Store Access	Thinking about the store where you buy most of your food, how do you usually travel to this store? *[car or other form of transportation]*	1-2	*3*	*1-16*	*NA*
	About how long would it take to get from your home to the store where you buy most of your food, if you walked there?	1-4 [a]			
	How important are each of the following factors in your decision to shop at the store where you buy most of your food? - Near your home - Near or on the way to other places where you spend time	1-4 [b]			
Restaurant access	About how long would it take to get from your home to the fast-food restaurant where you go most often, if you walked there?	1-4 [a]	3	1-12	*NA*
	About how long would it take to get from your home to the sit-down restaurant where you go most often, if you walked there?	1-4 [a]			
	When you eat out at a restaurant or get take-out food, how important to you is convenience?	1-3 [c]			
Store Consumer Nutrition Environment					
Store availability	Please mark whether you agree or disagree with the following statements: - It is easy to buy fresh fruits and vegetables in my neighborhood. - The fresh produce in my neighborhood is of high quality. - There is a large selection of fresh fruits and vegetables in my neighborhood. - It is easy to buy low-fat products, such as low-fat milk or lean meats, in my neighborhood. - The low-fat products in my neighborhood are of high quality. - There is a large selection of low-fat products available in my neighborhood.	1-5 [d]	6	1-5	0.94
Store motivation	How important are each of the following factors in your decision to shop at the store where you buy most of your food? - Selection of foods - Quality of foods - Prices of foods	1-4 [b]	3	1-4	0.67

Placement/ promotion of unhealthy items	Please mark whether you agree or disagree with the following statements for the store where you buy most of your food and you're shopping habits at that store. - I often buy food items that are located near the register. - The unhealthy foods are usually located near the end of the aisles. - I often buy items that are at eye level on the shelves. - There are lots of signs and displays encouraging me to buy the unhealthy foods. - The foods near the cash register are mostly unhealthy choices.	1-5 [d]	5	1-5	0.54
Placement/ promotion of healthy items & nutrition information	Please mark whether you agree or disagree with the following statements for the store where you buy most of your food and you're shopping habits at that store. - I notice signs that encourage me to purchase healthy foods - I see nutrition labels or nutrition information for most packaged food at the stores.	1-5 [d]	2	1-5	0.41
Restaurant Consumer Nutrition Environment					
Availability of healthy options	Please mark whether you agree or disagree with the following statements: - There are many healthy menu options at the restaurant. - It is hard to find a healthy option when eating out at a restaurant. - It is easy to find healthy fruit and vegetable choices at the restaurant.	1-5 [d]	3	1-5	0.63
Restaurant promotes healthy options/ nutrition information	Please mark whether you agree or disagree with the following statements: - The restaurant provides nutrition information (such as calorie content) on a menu board or on the menu. - Signs and displays encourage overeating or choosing unhealthy foods from the menu. - The menu or menu board highlights and promotes the healthy options at the restaurant.	1-5 [d]	3	1-5	0.56
Home Food Environment					
Accessibility of healthy food in the home	In your home, how often do you… - Have fruits and vegetables in the refrigerator? - Have fruit available in a bowl or on the counter?	1-4[e]	2	1-4	0.73
Accessibility of unhealthy food in the home	In your home, how often do you… - Have candy or chips available to eat? - Have ice cream, cake, pastries, or ready-to-eat sweet baked goods (cookies, brownies, etc.)?	1-4[e]	2	1-4	0.76

[a]*Response options: 4=10 min or less; 3=11 to 20 min; 2=21 to 30 min; 1=More than 30 min*
[b]*Response options: 1=not at all important to 4=very important*
[c]*Response options: 1=not at all important to 3=very important*
[d]*Response options: 1=strongly disagree to 5=strongly agree*
[e]*Response options: 1=never or rarely to 4=almost always*

Table 2. Demographic characteristics of participants by neighborhood

	Total *n=221*	Low Socioeconomic Status n=112		High Socioeconomic Status n=109		
		Neighborhood A *n=54*	Neighborhood B *n=58*	Neighborhood C *n=54*	Neighborhood D *n=55*	
	% or mean (sd)	% or mean (sd)	% or mean (sd)	% or mean (sd)	% or mean (sd)	p-value
Age (in years)	45.1 (11.1)	43.1 (11.9)	47.1 (9.7)	43.4 (11.0)	46.7 (11.3)	0.117
Gender						
Female	70.1 (155)	72.2 (39)	51.7 (30)	74.1 (40)	83.6 (146)	0.002*
Male	29.1 (66)	27.8 (15)	48.3 (28)	25.9 (14)	16.4 (9)	
Race						
Black/African American or Other	51.8 (113)	77.8 (42)	100.0 (56)	15.1 (8)	12.7 (7)	≤0.001**
White/Caucasian	48.2 (105)	22.2 (12)	0.0 (0)	84.9 (45)	87.3 (48)	
Education						
≤ High school graduate or GED certificate	25.0 (55)	33.3 (18)	45.6 (26)	13.0 (7)	7.3 (4)	≤0.001**
Some college or technical school	29.1 (64)	44.4 (24)	40.4 (23)	7.4 (4)	23.6 (13)	
College graduate or more	45.9 (101)	22.2 (12)	14.0 (8)	79.6 (43)	69.1 (38)	
Marital Status						
Married or living with a partner	40.9 (90)	29.6 (16)	8.8 (5)	55.6 (30)	70.9 (39)	≤0.001**
Separated/divorced or widowed	20.0 (44)	16.7 (9)	35.1 (20)	18.5 (10)	9.1 (5)	
Never been married	39.1 (86)	53.7 (54)	56.1 (32)	25.9 (14)	20.0 (11)	
Employment Status						
Full-time employment	30.5 (67)	27.8 (15)	15.8 (9)	38.9 (21)	40.0 (22)	0.006*
Part-time employment	27.7 (61)	31.5 (17)	21.1 (12)	25.9 (14)	32.7 (18)	
Unemployed, actively seeking employment	15.9 (35)	14.8 (8)	31.6 (18)	9.3 (5)	7.3 (4)	
Unemployed, not seeking employment	25.9 (57)	25.9 (14)	31.6 (18)	25.9 (14)	20.0 (11)	
Annual Household Income						
< $50,000	62.4 (121)	80.4 (37)	100.0 (50)	44.0 (22)	25.0 (12)	≤0.001**
≥ $50,000	37.6 (73)	19.6 (9)	0.0 (0)	56.0 (28)	75.0 (36)	

* $p \leq .01$ ** $p \leq .001$

Table 3. Perceptions of community and consumer nutrition environment, by neighborhood[+]

	Total Mean (SD)	Neighborhood A Mean (SD)	Neighborhood B Mean (SD)	Neighborhood C Mean (SD)	Neighborhood D Mean (SD)	p-value
Community Nutrition Environment						
Store access	8.9 (3.3)	9.3 (3.6)	8.1 (3.1)	8.8 (3.4)	9.6 (3.3)	0.089
Restaurant access	6.3 (3.1)	6.4 (3.3)	6.5 (2.8)	5.7 (2.8)	6.6 (3.5)	0.470
Store Consumer Nutrition Environment						
Store availability	4.1 (1.1)	3.8 (1.1)	3.6 (1.1)	4.4 (0.8)	4.5 (0.9)	≤0.001**
Store motivation	3.7 (0.4)	3.8 (0.4)	3.6 (0.6)	3.8 (0.4)	3.8 (0.3)	0.123
Price of fruits and vegetables	2.4 (0.1)	2.5 (0.6)	2.6 (0.7)	2.6 (0.6)	2.7 (0.7)	0.343
Placement/promotion of unhealthy items	2.8 (0.7)	2.8 (0.9)	2.8 (0.8)	2.8 (0.7)	2.9 (0.5)	0.899
Placement/promotion of healthy items and nutrition information	3.5 (1.0)	3.3 (1.1)	3.4 (1.1)	3.7 (0.9)	3.7 (0.8)	0.121
Restaurant Consumer Nutrition Environment						
Availability of healthy options	3.2 (0.1)	3.4 (1)	3.1 (0.8)	3.6 (0.9)	3.7 (1)	0.005*
Restaurant promotes healthy options and nutrition information	2.7 (0.2)	2.9 (1.2)	2.9 (1.0)	2.4 (0.9)	2.3 (0.8)	≤0.001**
Costs more to buy healthy option	3.2 (1.4)	3.3 (1.5)	3.7 (1.3)	2.9 (1.3)	2.9 (1.4)	0.017*
Home Food Environment						
Availability of fruits and vegetables in the home	4.1 (1.5)	4.1 (1.4)	3.8 (1.7)	4.3 (1.5)	4.3 (1.4)	0.250
Availability of healthier food in the home	6.5 (2.3)	6.5 (2.1)	5.6 (2.6)	7.1 (2.1)	7 (2.1)	≤0.001**
Availability of unhealthy food in the home	3.9 (1.8)	4.2 (1.8)	5.0 (1.6)	3.2 (1.4)	3.2 (1.8)	≤0.001**
Accessibility of healthy food in the home	3.2 (0.8)	3.1 (0.8)	2.6 (0.8)	3.4 (0.7)	3.7 (0.5)	≤0.001**
Accessibility of unhealthy food in the home	2.6 (0.8)	2.6 (0.8)	2.7 (0.8)	2.6 (0.8)	2.5 (0.9)	0.632

[+]Neighborhoods A and B are lower SES and neighborhoods C and D are higher SES neighborhoods.
* $p \leq .05$ ** $p \leq .001$

Table 4. Observed nutrition environments of stores and restaurants, by neighborhood.

		Total Mean (SD)	Neighborhood A Mean (SD)	Neighborhood B Mean (SD)	Neighborhood C Mean (SD)	Neighborhood D Mean (SD)
NEMS Stores	*Possible Range*	*N=158*	*N=62*	*N=71*	*N=16*	*N=9*
Availability	0-37	13.3 (7.6)	12.8 (6.8)	11.3 (5.7)*	18.3 (10.4)	23.8 (9.3)
Price	-9-18	0.6 (2.1)	0.3 (2.3)	0.7 (1.7)	0.4 (2.6)	1.9 (2.3)
Quality	0-6	4.7 (1.5)	5.0 (1.4)	4.4 (1.5)*	5.0 (1.5)	5.6 (1.1)
Total	-9-61	17.4 (9.8)	16.7 (9.5)	15.4 (7.5)*	21.5 (13.4)	30.7 (10.1)
NEMS Restaurants	*Possible Range*	*N=105*	*N=32*	*N=30*	*N=21*	*N=22*
Overall	-5-21	3.0 (3.7)	2.5 (2.8)	1.6 (3.2)*	4.1 (4.2)	4.7 (4.2)
Kid's Menu	-3-9	2.1 (2.0)	2.1 (1.8)	2.1 (2.6)	2.1 (1.5)	2.1 (2.4)
Total	-8-30	3.8 (4.8)	3.2 (4.0)	2.1 (4.3)*	4.8 (5.1)	5.8 (5.6)

Neighborhoods A and B are lower SES and neighborhoods C and D are higher SES neighborhoods.
*Significantly lower score, $p \leq 0.05$

18. Extent of Clinical Activities Initiated and Completed. Items 18(A) and 18(B) should be completed for all research projects. If the project was restricted to secondary analysis of clinical data or data analysis of clinical research, then responses to 18(A) and 18(B) should be "No."

18(A) Did you initiate a study that involved the testing of treatment, prevention or diagnostic procedures on human subjects?

_____ Yes
___X___No

18(B) Did you complete a study that involved the testing of treatment, prevention or diagnostic procedures on human subjects?

_____ Yes
___X___No

If "Yes" to either 18(A) or 18(B), items 18(C) – (F) must also be completed. (Do NOT complete 18(C-F) if 18(A) and 18(B) are both "No.")

18(C) How many hospital and health care professionals were involved in the research project?

_____Number of hospital and health care professionals involved in the research project

18(D) How many subjects were included in the study compared to targeted goals?

_____Number of subjects originally targeted to be included in the study
_____Number of subjects enrolled in the study

Note: Studies that fall dramatically short on recruitment are encouraged to provide the details of their recruitment efforts in Item 17, Progress in Achieving Research Goals, Objectives and Aims. For example, the number of eligible subjects approached, the number that refused to participate and the reasons for refusal. Without this information it is difficult to discern whether eligibility criteria were too restrictive or the study simply did not appeal to subjects.

18(E) How many subjects were enrolled in the study by gender, ethnicity and race?

Gender:
_____Males
_____Females
_____Unknown

Ethnicity:
_____Latinos or Hispanics
_____Not Latinos or Hispanics
_____Unknown

Race:
_____American Indian or Alaska Native
_____Asian
_____Blacks or African American
_____Native Hawaiian or Other Pacific Islander
_____White
_____ Other, specify:_____
_____Unknown

18(F) Where was the research study conducted? (List the county where the research study was conducted. If the treatment, prevention and diagnostic tests were offered in more than one county, list all of the counties where the research study was conducted.)

19. Human Embryonic Stem Cell Research. Item 19(A) should be completed for all research projects. If the research project involved human embryonic stem cells, items 19(B) and 19(C) must also be completed.

19(A) Did this project involve, in any capacity, human embryonic stem cells?
_____ Yes
___X___ No

19(B) Were these stem cell lines NIH-approved lines that were derived outside of Pennsylvania?
_____ Yes
_____ No

19(C) Please describe how this project involved human embryonic stem cells:

20. Articles Submitted to Peer-Reviewed Publications.

20(A) Identify all publications that resulted from the research performed during the funding period and that have been submitted to peer-reviewed publications. Do not list journal abstracts or presentations at professional meetings; abstract and meeting presentations should be listed at the end of item 17. **Includeonly those publications that acknowledge the Pennsylvania Department of Health as a funding source** (as required in the grant agreement). List the title of the journal article, the authors, the name of the peer-reviewed publication, the month and year when it was submitted, and the status of publication (submitted for publication, accepted for publication or published.). Submit an electronic copy of each publication or paper submitted for publication, listed in the table, in a PDF version 5.0.5 (or greater) format, 1,200 dpi. Filenames for each publication should include the number of the research project, the last name of the PI, the number of the publication and an abbreviated research project title. For example, if you submit two publications for PI Smith for the "Cognition and MRI in Older Adults" research project (Project 1), and two

publications for PI Zhang for the "Lung Cancer" research project (Project 3), the filenames should be:

Project 1 – Smith – Publication 1 – Cognition and MRI
Project 1 – Smith – Publication 2 – Cognition and MRI
Project 3 – Zhang – Publication 1 – Lung Cancer
Project 3 – Zhang – Publication 2 – Lung Cancer

If the publication is not available electronically, provide 5 paper copies of the publication.

Note: The grant agreement requires that recipients acknowledge the Pennsylvania Department of Health funding in all publications. Please ensure that all publications listed acknowledge the Department of Health funding. If a publication does not acknowledge the funding from the Commonwealth, do not list the publication.

Title of Journal Article:	Authors:	Name of Peer-reviewed Publication:	Month and Year Submitted:	Publication Status (check appropriate box below):
1. None				☐Submitted ☐Accepted ☐Published

20(B) Based on this project, are you planning to submit articles to peer-reviewed publications in the future?

Yes_____X____ No_____

If yes, please describe your plans:

Several publications are currently in-progress that both describe the development of the NEMS-P measure as well as the association between the observed and perceived nutrition environments in stores and restaurants. Additional analyses include the relationship between the perceived nutrition environment and diet/weight status as well as predictors of the home food environment (i.e. accessibility and availability of healthy and unhealthy food within the home).

21. Changes in Outcome, Impact and Effectiveness Attributable to the Research Project.

Describe the outcome, impact, and effectiveness of the research project by summarizing its impact on the incidence of disease, death from disease, stage of disease at time of diagnosis, or other relevant measures of outcome, impact or effectiveness of the research project. If there were no changes, insert "None"; do not use "Not applicable." Responses must be single-spaced below, and no smaller than 12-point type. DO NOT DELETE THESE INSTRUCTIONS. There is no limit to the length of your response.

None

22. Major Discoveries, New Drugs, and New Approaches for Prevention Diagnosis and Treatment. Describe major discoveries, new drugs, and new approaches for prevention, diagnosis and treatment that are attributable to the completed research project. If there were no major discoveries, drugs or approaches, insert "None"; do not use "Not applicable." Responses must be single-spaced below, and no smaller than 12-point type. DO NOT DELETE THESE INSTRUCTIONS. There is no limit to the length of your response.

None

23. Inventions, Patents and Commercial Development Opportunities.

23(A) Were any inventions, which may be patentable or otherwise protectable under Title 35 of the United States Code, conceived or first actually reduced to practice in the performance of work under this health research grant? Yes_____ No___X____

If "Yes" to 23(A), complete items a – g below for each invention. (Do NOT complete items a - g if 23(A) is "No.")

a. Title of Invention:

b. Name of Inventor(s):

c. Technical Description of Invention (describe nature, purpose, operation and physical, chemical, biological or electrical characteristics of the invention):

d. Was a patent filed for the invention conceived or first actually reduced to practice in the performance of work under this health research grant?
Yes_____ No___

If yes, indicate date patent was filed:

e. Was a patent issued for the invention conceived or first actually reduced to practice in the performance of work under this health research grant?
Yes_____ No___
If yes, indicate number of patent, title and date issued:
Patent number:
Title of patent:
Date issued:

f. Were any licenses granted for the patent obtained as a result of work performed under this health research grant? Yes_____ No___

If yes, how many licenses were granted?_____

g. Were any commercial development activities taken to develop the invention into a commercial product or service for manufacture or sale? Yes___ No____

If yes, describe the commercial development activities:

23(B) Based on the results of this project, are you planning to file for any licenses or patents, or undertake any commercial development opportunities in the future?

Yes_____ No____X_____

If yes, please describe your plans:

24. **Key Investigator Qualifications.** Briefly describe the education, research interests and experience and professional commitments of the Principal Investigator and all other key investigators. In place of narrative you may insert the NIH biosketch form here; however, please limit each biosketch to 1-2 pages. *For Nonformula grants only – include information for only those key investigators whose biosketches were not included in the original grant application.*

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME	POSITION TITLE
Glanz, Karen	George A. Weiss University Professor
eRA COMMONS USER NAME KGLANZ1	

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
University of Michigan, Ann Arbor, MI	B.A.	1974	Spanish
University of Michigan, Ann Arbor, MI	M.P.H.	1977	Health Beh/Health Ed.
University of Michigan, Ann Arbor, MI	Ph.D	1979	Health Beh/Health Ed.

A. Personal Statement.

I am currently George A. Weiss University Professor, a Penn Integrates Knowledge (PIK) Professor of Epidemiology in the Perelman School of Medicine, Professor of Nursing in the School of Nursing, and Director of the Center for Health Behavior Research at the University of Pennsylvania (since July 2009). Over the past 15 years, I have been Principal Investigator on grants funded for over $25 million. My style is both collaborative and results-oriented. My basic and translational research focuses on theories of health behavior, obesity and the built environment, social and health policy, cancer prevention and control, and new health communication technologies.

B. Positions and Honors.

Positions and Employment

2004-2009 Charles Howard Candler Professor, Department of Behavioral Sciences and Health Education, Rollins School of Public Health (RSPH), Emory University (tenured); and Georgia Cancer Coalition Distinguished Research Scholar. Professor of Epidemiology, RSPH.

2009- George A. Weiss/Penn Integrates Knowledge (PIK) University Professor of Epidemiology and Nursing, University of Pennsylvania Perelman School of Medicine and School of Nursing

Other Experience and Honors (selected)

1997-2000 Member, Behavioral Medicine Study Section, National Institutes of Health (NIH)

2006-2011 Member, Task Force of Community Preventive Services (CDC Director Appointment)

2006 Institute for Scientific Information, Most Highly Cited Researcher (top 0.5% over 20 year period), 1997-2006, Social Sciences-General

2007 Elizabeth Fries Health Education Award, from James and Sarah Fries Foundation

C. Selected relevant peer-reviewed publications (*from a total of more than 370 publications)*

1. McLeroy K, Bibeau D, Steckler A, Glanz K. An ecological perspective on health promotion programs. *Health Education Quarterly, 15*, 4: 351-377, 1988.
2. Glanz K, Mullis RM. Environmental interventions to promote healthy eating: a review of models, programs, and evidence. *Health Education Quarterly*, 15,4:395-415, 1988.

3. Glanz K. Reducing breast cancer risks through changes in diet and alcohol intake: From clinic to community. *Annals of Behavioral Medicine,* 16(4):334-346, 1994.
4. Glanz K, Maskarinec G, Carlin L. Ethnicity, Sense of Coherence, and Tobacco Use Among Adolescents. *Annals of Behavioral Medicine,* 29 (3): 192-199, 2005.
5. Maddock JE, Glanz K. The relationship of proximal normative beliefs and global subjective norms to college students' alcohol consumption. *Addictive Behaviors,* 2005, 30(2): 315-323.
6. Glanz K, Sutton NM, Arriola KRJ. Operation Storefront Hawaii: Tobacco Advertising and Promotion in Hawaii Stores. *Journal of Health Communication,* 11: 699-707, 2006.
7. Glanz K, Murphy S, Moylan J, Evensen D, Curb JD. Improving dietary self-monitoring and adherence with hand-held computers: A pilot study. *American Journal of Health Promotion*, 20(3): 165-170, 2006.
8. Glanz K, Jarrette AD, Wilson EA, O'Riordan DL, Arriola KR. Reducing minors' access to tobacco: eight years' experience in Hawaii. *Preventive Medicine*, 44: 55-58, 2007.
9. Glanz K, Mau M, Steffen A, Maskarinec G, Arriola KR. Tobacco use among Native Hawaiian middle School students: Its prevalence, correlates and implications. *Ethnicity and Health,* 12 (3): 1-18, 2007.
10. Story M, Kaphingst K, Robinson-O'Brien R, Glanz K. Creating healthy food and eating environments: Policy and environmental approaches. *Annual Review of Public Health,* 2008; 29: 253-272.
11. Glanz K, Bishop D. The role of behavioral science theory in development and implementation of public health interventions. *Annu Rev Public Health* 31: 399-418, 2010.
12. Hermstad AK, Swan DW, Kegler MC, Barnette JK, Glanz K. Individual and environmental correlates of dietary fat intake in rural communities: A structural equation model analysis. *Social Science and Medicine*, 71: 93-101, 2010.
13. Honeycutt S, Davis E, Clawson M, Glanz K. Training and Dissemination of the Nutrition Environment Measures Surveys (NEMS). *Preventing Chronic Disease,* 2010; 7(6).
14. Mumford KG, Contant CK, Weissman J, Wolf J, Glanz. Changes in physical activity and travel behaviors in residents of a mixed-use development. *Amer J Prev Med*, 2011; 41: 504-507.
15. Zook JB, Lu Y, Glanz K, Zimring C. Design and pedestrianism in a smart growth development. *Environment and Behavior*, 2012; 44: 216-234.